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Technosocial disruption, enactivism, & social media: On the overlooked risks of teenage cancel culture

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ABSTRACT

In a world undergoing rapid, large-scale technological change, the phenomenon of *technosocial disruption* is receiving increasing scholarly and societal attention. While the phenomenon is most actively delineated in philosophy of technology, it is also receiving growing attention within a different area of philosophy, namely the so-called "4E Cognition" approach to philosophy of mind. Despite this shared interest in technosocial disruption, there is relatively little exchange between the theorizing going on in these two different areas of philosophy. One of our paper's two main aims is programmatic: to motivate the fruitfulness of such an exchange. We do this by turning to a specific case of technosocial disruption, namely *Teenage Cancel Culture* [TCC]. TCC cannot be disentangled from the introduction of social media platforms [SMPs] into modern day social life. Hence, we will speak of *SMP-Afforded TCC*. SPM-afforded TCC is a phenomenon fretted over by societal actors but strikingly ignored in academic research. In our effort to narrow this knowledge gap, we analyze SMP-afforded TCC from a perspective of technosocial disruption enriched by insights from 4E-Cognition. This brings out a specific worry about the role of SMPs in the social lives of teenagers. We argue that SMP-afforded TCC disrupts the social relational domains within which teenagers develop, maintain, and express their precarious social identities, by creating social affordances that are hostile to healthy *risky interpersonal identity-exploration*. As such, SMP-afforded TCC not only cancels particular individuals for particular acts; it may also pre-emptively cancel a certain way of being a social self, namely a healthy social risk-taker. We conclude the paper by proposing several potential routes for mitigating the perniciously disruptive effects of SMP-afforded TCC and identifying future areas for research.

1. Introduction

In a world undergoing rapid, incessant, large-scale technological change, the phenomenon of *technosocial disruption* is receiving increasing scholarly and societal attention. Technosocial disruption refers to the idea that emerging technologies, such as social media platforms, gene-editing technologies, large language models, and social robots, can bring about profound transformations in human capacities, practices, values, social relations, and concepts. When these transformations come about in a sudden and disorderly manner, bringing about socioethical changes, risks, and uncertainties that are challenging to anticipate, reverse, and adapt to, they can be categorized as socio-technical changes of the *disruptive* sort. Unlike sociotechnical analyses that capture people's intentional agential usage of technology, analyses of technosocial disruption foreground how technologies can transform our lives in a more invasive and pre-reflective manner, working behind the backs of (or even against) our explicit agential intentions [1].

Currently, the notion of technosocial disruption is actively developed within the field of philosophy of technology, with Jeroen Hopster [1] offering the first robust conceptual analysis of technosocial disruption as a distinctive form of technosocial change in *Technology in Society* (See also [2–4]). Alongside these developments in philosophy of technology, the phenomenon of technosocial disruption is also receiving growing attention within a different area of philosophy, namely the so-called *4E Cognition* approach to philosophy of mind. A key notion in 4E research is that of *affordances,* which refers to the *perceivable possibilities for action* that environments offer to living organisms "either for good or for ill" (Gibson 1979, p.129; see also Rietveld & Kiverstein 2014). In the human environment, many affordances are shaped by technology. A growing number of 4E researchers are unpacking how (emerging) technologies are introducing affordances that contribute to modes of seeing and acting within our environment that are insipiently hostile to our

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flourishing [5,6]. Although the concept of technosocial disruption, as developed in philosophy of technology, is not used explicitly in this 4E context, there is thus an interest in something that is highly akin to technosocial disruption.

Despite this shared interest, there is little exchange between these developments in philosophy of technology and 4E Cognition. One of our two main aims here is programmatic, namely, to establish the fruitfulness of such an exchange. Motivating this is the following: while Hopster offers a precise conceptual analysis of the distinctiveness of technosocial *disruption*, he has notably little to say about *that* which technosocial disruption is disruptive *of:* i.e. *the social*. However, such an account is needed on methodological grounds. In order to uncover the potentially disruptive socioethical effects of newly emerging technologies, we need to engage not only with the obviously visible, empirically established ways in which a technology is impacting upon our lives and our ability to flourish. We also need to venture into the space of anticipation and imagination and retrieve the more inchoate pre-reflective ways in which technosocial disruption can be at work. To meaningfully ground such an endeavor, what is needed over and above a set of formal criteria of sociotechnical disruption and the relevant empirical facts are robust accounts of human nature and sociality. Such accounts orient our thinking with respect to a given instance of technosocial disruption, enabling us to anticipate which dimensions of human nature and sociality might be affected; who might be harmed (disproportionately); and how we might be able to mitigate such harms. In this paper, we focus on how one particular inflection of 4E cognition, namely *enactivism* ([7,8]; [9], is well-suited to orient such questions when it comes to analyzing one particular case of technosocial disruption.

This gets us to our paper's second objective: we aim to use an enactive approach to technosocial disruption to evaluate the phenomenon of *Teenage Cancel Culture* [TCC hereafter]. Cancel culture (CC) refers to *the practice of condemning (a) socially transgressive act(s) committed by a person, institution, or company by withholding all forms of recognition, interaction, and attention from them*. While initially directed at powerful individuals and institutions, CC has been spilling over into the lives of teenagers [10]. As we will argue, (T)CC is deeply entangled with the *social affordances* introduced by social media platforms [SMPs], whereby social affordances we mean perceivable possibilities for social expression and interacting. Hence, from here on, we speak of *SMP-afforded TCC*. While teenagers, educators, and parents across the globe are grappling with SMP-afforded TCC, academics have paid little to no attention to it (see next section). As a step towards closing this knowledge gap, we analyze SMP-afforded TCC from our enactive approach to technosocial disruption. This approach enables us to articulate a specific socioethical worry about the role of SMPs in the social lives of teenagers. We argue that SMP-afforded TCC may disrupt conditions necessary for teenagers to engage in what we call *risky interpersonal identity-exploration*. Risky interpersonal identity-exploration refers to the notion that teenagers develop their social sense of self through exploratory interpersonal interactions; trying out different viewpoints, commitments, jokes, expressive gestures and the like, and seeing and adapting to how their peers respond in return. Because these identity-explorations emerge in relational contexts over which we lack full agential control and because our identity explorations can be taken up by others in unforeseen ways, social transgressions and breakdowns in social interaction are baked into processes of identity-exploration navigated through interpersonal interaction. This makes social environments marked by possibilities for interpersonal repair vital for the development and maintaining of a healthy social identity, or so we argue on enactive grounds.

We articulate the worry that these environments are disrupted by SMP-afforded TCC. As such, SMP-afforded TCC cancels not only particular teens for particular acts deemed socially transgressive; it also threatens to preemptively cancel a certain way of being a teenage social self, namely a healthy social risk-taker. To be clear, our argument does not deny that teenagers can (and do) actively use SMPs (and possibly even SMP-afforded acts of TCC) to further their identity-exploring goals and activities. We *do* deny, however, that such an agency-oriented take on SMPs and teenage identity-exploration can adequately bring out the disruptive character and stakes of SMP-afforded TCC. Having argued for our stance, we conclude by proposing several potential routes for mitigating the perniciously disruptive effects of SMP-afforded TCC. First, however, let us begin by further detailing our research objectives, the research gap we aim to address, and the steps we will take towards bridging this gap.

2. Research objectives, gaps, and steps

As stated in the introduction, the research objective of our paper is twofold: Firstly, we aim to articulate the fruitfulness of infusing analyses of technosocial disruption with an enactive 4E-account of human nature and sociality. This, in turn, serves our paper's second objective: to identify socioethical concerns about the phenomenon of SMP-afforded TCC. Our concern with SMPs' effects on teenagers' lives is not new. As teens are spending a majority of their time on social media,[1] there is a growing body of research on a wide range of detrimental psychological effects of SMPs on the lives of teenagers.[2] Within this research, attention is also being paid to how SPMs shape teenage interpersonal identity-exploration (Cf. Wallace 2016 [11,12]; Vogels et al., 2022). Strikingly, though, TCC and the link between SMPs and TCC is not touched upon in this body of research, leaving unaddressed the stakes–both for individual teens and for human sociality as such–of creating a social environment in which a pervasive form of ostracization by one's peers is an ever-present possibility. While SMP-afforded TCC is a topic of concern to societal actors (teenagers, parents, and educational institutions[3]), a comprehensive literature search conducted while writing this paper uncovered no robust research on teenage cancel culture (nor on related practices such as "online shaming" and "dragging) and its effects on identity exploration, nor on the role played by the social affordances of social media platforms.[4] We also found no research analyzing social

[1] Cf [57].

[2] Psychologists, such as Jonathan Haidt, are increasingly voicing concern about a variety of ways in which SMPs impact upon the development of teenagers (Cf. https://jonathanhaidt.com/social-media/). Troubling links have been exposed between SMP-usage and loneliness [58], sleep deprivation [59] and depression, and body-image [60,61,69]. Recently, in a time span of one week, two major newspapers in the US (the NY Times and the Washington post) posted articles on the link between SMPs and a rapid increase in teenage depression and suicide (https://www.nytimes.com/2023/02/24/opinion/social-media-and-teen-depression.html?referringSource=articleShare) and the disturbing ways in which Instagram's algorithms have a damaging effect on teenage girls' self-image by curating their recommended content and explore tab around issues of weight-loss and impossible beauty standards (https://www.washingtonpost.com/technology/2021/10/21/teens-instagram-feed-mental-health/). Lawmakers are also increasingly taking action. As we were writing this paper, New York City officially declared social media a public health hazard. Similarly, high school students in the Netherlands are no longer allowed to have access to mobile phones, tablets or smart watches during class hours since January 1st, 2024; this in direct response to a growing worry that SMP-usage distracts teenagers and negatively impacts social interaction.

[3] Cf Weil 2022; https://www.newportinstitute.com/resources/mental-health/cancel-culture-psychology/; https://www.nytimes.com/2020/11/19/learning/what-students-are-saying-about-cancel-culture-friendly-celebrity-battles-and-finding-escape.html.

[4] The literature review was done on the Scopus database, with 13 queries using a combination of the following terms: cancel culture OR dragging OR online shaming, teenage OR adolescence, socio-technical disruption, social media OR social networks. The search generated a total 294 papers and books. After reading the abstract we found that 30 of these were relevant to our paper's topic. While many of these papers informed our article, none of the them explicitly addressed the societal effects of teenage cancel culture and the role played by SMPs. There was *some* literature on the experience of cancellation and the call-out culture on SMPs, but this research focused solely on adults. Notably, this research has mainly emerged in the last year or two. This arguably indicates an emerging trend among researchers to attend to the phenomenon of cancel culture.

media platforms and their effects on teenagers from the perspective of technosocial disruption. Our paper aspires to take a significant step towards closing these knowledge gaps.

We begin, in section 3, by introducing our enactive approach to social cognition and development. This approach sheds light on the social significance of risk-taking and breakdown in interpersonal interaction and the vital need for these to be couched in inter-personal experiences of repair. On this basis, we then begin our enactive-informed analysis of SMP-afforded TCC. This discussion is divided into four sub-sections: (4.1) a subsection on Cancel Culture generally; (4.2) a sketch of SMPs as introducing distinctive social affordances; shaping how we attend to others, how we flag and maintain group membership, how socially risky behavior is responded to, and how we can become hyper visible to others in an unprecedented way; (4.3) a sketch of adolescence as a stage in human social development marked by risky interpersonal identity-exploration, which is increasingly moving online; and (4.4) a sketch of the lived experiences of teenagers who either have been cancelled or who worry about the phenomenon. In section 5, we circle back to Hopster's notion of sociotechnical disruption, and we use additional 4E insights to defend the importance of understanding SMP-afforded TCC as a paradigmatic case of pernicious socio-technical disruption, undermining a vital relational condition needed for social flourishing. We conclude (6) by proposing several potential routes for mitigating the perniciously disruptive effects of SMP-afforded TCC and by touching on further areas for research.

A final note before we start. We note that the term CC is a contested one, the perception of which varies along cultural and political commitments ([13]; [14]). Further adding to CC's etymological complexity is its intimate link to other concepts and phenomena such as "dragging" (Inya 2023), "calling out" (Vogels et al., 2021), "online shaming" (Murumaa-Mengel & Lott 2023), and "networked harassment" [15], all of which refer to socially punitive practices unfolding largely online. Our aim here is not to analyze distinctions and overlap within this family resemblance of phenomena. Rather, while we take our analysis to have prima facie bearing on this cluster of phenomena, we focus specifically on SMP-afforded TCC. Our reason for doing so is that TCC is singled out by teenagers, parents and educational institutions, whose concerns we aim to speak to directly.

3. Enactive social sense-making: the inevitability and significance of social risk-taking and the need for repair

As announced, we will argue that SMP-afforded TCC is capable of profoundly disrupting teenagers' developing sense of social self by eroding the relational social domains that are conducive to healthy social identity development. To substantiate this claim, we build upon 4E enactive insights. With this, we also aim to offer a more substantive account of sociotechnical disruption. As indicated in the introduction, such an account is merely hinted at by Hopster. While he touches on "deep" forms of technosocial disruption that "transform fundamental modes of human sensemaking and being-in-the-world" (2021), he primarily offers formal criteria by means of which we can analyze potential cases of technosocial disruption; criteria such as the "depth," the "the pace," the "range," and the "valence" of a technology's impacts (2021). These formal criteria leave analyses of technosocial disruption underdetermined. Admittedly, Hopster himself cautions that he has "merely [provided] conceptual groundwork," adding that "the philosophical and ethical meat on the bones must come from case-studies of technosocial disruption" (2021). However, case studies (though necessary) won't suffice. Also needed is a robust account of the phenomena we take to be disrupted in such case studies. After all, the way in which we understand those phenomena will affect how we evaluate the "depth," "range" and "valence" of a given case of disruption. For instance, an account of human nature that highlights, say, an innate capacity for rational autonomous decision-making will inform analyses of SMP-afforded TCC in a rather different manner than analyses grounded in an account of human nature highlighting the relationally negotiated character of our social identity and our dependence on interpersonal repair. An account of the latter sort is supported by state-of-the-art developments in the field of enactive embodied cognitive science. We now turn to these enactive insights.

Enactivism builds upon insights from biology, dynamic systems theory, developmental and ecological psychology, and phenomenology, to offer an account of cognition that is anchored in the ontological nature of living organisms [7,16]. Living organisms are embedded in an environment of affordances, i.e. perceivable possibilities for action. For instance, water can be perceived as "affording-a-drink " or a cave as "affording-to-be-sheltered-in." The perception of an affordance can directly, and often habitually, motivate a living being's response to its environment (e.g. to take a sip of water or enter a cave). What situates living beings in an environment of affordances is their self-constituting nature: a living being is continually in the business of constituting and maintaining its precarious identity as a bounded bodily self via ongoing dynamic adaptive exchanges with its environment. This ongoing project of self-constitution enacts different features of the perceptual environment as affording relevant possibilities for action. For enactivists, this meaningful adaptive responsiveness to one's environment is the mark of cognition, also referred to as *sense-making* [7].

Remaining viable as a *human* self is to an important degree a social endeavor. Put in enactive terms, human sense-making is *participatory* [8]. From early infancy onward, we are attuned to the expressive bodies of others, whose sense-making affords us with engagement. Through these engagement, we develop a sense of ourselves and others and the different possibilities for action we can afford one another (Cf Reddy 2008; [17]). This relationally enacted shaping of our sense of self and other extends into our adult lives and is never complete. There is always more of the other that we come to see in participatory sense-making, and we ourselves are also "constantly being re-shaped as an entity in relation … gradually building up awareness of … [ourselves and others] in these relations" ([18] pp. 148-9).

Whether we are conversing, dancing, singing, or arguing with one another, the shared meanings enacted through participatory sense-making are not neatly attributable to the intentions, affects and expressions of each discrete individual agent but emerge and transform through shared interaction processes:

> "In interactive situations, participants do not just bring their ready-made significances to bear on the interaction; significances are implicit in the situation of the encounter …. There will also be myriad shared, complicit, disputed, resolved, dissolved, rebutted, etc., significances which emerge in a constantly shifting, more or less shadowy way, in any interactional situation" [9].

This lack of full agential control over how an interaction will unfold and the emergence of constantly shifting significances means that participatory sense-making "demands frequent readjustment of my individual sense-making… I must alter my actions contextually in order to reencounter the other and in the process, sometimes, be encountered myself when her sense-making unexpectedly modulates my own" ([8], p. 504).

Our ability to be adaptively responsive to the other as a sense-making being across a range of different contexts, is in part enabled by the wider material-technological contexts in which participatory sense-making unfolds [19]. Many of our interactions are organized around use-objects and technologies, whose affordances we cope with in accordance with shared norms and practices (Rietveld & Kiverstein 2014). When we are initiated into the social world as young children, we not only learn what "we" do with other people ("a visitor affords greeting," "a sad friend affords comforting"), but also how we

appropriately cope with the artefacts that surround us ("utensils afford holding," "soccer balls afford kicking," "SMPs afford sharing personal content"). The normativity of technological affordances quietly plays an important role in our social lives. By showing that we know our way around the objects that surround us, we flag community membership. It also makes the meaning our embodied expressions and actions easily perceptible to others, as shared circumscribed contexts enable us to see nuance in what would otherwise be a decontextualized expressive act (when a student raises their hand in the context of a class room I see they have a question that affords me to listen; when you raise your hand when you stand on your doorstep, I see you are trying to greet me, affording me to greet in return) [20].

Crucially, though, while our embeddedness in shared material affordance contexts often facilitates smooth habitual social interaction and cognition, participatory sense-making is inevitably marked by moments of *breakdown* (Cf. Varela 1991). This may sound unfortunate, but it isn't so. Moments of breakdown, in which expected interaction patterns break down and reorientation towards the other is needed, can play a vital enriching role in our sense-making lives as social beings. Enactive developmental psychologist Vasu Reddy has shown, for instance, that moments of breakdown in the affectively charged embodied interactions between infants and caretakers often lead to exciting new games and new forms of sense-making. In fact, through playful teasing, infants *actively risk* breakdown in social interactions. This is because, Reddy argues, the socially risky "unscripted quality" of our interactions with others prevents them from becoming predictable and boring, enabling us to discover new ways of being and being-with another: "it is precisely this that keeps us alive in our engagement … with the … social world" ([18], pp. 82-3). Similarly, Hanne De Jaegher and Ezequil di Paolo (2007) observe that opening oneself up to the risk of interactional breakdown can afford interactors with new ways of re-establishing connection, enabling more resilient social dyads and individual social agents who are "better able to remain in" or "reinitiate" social interaction ([8], 496 & 479). Of course, it will depend upon a variety of factors whether new enriching forms of participatory sense-making are possible or even desirable after an instance (or history) of breakdown. Sometimes interactions and relationships are beyond repair. Our point, however, is that social breakdown is not an inherently negative phenomenon but, in fact, plays an inevitable and often positive role in social interaction, with humans seeking out, from infancy onward, interactions that move beyond the predictable into the risky and unpredictable.

Crucially, though, whether breakdown can play such a positive role and whether socially risky unpredictable interactions are sought out depends on how they are responded to. We can typically only tolerate the riskiness characteristic of participatory sense-making when cushioned in the reliable presence of repair and reconciliation As Reddy warns in the context of infant development: "When infants chronically experience prolonged mis-co-ordinated interactions *without the experience of repair*, they seem to regularly withdraw from the other person" or "arm" themselves with reliable "patterns of feeling and doing" which "at least have the advantage of being familiar and coherent" ([18], pp.76-7& 81). This can be framed in the language of pathology and health, following a definition from George Canguilhem. For Canguilhem, "Health … is not simply a matter of establishing harmony with the vital and habitual "norms of life" …. and "tolerating [their] infractions". It is also a matter of being able to "institut[e] new norms in new situations." Following this definition, Canguilhem proposes that health requires a "set of securities and assurances" with "the double sense of insurance against risk and [the] *audacity to run this risk*" ([21], 198, our italics). To put it in the context of our case study, to which we now turn: teenagers' health qua social beings requires the audacity to run social risk, which is under threat because its insurance against it, i.e. communities and interactions characterized by the availability of repair, is disrupted through SMP-afforded TCC.

4. SMP-afforded teenage cancel culture

4.1. Cancel culture: a brief discussion of its meaning

While technosocial disruption is marked by a sudden disorienting and often unanticipated change in our practices, values, concepts, or capacities, this change does not need to be wholly new in order for it to count as disruptive. In Hopster's words: "New technologies get entangled with sociohistorical trends and recombine with other emerging technologies, mutually transforming each other in the ensuing process" (2021, 7). This is an apt way of looking at SMP-afforded TCC. In a sense, Cancel Culture, understood as a punitive practice of ostracization, has been around for as long as there have been human communities, with ostracization functioning as a mechanism for delineating, building, or reaffirming social communities. It is a distinctive feature of (high) modern Western societies that traditional practices of ostracization were replaced by (or sublated into) the rule of law, with modern legal systems legislating whose transgressive acts demand temporary or permanent social ostracization [22].[5] In recent years, though, ostracization, in the form of CC, has come back with a vengeance in Western societies, with SMPs facilitating or even enabling the emergence of online communities united around a sense of shared moral outrage over transgressed social norms (Cf. [15]; Blessing Ramsey-Soroghaye et al., 2023; [23]). While initially a Western phenomenon, SMP-afforded CC has been spreading globally ([14,24,25]; Inya 2023; Ramsey-Soroghaye.; Onalu; Anyaegbu 2023 [26];

CC began taking the world by storm with Alyssa Milano's #MeToo tweet, which mobilized a movement that has aimed to hold to account those whose acts of sexual misconduct escaped legal punitive consequences (Gruber 2023). Modern day CC can thus arguably be seen as an important technology-enabled mechanism for rectifying problematic power relations, punishing pernicious behaviors and viewpoints such as racism, sexism, ableism, and homophobia [15,27]. Perhaps this shows that cancellation is best understood as a tool that agents can use for punitive but also redistributive justice purposes (Cf Janssens & Spreeuwenberg 2022). Meredith D. Clark seems to concur. She traces online cancellation, understood as a "digital discursive accountability praxis," to "Black oral tradition" and efforts to enact "counterpublics" in the face of a public realm marked by discriminatory practices (2020). Brady & Crockett [28], by contrast, offer a less optimistic take on the socially redistributive potential of cancellation. Their research shows that online moral outrage, which goes hand-in-hand with SMP-afforded CC, disproportionately targets and silences marginalized individuals and groups (2019; see also [15,29]). In line with such concerns, Aya Gruber (2023) offers a nuanced critique of how cancellation, as utilized in the mainstream (predominantly white) #MeToo movement, aligns with a carceral and racially fraught punitive U.S. legal system that prioritizes ostracization over restoration.[6]

Such findings problematize the framing of cancellation as an emancipatory tool that can be used to redistribute problematic power dynamics and serve marginalized individuals and communities. Our aim, though, is not to deny that CC can be used in this way. We will, however,

[5] As Gruter & Masters [22] point out, a key difference between communities vs. laws legislating who gets ostracized is that in the latter case, individuals typically have clear routes for recourse (e.g. through the notion of legal appeal). One could argue that it is for this reason that the resurgence of cancel culture with a vengeance in Western society is experienced as emphatically disruptive of our practices of holding people to account, even though geographically speaking Cancel Culture is by no means a phenomenon exclusive to Western cultures.

[6] Gruber simultaneously shows how this mainstream (white) #MeToo movement sidelined an alternative "intersectional and restorative Me Too movement that could have been" (1675). This alternative movement emerged with Tarana Burke, a Black woman and youth counselor who in fact had already founded the "'me too' Movement" in 2006.

critique the narrow framing of SMP-afforded (T)CC as a tool or resource actively used by users to further their explicit aims and intentions in section 5. Instead, we argue for the need to also analyze SMP-afforded (T)CC through the lens of sociotechnical disruption. As we discussed in the introduction, such an analysis does not deny that technologies can be used as tools by agents to further their agential goals and aspirations but it does emphasize the need to also consider the ways in which technologies can transform our lives in a more invasive and pre-reflective manner, working behind the backs of (or even against) our explicit intentions and agency.

Having offered a general sketch of CC as a phenomenon, we will now zoom in on the primary medium through which CC is enacted, namely SMPs, which have introduced distinctive social affordances that are shaping how we perceive and interact with other people.

4.2. How social media platforms afford distinctive forms of social cognition and interaction: some key features and functions

SMPs are "digital internet technologies that facilitate communication and collaboration by users" [30], allowing them to upload personal content and react to other people's content in a visible way [31]. By encouraging users to connect to others through the sharing of user-generated content, SMPs are emphatically directed at the self as a social being, introducing a "new territory for human interaction" that is shaping our ways of perceiving, responding, and relating to ourselves and others as socially expressive and connected beings (Wallace 2016). By design, SMPs encourage specific ways of attending to other people, namely as affording to-be-liked, shared, scrolled-past, commented-upon and judged [32]. What enables this passive 'share-and-judge-like' way of attending to and interacting with others are (dis)like bottons, share-buttons, and comment sections as well as the *newsfeed*, which is a stream of posts showing what our connections signal as relevant in the form of uploaded content, likes, and shares.

Supporting the business model of SMPs, newsfeeds facilitate engagement with a profoundly widened social circle, situating the online social self in an inchoate ever-present audience [33].5 Every time we post or share something on a social platform, we establish a relationship (however tenuous and abstract) with the many weak ties who are nudged to evaluate us (like us, endorse us, scroll past us, comment on us) based on what we gesture online. This creates the conditions for individuals to internalize an anonymous communal gaze, self-monitoring and curating how they express themselves and are visible to others [32]. Indeed, Setty [34] observes that, among teenagers, "there are pressures … to monitor and compare self-presentations, and to pursue validation through self-expression while maintaining 'authenticity" (3). What complicates this task of constant self-monitored authentic self-presentation is the fact that SMPs suffer from what danah boyd calls *context collapse (2008*), which represents the phenomenon of "flatten[ing] multiple audiences into one" (Marwick and boyd, 2011, p. 123) Offline interactions and participatory sense-making are contextually circumscribed (we engage with family at home; with our colleagues or peers at work and school; with our team-mates at the local football club). As we saw in section 3, these contextualized settings and their context-specific social and material affordances enable fine-grained perceptions of what a situation affords. SMPs erase this fine-grained contextuality and ask us to express ourselves – through an image or a brief post – to a wide variety of people and communities within our SMP circle. As Setty [34] observes in interviews with teenagers, this "creates risks regarding unintended use, misuse, or misinterpretation, with consequences for coherent identity performance and impression management" ([34], 3). When these risks for social misinterpretation and misuse occur, they are exacerbated by the fact that the communal gaze is one that never forgets a remark and that is part of a collective social media memory that can strike us at any time with recollections from the past, as all our utterances online afford being captured and shared ([35], p. 102). It has been shown that young people (under 30) are especially concerned with the possibility that something they say online now may come back to haunt them decades later ([36], p. 969).

The pervasive presence of cameras and SMP apps on phones and tables connects every seemingly private off-line moment to online SMP environments.[7] Once shared online, a social faux-pas or transgression made privately, in a specific context, becomes visible to a potentially ever-widening audience. This, in turn, loops back into various off-line contexts (family; school; the sports club), after members of those contexts witnessed (and possibly shared) the transgression online. With a readily available camera in many people's pockets and SMPs affording us to share snippets of our lives with our ever-widening online social circles, the lives of others and of ourselves are increasingly perceived as affording capturability and shareability. With that, the complex and multifaceted nature of who we are as social selves, almost quantum-like in its flux and by nature continually reshaped through participatory sense-making, gets collapsed into one reference point: one image or remark stored in the digital realm.[8] Echoing this concern, Malvini Redden & Way note that our "networked identities" not only miss "the full, nuanced, complicated, and crystallized presentation of identities across platforms," but they also inadvertently hide "what others are *not* doing online … Users make meaning of all the information others post to social media and are crafting specific impressions of people, but they are not (by nature of the platforms) engaging in microdiscursive meaning making of what people keep offline" [37] p.501). SMPs thus disrupt the thickness of a person's identity, accessed through participatory sense-making, and affords the reification of a person by design ([38,39, 40]).[9]

A reified other will more readily afford the scepter of condemnation and moral outrage, "a powerful emotion that motivates people to shame and punish wrongdoers" ([41], p. 769). Setty [34] confirms that teens are cognizant of the risks related to reified perceptions of the other, with SMPs creating a kind of moral distance between self and other: "Some felt peers think they can 'get away with' [certain] interactions because they are constrained to digital contexts and ramifications in non-digital spaces are minimal or can be avoided … meaning that individuals feel disinhibited compared to when in-person." (10). Given the high shareability of emotionally charged moralizing content and given the incentive of SMP companies to increase user engagement, personalization algorithms feed off and contribute to the emergence of collective expressions of moral outrage, enabling an uploaded act or expression deemed socially risky or problematic to circulate in an ever-expanding inchoate social community, with moral outrage "spread[ing] like wildfire online" ([28], 79). Algorithmic boosts enable a singular deed or utterance from an average user, including unsuspecting teenagers, to go viral and potentially becoming the target of moral outrage within a

[7] For in in-depth discussion of the obliteration between the public and the private in teenagers' SMP-shaped lives see [32].

[8] In the EU, the law recognizes the new danger of this identity-reification with "the right to be forgotten" allowing anyone (in theory) to demand the removal of images and results from search engines and social media platforms [62]. However, the legal right to be forgotten works only retroactively, when much of the damage of viralized reification has already been done.

[9] Delacroix [39] maintains that all "non-optimized environments" reify people by reducing them to a fixed role or stigma, but that in the 'real' world such environments still allow for "events or encounters with others [that] can nevertheless unmask a field of possibilities in a way that allows for gradual, experiment-based learning" ([39], p. 126). She worries that it is precisely this "possibility of such iterative experimentation that is taken away in profilebased, optimized environments" (Ibid).

potentially ever-widening online community.[10] When this happens a person experiences a form of hyper visibility that quickly transforms into utter social invisibility: being cancelled.

We suggest that this combination of design features and functionalities contribute to an environment of social affordances conducive to TCC and antithetical to risky interpersonal identity exploration. To substantiate that claim further, we now turn in more detail to the notion of risky teenage interpersonal identity-exploration, which is increasingly unfolding online (See Fig. 1).

4.3. Risky (online) teenage identity-exploration

In section 3, we used enactive insights to bring out the exploratory interactive nature of human sense-making and the positive role that risk-taking and breakdown can play in our social lives. These insights were grounded to an important degree in developmental research on infant-caretaker engagement. Enactive research shows that, throughout our adult lives, we continue to refine and rely upon our embodied know-how of social affordances acquired in infancy (Cf. Gallagher 2008). Curiously, a robust enactive account of what happens between infancy and adulthood in terms of teenage risky interpersonal identity-exploration is missing. This lacuna is not unique to enactive 4E Cognition. As Brizio et al [42] observe, adolescence is a remarkably understudied stage in human development. That said, among existing research there is broad agreement that adolescence signifies a particularly precarious phase in human social development, with kids emphatically embarking upon an "independent exploration of life's possibilities" questioning, playing with, and fine-tuning their stance on social norms, rules, styles, practices, hierarchies, etc. ([43], p. 469).

As anyone who was ever a thirteen-year-old will recall, teenagers precariously develop, reshape, and refine their social identity in an exploratory way, by trying out different viewpoints, commitments, jokes, expressive gestures and the like, and by seeing and adapting to how peers respond in return [42,44,45]. As Laursen & Veenstra [46] put it: "The normative search for one's own identity … leaves an opening for input from … [p]eer influence [which] should peak when identities are in a state of flux." This susceptibility to peer influence serves to "eliminat [e] differences that might result in social exclusion" (2021, 889). Because social identity-explorations are negotiated interpersonally, with teenagers' developing sense of self precariously exposed to and shaped by the responses of their peers, *interpersonal identity-exploration* is an inevitably *risky* endeavor, marked by frequent moments of rejection, repositioning, and, *ideally*, reconciliation and repair. In the words of Brizio et al., adolescence opens up

> "a world of new possibilities, new promises, new dangers. Cast abruptly in this new world, the adolescent has to wade through it, finding her own way … In this task, social life is simultaneously a huge source of problems, opportunities, and resources. That most of us survive this storm to find comparatively calmer waters is one of the most amazing feats of human kind" [42].

Contributing to this "amazing feat," psychoanalyst Erik H. Erikson suggests, is the *psychosocial moratorium* that human societies have historically afforded to teenagers. This moratorium refers to a "period that is characterized by a selective permissiveness on the part of society and a provocative playfulness on the part of youth" ([44], p. 157). This provocative playfulness is furthermore enabled by intimate contexts of friendship: "The intimacy, loyalty, and reciprocity that characterize adolescent friendships proffer a uniquely sheltered context for identity exploration … Peer relationships provide a safe space for experimentation, including trying and discarding different identities." ([46],892). To what extent do SMPs facilitate or disrupt the conditions necessary for teenagers' provocative playful identity exploration?

It depends, of course, on who you ask. In her 2016 book *The Psychology of the Internet*, which was written before TCC emerged as a widespread phenomenon in the lives of teenagers, Patricia Wallace expounds a mildly critical yet largely optimistic view.[11] Aligning herself with insights from psychologists like Erikson, she highlights the importance of identity exploration, pointing out that "children who don't have opportunities to explore may fall into "identity diffusion," not really committing to much of anything (2016, 248). She seems to believe that the Internet (SMPs included) by and large offers novel and safe spaces for such identity exploration: "adolescents have plenty of room to experiment. Indeed, online worlds are like identity labs in which people of any age can try on different personas to see how they feel and how others react" (2016, 249). Note the agential lens of her characterization, with teenagers actively using SMPs as tools facilitating identity exploration. Although Wallace warns that "digital footprints don't disappear, and youthful identity explorations may come back to haunt adolescents as young adults on the job market" a deeper consideration of how SMPs may work against social identity development in teens is absent from her reflections on "Identity Development" (2016).

Similarly, Malvini Redden & Way (2017) exhibit a largely optimistic and agency-centered perspective when they propose that SMPS enable "Teens [to] 'try out' different types of identities – goofy, sexy, or otherwise – … Unlike offline life, online identity work allows people to 'clean-up' profiles and online footprints to a certain degree. It is interesting to think of this flexibility as a method of identity play/development" (36-7). That said, they also note a tension in interviewed teens who, on the one hand, desire to be playful and carefree on SMPs, while also experiencing SMPs social affordances as constraining and limiting. For instance, one interviewed teen calls on others to "just be who you want to be" online, while "also admitt[ing] she avoids posting "stupid stuff" so as to keep her preferred persona and not lose followers' respect." (2019, 492). Another teen, Bea, "mentioned wanting to be as "authentic as possible online," adding that "that's … really hard to do. I feel like if you try to do anything different than what other people are doing, then you're immediately going to get like judged. Or like shut down" (2019, 492).

Such worries speak to a concern raised by Eichhorn, namely that "the spaces where [provocative playfulness and] self-discovery can safely be carried out without consequence are rapidly shrinking" in the age of social media (2019, p. 63). The emergence of TCC as a widespread phenomenon in the social lives of teenagers underscores the legitimacy of such a concern. In a brief assessment of TCC's mental health effects, Ramsey-Soroghaye et al. [47] warn: "Cancel culture has shown negative mental health effects on teenagers especially as it outweighs the positives since teens are still forming their identities and their beliefs and thus need to learn from their mistakes rather than being punished" (596). While we align ourselves with this warning note, we note that it is made in passing and doesn't build upon robust research, relying instead

[10] This happened to Ghyslain Raza, who went viral in 2003 as "the Star Wars kid" in one of the first Internet memes: "Raza was just having fun in his high school's film studio when he shot a video of himself wielding a makeshift light saber and clumsily imitating a character from the Star Wars series" ([63]: 81). The film, recorded by Ghyslain on a VSH cassette, was found by a school mate who digitized it and released it on the internet. The consequences turned out to be devastating, with Ghyslain becoming the target of relentless ridiculing on and off-line, with some online posts urging him to commit suicide. Forever known as the Star Wars Kid, his frozen identity haunted him for years. Two decades after Ghyslain was reduced to a meme and subjected to violent (cyber) bullying, his school mate apologized to him, expressing that he had not anticipated the far-reaching consequences of his action and that he continued to have "enormous regret about posting the video." Though undoubtedly at different degrees, we might say that unintended viralized reification affects both the reified and the reifier. Source: https://en.wikipedia.org/wiki/Star_Wars_Kid.

[11] As [64] discuss, CC began to spread around 2017.

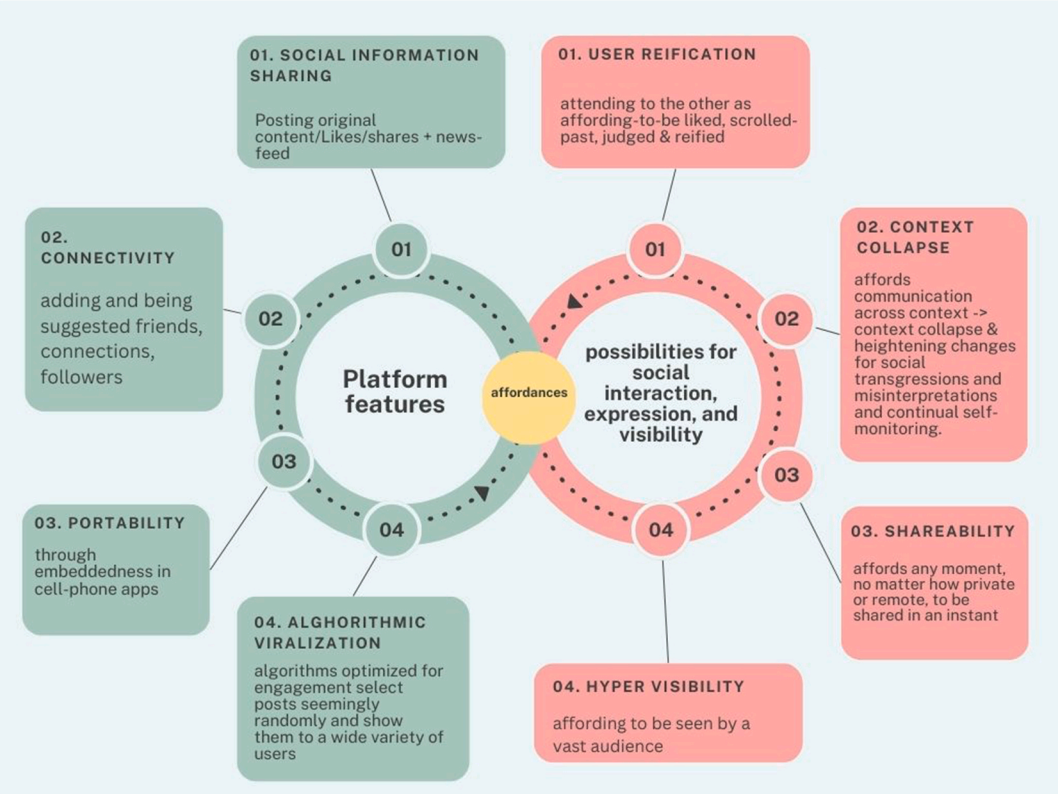

Fig. 1. To summarize the specific design features of SMPs that shape social affordances conducive to TCC, we provide the following figure. This serves as an analytical tool that oversimplifies the dynamic way in which these different design features and social affordance interlock.

upon information provided by the website of an educational institution. This underscores a point we made in section 2: that TCC is a strikingly understudied phenomenon that receives little to no explicit attention from research communities across the globe, while it is of central concern to those 'on the ground,' namely educators, parents, and of course teenagers themselves. It is to some of their lived experiences that we now turn.

4.4. Teenage cancel culture: lived experiences

TCC is a hybrid phenomenon that permeates a cancelled teen's online and off-line worlds [10]. As such, the experience of social ostracization can become nearly inescapable, affecting most if not all domains of a teen's life [10]. As cancelled teenagers effectively become "ungrievable" subjects ([48], p. 129) who are no longer perceived by their social environment as affording interaction, the experience of cancellation can become so intolerable that some teenagers contemplate or commit suicide (Cf. [10]).[12] What makes the experience of SMP-afforded TCC so devastating from an enactive perspective is that the ability to reassert oneself after social breakdown is altogether removed as a possibility for action in one's social environment. One occupies the painfully paradoxical position of still being a social self without having access to participatory sense-making, which is what one depends on to reestablish one's connections to the social world and remain viable as a social self. Consider some of the following testimonials, describing SMP-afforded TCC from the lived perspectives of affected teenagers[13]

> "You can do something stupid when you're 15, say one thing and 10 years later that shapes how people perceive you. … We all do cringy things and make dumb mistakes and whatever. But social media's existence has brought that into a place where people can take something you did back then and make it who you are now … I am very prone to questioning everything I do. …. I have issues with trusting perfectly normal things … That sense of me being some sort of monster … has stayed with me to some extent.'" (L, who was cancelled at 15 for reasons not fully clear to her, in Yar & Bromwich, 2019).

Another girl, who describes being cancelled after uttering a tasteless racially charged joke to a Black friend describes: "There's no room for growth […] You do something wrong, therefore you're a bad person. … My brain isn't fully developed … None of our brains are fully developed" [10]. Notably, cancellation doesn't just befall those who commit a transgressive act (actual or alleged). It also happens to those who forgive a cancelled friend for their (alleged or actual) wrongdoing. This can affect the reliable presence of friendships as safe dyadic settings in which precarious risky identity exploration can be carried out. As teen Dave puts it: "I feel like we're in a bubble of hate," after an *Instagram* post in

[12] The link between CC (not TCC) and suicide, depression, and low self-esteem is also discussed by Ramsey-Soroghaye et al. [47]. The notion of "ungrievable subjects" comes from Judith Butler's work and has been adopted by Cover (2019) to analyze how "digital hostility risks the unhealthy disruption of the subject. This could be said to occur when a user is positioned by the massified group to perceive themselves as an 'ungrievable' subject." (2022, p. 129).

[13] Because (much-needed) phenomenological research on SMP-afforded TCC is yet to be conducted, we are drawing on testimonials lifted from three journalistic articles, published in The New York Times and New York Magazine. This reflects a potential bias in our analysis towards Northern America that points to the need for more, globally conducted, ethnographic and phenomenological research on the phenomenon of SMP-afforded TCC. That such an orientation is warranted is evidenced by the fact that SMP-afforded CC is a concern expressed across the Globe ([14,24,25]; Inya 2023; Ramsey-Soroghaye.; Onalu; Anyaegbu 2023; [26]).

which he is seen together with his cancelled friend got him cancelled as well [10]. Teen Jenni sums up the sentiment as follows: "people are scared to be on the wrong side.'' (in Ref. [10]). This is not surprising, given that the function of peer influence and alignment is to "eliminat[e] differences that might result in *social exclusion*," to repeat Laursen & Veenstra [46], 889, our italics).

Other testimonials reflect concerns from teens who were not cancelled themselves but worry about TCC's effects: "people should be held accountable for their actions … but … canceling someone 'takes away the option for them to learn from their mistakes and kind of alienates them" (Yar & Bromwich, 2019). Alex, 17, worries that, once cancelled, someone will "forever be thought of as that action, not for the person they are." Or, as Nate puts it, "Think how differently you thought just 5 years ago. Some of the things you said or did you laugh or cringe at now. We need to accept apologies and if the person understands what they did wrong they should be forgiven, not the product of a witch hunt by millions of Twitter users calling them less than human for holding a controversial opinion or saying something not politically correct 10 years ago" [49].

When reading through these testimonials, what stands out is the concern that one's identity is conflated with a single act, where *any* act deemed socially transgressive–not only profoundly harmful ones, but also tasteless jokes, a poorly formulated opinion, or the act of forgiving an (alleged) social transgressor–can be seen as beyond repair and calling for cancellation. An environment in which a singular act deemed socially transgressive can render one socially invisible (as no longer affording participatory sense-making) is an environment in which the 'permissive moratorium' required for risky identity exploration is under threat. Recall Reddy's observation that infants who don't experience the reliable presence of repair after interaction breakdown occurs and who "arm" themselves with reliable "patterns of feeling and doing" which "at least have the advantage of being familiar and coherent" ([18], pp.76-7& 81). Ron Johnson, author of *So You've Been Publicly Shamed (2016)*, echoes this worry in the context of people navigating a social world shaped by SMP-affordances: "We are creating a world where the smartest way to survive is to be bland." Not only that, the smartest, safest way to survive for precarious socially developing selves who are emphatically susceptible to peer influences, may be precisely to join in on acts of cancellation so as to avoid being cancelled oneself (to repeat Jenni: "people are scared to be on the wrong side").

One of the implicit assumptions that appears to underlie the practice of SMP-afforded TCC is that we can rightfully employ a notion of accountability that equates *what* a person says or does (a single expression or deed) with who they are, such that an act that (sufficiently) violates social norms or values can justify placing the person accountable for said act outside the space of human interaction. From an enactive standpoint, this is both ontologically misguided and damaging. It is ontologically misguided because who we are is continually reshaped through interactions with others, with social meanings emerging "in a constantly shifting, more or less shadowy way" that is irreducible to individual intentions and expressions [9].[14] It is ontologically damaging because human beings in general, and teens in particular, are the sorts of selves who constitutively depend on participatory sense-making with others in order to remain viable as social selves.

First and foremost, cancellation harms and petrifies the cancelled person. By being utterly isolated and ignored by others, those who are cancelled have no meaningful agential recourse to initiate participatory sense-making and processes of repair. Arguably, though, environments that nudge precariously developing social selves towards joining in acts of cancellation are also damaging to those who cancel. As some of Weil's [10] testimonials indicate, those who join in on acts of cancellation might suffer the felt discrepancy between their readiness to repair (a practice that we get habituated into as younger children through healthy off-line interactions with our care-takers) and a socially stifling environment that punishes such practices of reparation. Relatedly, they might come to regret their role in the viralization and cancellation of a peer. As we saw earlier, the consequences of canceling or shaming another person online might feel initially inchoate and inconsequential due to the moral distance created by online environments but a single deed can quickly spiral out of control.[15] Finally, the mere possibility of being subjected to SMP-afforded TCC can pre-emptively discourage teens from engaging in risky interpersonal identity exploration, thus causing harm even to those who have neither cancelled or have been cancelled. Finally, as a practice, SMP-afforded (T)CC devalues the social significance of breakdown as a driver of renewed sense-making, while eroding contexts and practices of repair.

Of course, as a matter of psychological fact, the actuality or possibility of cancellation and its eroding effects on teenagers' ability to explore who they are in relation to others in a manner that affords risk-taking will impact upon each developing teen differently. Some will experience the lingering possibility of cancellation and the nudge toward socially risk-free behavior more than others; and others will bear the actual weight of cancellation or the consequences of having cancelled another person more than some. However, the emphatic precariousness of teenagers' developing social identity, increasingly shaped through online interactions, underscores the need to evaluate the phenomenon of cancellation and its link to SMPs not just on a case-by-case basis, but at the more structural level of its potentially disruptive effects on the nature and quality of teenagers' social environment and the extent to which this environment supports or undermines risky interpersonal identity exploration. What is at stake are not only the precarious identities of individual teenagers who have in fact been cancelled (where one could perhaps reasonably argue, on a case-by-case basis, whether the severity of a teen's socially transgressive act(s) might warrant some form of social ostracization), but also the overall environment within which teenagers today develop themselves qua social agents. To the extent that this environment poses a pervasive threat to risky identity-exploration, and to the extent that such exploration is integral to what it means to be a healthy social human self, what is thus at stake is a certain way of being a social human self.

5. SMP-afforded TCC as technosocial disruption

We have been painting a rather grim picture of the disruptive effects of SMPS and their role in TCC. One might wonder if we have overstated our case. Indeed, as we raised in section 3, CC can be (and has been) framed as a tool that can be used by agents to advance morally laudable social justice causes. Consider the role of SMPs in mobilizing the #BlackLivesMatter movement, the OccupyWallstreet and Arab Spring protests, or the #MilkTeaAlliance movement [50]. We don't want to disregard the potentially emancipatory impacts of SMPs in these cases, which in some instances involved SMPs-afforded CC.[16] However, we maintain that this reflects a particular way of framing SMPs and users' relationship to them that is incomplete. We can capture this via a distinction Hopster makes between sociotechnical *disruption* vs. technomoral *revolutions*. Technomoral revolutions are marked by "the elements of intentionality, agency, and activism," while "to the extent that an autonomous dynamic of technological forces is regarded as a key driver of radical social change, this is naturally couched in terms of social disruption" ([1], p. 5). These two forms of sociotechnical change are not mutually exclusive. The same type of technological artefact or

[14] This doesn't mean practices of praising and blaming lose their significance. For a discussion of how personal accountability gets a foothold in contexts of participatory sense-making see [68].

[15] See footnote 10 for an example of this that harmed both victim and 'perpetrator'.

[16] Though, as we discussed in section 4.1, there are reasons withhold optimism about this potential.

system can warrant an analysis from both perspectives. Thus, without denying that teenagers can actively use SMPs as a resource for experimenting with their identities, flagging, shaping and sharing their social and political commitments, and perhaps even for mobilize a techno-moral revolution, we argue that we are missing salient concerns if we look at SMPs and SMP-afforded TCC solely from this agential-oriented perspective, which frames teenagers as deliberate users of a technology that is in itself a neutral tool amenable to their purposes. We believe an evaluation of SMPs and SMP-afforded TCC is incomplete without an examination from the perspective of technosocial disruption.

To orient such an analysis, however, we argued for the need of an account of our human social sense-making lives that can capture and specify our exposure to technological change. Such a picture is offered by enactive 4E research, which we have drawn upon to uncover the socioethical worry that SMPs and the social affordances that they introduce into the lives of teenagers are contributing to an environment that erodes practices of repair and threatens healthy risky identity exploration. 4E research supports a picture of human beings as not just deliberate users of technology, but also as selves who have the sorts of sense-making lives that are precariously exposed to and shaped by the affordances of the sociotechnical environment in which they are embedded. Affordances offer possibilities for action to living organisms that are not only "for good" but also "for ill" (Gibson 1979, p.129), creating habits of perceiving and acting in the world that work behind the backs of (or even against) people's explicit intentions as agents. Building upon such 4E insights, Jan Slaby explicitly critiques the picture of human beings as agents who purposively use technologies as resources to further their agential ends (2016). Slaby shows that, while a "user/resource" model may apply sometimes, there are (countless) instances in which human minds are "invaded" or disrupted by exploitative affordances in their sociotechnical environments, impacting upon their lives in ways that are hard to control, to reverse, and to anticipate. Taking web-based communication technologies used in work environments as one of his examples, he argues that these technologies:

> "exert structuring pressures on everyday routines … While they enable communicative feats of various kinds and remote access to the workplace and to relevant flows of information, they establish affective habits of rampant attentiveness, lead to hectic efforts in staying tuned, kindle anxieties of disconnection … The world of unlimited access, while empowering, *also encroaches upon various spheres of existence*" ([51], p. 10, our italics.)

Slaby's characterization of the quiet pernicious way in which web-based communication technologies are shaping the "pressures," "everyday routines," and "affective tendencies" of office work life is equally, if not more, applicable to the case of SMP-afforded TCC. In fact, if our argument is right, then the latter is invasively disruptive in a more fundamental sense. Whereas Slaby's case concerns primarily the invasion of one's identity qua office employee, SMP-afforded TCC is potentially disruptive of the relational domains required for the development and maintaining of a healthy social identity as such, making it an emphatic case of what Hopster calls "deep" sociotechnical disruption. Put differently, while an employee with awareness of the pernicious affordances of web-based communication technologies may be able to find various ways of combatting and altering their situation, teenagers who are in fact cancelled are precisely deprived of the ability to make meaningful moves in their social environment tout court; their social agency and the ability to explore who they are in relation to others has been utterly silenced. Furthermore, teenagers who are not themselves cancelled, but who worry about its possibility as an every-present threat in their SMP-afforded social environment are likely to avoid opportunities for risky interpersonal identity exploration, engaging in actions perceived as "familiar" [18], "bland" (Johnson, 2016), but socially safe. In sum, and to rephrase Slaby, while SMPs can be legitimately framed as "empowering, [they] also encroac[h] upon various spheres of existence; " not in the least, they potentially encroach upon the all-encompassing sphere of social interaction and the development of our social identities.[17]

To be sure, the degree to which SMP-afforded TCC erodes teenagers' readiness to engage in risky interpersonal identity exploration is an empirical question. Our paper will have succeeded if our enactive perspective on SMP-afforded TCC as a case of sociotechnical disruption reveals this question as an urgent one to track and unpack through future research. Such tracking should approach SMP-afforded TCC not just as a phenomenon that cancels particular individuals for particular deeds done, but also as a phenomenon that may pre-emptively cancel a certain way of being a social self, contributing to a shared sociotechnical environment in which human beings, who are at their core exploratory social risk-takers, are discouraged from such risk-taking.

6. Looking ahead and concluding remarks

There is an increasing interest in philosophy's ability to inform rigorous analyses of the socioethical and political impacts of disruptive technologies [52]. In line with this trend, our paper drew upon state-of-the-art theory from philosophy of technology and enactive embodied cognition to shed light on the socioethical effects of SMP-afforded TCC – a phenomenon that is fretted over by societal actors (teens, parents, and educational institutions), but largely ignored in academic research. To round up our discussion, we conclude by proposing several potential routes for mitigating the perniciously disruptive effects of SMP-afforded TCC uncovered by our analysis, while also identifying future areas for research.

As we argued in section 4, the functionalities and design of SMPs have introduced distinctive social affordances into the lives of teenagers that contribute to TCC. If we are right, then some of the disruptive effects of SMP-afforded TCC can be mitigated at the level of design choices. Indeed, there are already some indications that certain design interventions may be effective. Lee et al. [53], for example, noticed that a high number of *dis*likes given to a social media post that calls out a wrong doer online can discourage bystanders from further amplifying the harassment. This, in turn, means that, if a post gets a disproportionate number of dislikes and is automatically flagged through a sentiment analysis algorithm for detecting hateful/shaming speech, a platform can choose to decrease the post's visibility. Furthermore, on specific SMPs, there are ways to detect when a viral post is the target of online calling-out and shaming. For instance, on X formerly known as Twitter, having more quote tweets than retweets for a specific tweet signals that people are engaging with it negatively [26]. Restricting the visibility of such tweets could be a step towards mitigating storms of public shaming.

Another design-centered solution could be to enable users to contextualize their posts and target them to specific audiences. Context

[17] From an enactive perspective, human beings are at their core adaptive relational social selves. As such, one could object that we always have the capacity, as people, to engage in acts of risky interpersonal identity exploration such that it cannot in any meaningful sense be disrupted. However, one can agree with the first part of this claim without conceding the second. Here we might heed Hannah Arendt's political warning notes on the conditions necessary for human freedom to flourish. Arendt understands human freedom as the human ability to show who we are as unique selves to others through our actions and expressions, which approximates what we've been calling risky interpersonal identity exploration. While freedom is an ontological given of human existence, Arendt warns that it can nevertheless be emptied of its significance during 'epochs of petrification:' "Because the source of freedom [read: risky interpersonal identity-exploration] … remains present even when political life has become petrified and political action impotent to interrupt automatic processes, [it] can so easily be mistaken for an essentially nonpolitical phenomenon … but [it] develops fully only when action has created its own worldly space where it can come out of hiding, as it were, and make its appearance." ([65], p.169).

clarification may also encourage users to reflect on their message and intended audience, thus enabling a delay and discouraging knee-jerk reactions [54]. One can also imagine ways in which design choices can introduce online social affordances that are more amenable to practices of repair and participatory sense-making. Think of a button (something along the lines of a flashing talk bubble perhaps) that can signal a post as a view-in-progress of which the poster is uncertain. Or think of a posting format designed to invite open exploratory exchanges, allowing no definitive statements but only posts that end with "on the other hand …" or "but then again …," affording others to add to a thought and engage in online participatory sense-making, where emerging shifting meanings are emphatically not attributed to a single agent but instead reflect an inter-personal interaction process. Or think of a functionality that would afford those who just joined in on an act of online cancellation to be exposed to features of the cancelled person's life that bring out the multifaceted nature of their sense-making existing. Even making the choice to decline exposure to such information could create a sense of friction within tendencies toward reification.

These are just some possibilities for redesigning the social affordances shaped by SMPs. We invite researchers from HCI, enactive 4E Cognition and other relevant fields to propose additional ways in which risky interpersonal identity-exploration, participatory sense-making, and practices of repair, can be facilitated rather than disrupted through the design of SMPs. Furthermore, we encourage such research is conducted via processes of co-creation. To be sure, teenagers' lived experiences of SMPs are complicated and it would be overly simplistic to grant them with over-riding authority on the socioethical implications of SMPs social affordances. After all, as we saw in section 4.3, teenager testimonials reflect a contradictory tension between seeing SMPs as affording authentic identity-expression while also feeling the dangers of deviating from the social norms afforded by SMPs. Still, teenagers' lived experiences of SMPs are vital for non-paternalistic assessments of how SMPs can be improved upon through R&D processes ([12] & 2019). The conceptual resources provided in our analysis could also inform such processes, by informing questions and topics raised in focus groups or traced through ethnographic research.

Sometimes the disruptive effects of design cannot be solved in the same problem space in which these were created. Over and above mitigation strategies at the level of design, we recommend an increased need for digital skills and literacy courses for teenagers. Such courses should exceed a focus on technical skills and include skills and practices for coping with the socioethical challenges of growing up online. That such courses are needed is underscored by González-Villa & Gewerc [32] whose recent systematic review shows that, in a world not equipped to cope with the disruptive effects of SMPs on teenage life, "adolescents learn to cope with [SMPs] … through informal strategies such as trial and error or imitation of their peer group." The insufficiency of such ad hoc coping strategies, they add, "raises the role of the school in today's society and sheds light on the most immediate challenges it must face in order to provide children and adolescents with skills adjusted to the current sociocultural reality for adequate digital participation in a context marked by the convergence of media where increasingly complex practices emerge volatilely" (2024). Aligning ourselves with their proposal, we suggest that our analysis can provide valuable input for schools seeking to support such skill development by introducing an emphasis on the significance of interpersonal repair and the ontological harm of being deprived of participatory sense-making.[18]

While digital literacy and design strategies are necessary to cope with the disruptive consequences of SMP-afforded TCC, we simultaneously stress the limits of such approaches. In the end, these solutions locate the solution to the disruptive effects of SMP-afforded TCC at the level of artefact-optimization and individual skills and responsibilities for coping with sub-par technologies. As adaptive social selves who are, by nature, in the business of remaining viable within their environment, teenagers are finding ways to cope with the challenges introduced by the SMP-afforded social environment in which they are developing their social sense of self. But an over-emphasis on teenagers' micro-level resourcefulness in navigating SMPs social affordances and the threat of SMP-afforded TCC, and an emphasis on teens' ability to acquire additional coping skills in this context, can distract from larger critical macro-level questions and concerns about the generational effects on who we are as social beings. Furthermore, an emphasis on individual resourcefulness and skill-development can be coopted by powerful SMPs as evidence that nothing untoward is happening, protecting their invested financial interest in keeping the social lives of teenagers thoroughly mediated by their products.

Related to this macro-level concern, we reject the notion that SMPs' disruption of teenage life through TCC can be categorized as simply another case of technological influence. Influence, initially a psychological concept, concerns the extent to which a group of people can influence what an individual believes (informational influence) or their evaluative attitudes regarding a certain issue (normative influence).[19] The psychological concept of influence is limited in guiding future research on SMP-afforded TCC, because the influence of a technology on one's opinions and actions is measured primarily at the individual level and for short periods of time.[20] In ethics of technology, discussions of technological influence, initiated by Cass Sunstein [55], have been revisited by Ref. [56] who argue under what conditions a persuasive technology is permissible. While they draw attention to the need for a more longitudinal approach, their analysis too focuses primarily on the ways in which particular artefacts can influence individuals in ways that undermine their reflective capacities and ability to flourish (p. 423). Our focus, by contrast, draws attention to how SMPs and SMP-afforded TCC doesn't just affect particular individuals in particular cases, but how it shapes the wider social environment in which human social beings as such remain viable as social selves.

Looking beyond the case of SMP-afforded TCC, we propose that the enactive perspective on human sociality is likely fruitful for other analyses of socially disruptive technologies. Hopster's account of technosocial disruption gestures at "'deep disruptions" regarding our human nature" – disruptions that "transform fundamental modes of human sensemaking and being-in-the-world" (2021). Enactive 4E Cognition can help us gain a more precise understanding of what such "deep disruptions" entail, since it offers robust analyses of human nature precisely in terms of our being-in-the-world as sense-making beings whose social and technical environments can be conducive as well as hostile to the development and functioning of our sense-making lives. Conversely, the emerging 4E literature on technosocial disruption also stands to benefit from the precise analytical distinctions made by Hopster in *Technology in Society*.

Finally, we call on both 4E and philosophy of technology to attend more thoughtfully to adolesence as a distinctive phase in human social development. Teenagers are marginalized not only as experts by experience who can be vital to co-creation processes surrounding the emerging technologies that will be shaping their world of affordances. They are also marginalized as research subjects. As we signaled, it isn't just the phenomenon of TCC that is pressingly under-researched. Adolesence in general is a strikingly understudied phase in human development, that is also skipped over in 4E accounts of social cognition and has received little to no attention in analyses of technosocial disruption. This is unfortunate, to say the least. As scholars and as a society we can

[18] Digital citizenship education is also proposed to mitigate the effects of call-out and cancel culture by Ref. [48], though not in the context of teenage development.

[19] See Ref. [66], p. 371 for an overview of different types of influence.

[20] Similarly, discussions of SMP influence focused on how social media "influencers" get to influence the beliefs and attitudes of their followers [67] tend to have a focus on (short term) effects on individuals.

do better when it comes to understanding, valuing, and mitigating against the ways in which emerging technologies (and the corporate interests driving them) are disrupting the lives of some of the more precarious and vital members of our social community.

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Janna Van Grunsven: Writing – review & editing, Writing – original draft, Conceptualization, Visualisation. **Lavinia Marin:** Writing – original draft, Conceptualization, Visualisation.

Data availability

No data was used for the research described in the article.

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