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Technological solutions to loneliness—Are they enough?

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Abstract

Loneliness is a major public health concern, particularly during pandemics such as Covid. It is extremely common, and it poses a major risk to human health. Technological solutions including social media, robots, and virtual reality have been advocated and implemented to relieve loneliness, and their use will undoubtedly increase in the near future. This paper explores the use of technological solutions from a normative perspective, asking whether and to what extent such measures should indeed be relied upon. The conclusion is that technological solutions are unquestionably part of the solution to loneliness, but that they cannot and should not constitute the whole solution. It is important to note that this is not a straw-man argument, as several organizations and scholars have strictly focused on such technological solutions for loneliness.

KEYWORDS

loneliness, responsibility, social media, technology, virtual reality

1 | INTRODUCTION

The 2010 movie Repo Man ends with Jude Law being put in a virtual reality (VR) world without his consent or knowledge, while Liev Schreiber compassionately tells his audience of consumers that, "Yesterdays' dreams are today's reality. Imagine your loved ones living out the rest of their lives when they are always happy, always content. Always taken care of. You owe it to your family. You owe it to yourself…"

Imagine yourself together with Jude Law in Nozick's Experience machine—or in a modern, VR modification of it—where your experiences are programmable. The machine makes you forever content. More relevant to the discussion here, the machine makes you think you are always surrounded by people whom you consider to be friends, thus making you feel the opposite of social isolation. The machine also simulates you having intimate, romantic relations with one or several people, thus making you feel that you have significant others in your life. Imagine that you could be hooked up to this machine for your entire life. By most accounts, you are not supposed to feel lonely under such circumstances, ever. If you are afraid of loneliness then—and all of us are—this might be your ideal solution. The question is—will that be enough for you?

Loneliness, most commonly defined operationally as a subjective mismatch between one's expectation of social relations and one's perceived social relations,[1] is extremely common, reported to affect 20%–34% of the elderly in China, USA, Latin America, and Europe.[2] Young adults are also reported to suffer from loneliness, even to a larger percentage compared to the elderly.[3] Loneliness seems to be on the rise post-Covid,[4] and this rise is only partially explained by lockdowns. A survey of 2000 Australians aged 18–80 years has revealed that feelings of social disconnection and loneliness not only

[1]Svendsen, L. (2017). *A philosophy of loneliness*. Reaktion Books.
[2]World Health Organization. (2021). *Social isolation and loneliness among older people: Advocacy brief*.
[3]Richard, A., Rohrmann, S., Vandeleur, C. L., Schmid, M., Barth, J., & Eichholzer, M. (2017). Loneliness is adversely associated with physical and mental health and lifestyle factors: Results from a Swiss national survey. *PLoS ONE*, *12*, e0181442; BBC Radio 4. (2021, November). *The anatomy of loneliness—Who feels lonely? The results of the world's largest loneliness study*. https://www.bbc.co.uk/programmes/articles/2yzhfv4DvqVp5nZyxBD8G23/who-feels-lonely-the-results-of-the-world-s-largest-loneliness-study
[4]Bu, F., Steptoe, A., & Fancourt, D. (2020). Who is lonely in lockdown? Cross-cohort analyses of predictors of loneliness before and during the COVID-19 pandemic. *Public Health*, *186*, 31–34; McGinty, E. E., Presskreischer, R., Han, H., & Barry, C. L. (2020). Psychological distress and loneliness reported by US adults in 2018 and April 2020. *JAMA*, *324*, 93–94; Pai, N., & Vella, S. L. (2021). COVID-19 and loneliness: A rapid systematic review. *The Australian and New Zealand Journal of Psychiatry*, *55*, 1144–1156.

increased during lockdowns due to Covid but also persisted for months after they were lifted.[5]

Loneliness is not only ubiquitous; it is also dangerous. Empirical evidence links loneliness to various adverse health effects, including high blood pressure, high cholesterol, higher rates of depression, increased mortality, and so forth, thus making loneliness a major public health concern.[6]

In light of the grave public health implications of loneliness, many international and national professional organizations have set an agenda to prevent or mitigate loneliness. Virtually all of these plans provide or advocate technological solutions to loneliness, sometimes in addition to other measures. While technological solutions can and should be part of the overall policy to address loneliness, this paper raises a concern regarding the degree of reliance on such solutions. Public health agencies and healthcare organizations should not be relieved of the responsibility to address loneliness once they have provided technological solutions, as in to say "we provided laptops to all lonely people, therefore we need not do more." The argument presented here relies on two premises: one empirical and the other theoretical. The empirical premise is that technological solutions may not be wholly effective on their own, as seen in the literature. The theoretical—and more controversial—premise is that there has to be more to human interaction than mere connections via the Internet or other technological measures; human interaction is also about touch, body language, smell, eye-to-eye contact, and so forth.[7] These arguably cannot be achieved through the Internet or other technological measures, regardless of how advanced the technology is. This paper merely takes the first step in elaborating the second premise, focusing specifically on touch and smell.

What immediately follows is a critical review of the most prominent account of loneliness as a normative term. The objective is to lay out the normative grounds as to why we should be concerned about loneliness in the first place. Having argued that loneliness is both intrinsically and instrumentally bad for humans and therefore needs remediation, several proposals to engage loneliness are then critically reviewed, mostly in regard to their promotion of technological solutions. The objective here is to warn against solely relying on oneself to cope with one's loneliness. Next to be reviewed is the literature on such technological solutions, indeed supporting the first premise—that these may not be wholly sufficient, at least based on available evidence. The more advanced technology becomes, however, the more it seems promising in mitigating loneliness; VR, for instance, can potentially provide all we need in order not to feel lonely, as described in the vignette above and according to the operational definition of loneliness above. if loneliness is nothing but a mismatch between what is expected and what is perceived, and if VR can wholly modify what is perceived, then loneliness could be easily annulled. The intuitive uneasiness raised by the vignette above, however, suggests that loneliness is not wholly captured by its common, operational definition.

The increasingly advanced technology presents a challenge to the first premise, leading to the second premise—that technology, however advanced, is conceptually insufficient to wholly address loneliness. This means that the operational definition of loneliness is hardly sufficient to adequately understand loneliness. Richer, more comprehensive accounts are in order. Such is indeed the overlying intuition motivating the present paper—that being lonely is more than merely experiencing an absence, more than merely not meeting one's expectation of social interactions. Loneliness, rather, is something deeper: it expresses and is caused by one or more unfulfilled components of human essence or the human experience. This paper is indeed a precursor for a larger project, aiming to define exactly what loneliness is and how it relates to human essence. This paper tentatively suggests that human touch or smell for instance may be a necessary condition to wholly alleviate loneliness because they intimately relate or contribute to human essence and the human experience. Understanding loneliness in this fashion would necessarily lead to far-reaching conclusions from an ethical and public health perspective, and this paper poses an invitation to explore them further.

2 | WHAT IS LONELINESS?

As mentioned, loneliness is nowadays most commonly defined as a discordance between one's expectations of one's social relations and one's actual social relations. It became associated with such a negative connotation, however—with the experience of absence[8]—only in the 19th century. According to European (of more accurately English) historians, as people earned enough money to leave their household or relieve themselves from household chores even for a little while in the 18th century, they adopted activities of aloneness perceived as expressing solitude more than loneliness. Tramping for example became common practice even for the middle class, and the advent of maps and guidebooks allowed one to walk for days without conversing with the locals. Most relevant here, the new technology of newspapers and the letter, with the development of the Penny Post in England and the United States, allowed one to be alone in the company of others while reading and to communicate with other people who are geographically distant.[9] Ride a subway in Singapore (or any other place in Asia for that matter) and you will understand the full meaning of being alone while in the company of others, as virtually all other passengers stare into their mobile devices. At the same time—and perhaps analogous to modern-day Internet cafes—the high costs of books led to the propagation of public libraries where people could read and socialize.[10]

[5]Patulny, R., & Bower, M. (2021). Lonely after lockdown? How COVID may leave us with fewer friends if we are not careful. *The Conversation*.
[6]World Health Organization, op. cit. note 2; Richard, A., et al., op. cit. note 3.
[7]Higgins, J. (2022). *Sentient: How animals illuminate the wonder of our human senses*. Simon & Schuster.
[8]Roberts, T., & Krueger, J. (2021). Loneliness and the emotional experience of absence. *The Southern Journal of Philosophy*, *59*, 185–204.
[9]Vincent, D. (2020). *A history of solitude*. Polity Press.
[10]Ibid.

Most philosophers discuss loneliness as a phenomenological, existential, or an affective state,[11] whereas social and biomedical scientists discuss loneliness as an unfulfilled evolutionary and biological need that causes severe health risks. Ethicists have been largely silent, unfortunately.[12]

In one of the only and most nuanced accounts of loneliness as a normative term, Kimberley Brownlee highlights the basic human need to live amicably with other people, as she defines it.[13] Living amicably with others means having social connections, ranging from intimate relations with our significant other or random exchanges with the cashier at the supermarket. Social deprivation occurs when we lack such connections to the extent that it harms us and our well-being, whether knowingly or not.

We all depend on social connections, across all ages and life conditions. We first require social connections as children, to develop into well-functioning adults. We next depend on social connections to develop and define our identities as adults. As adults, we require social connections both in periods of dependency due to illness for instance and when we wish to share our successes and accomplishments. Lastly, moving to old age, we need social connections to support us through our dependency. These constitute our "social-access needs" (Brownlee also refers to our basic needs to socially contribute to others, that is, "social-contribution needs," but these will be ignored in this paper. Point 4 then will be ignored as well in the quote below).[14]

Understood in another way, all or virtually all humans (to account for some rare exceptions) have a fundamental need to belong: "When we belong somewhere with, to, or in a set of people, then we have a place and usually we know our place."[15] Belonging is a prerequisite for a minimally good life.

Brownlee argues that social deprivation prevents us from living a minimally good life:

> To lead minimally good lives, we need certain social goods including: 1)basic social abilities, 2) adequate social opportunities, 3) access to persistent, stable social connections, and 4) the means to contribute directly to other's people's survival and well-being.[16]

Basic social abilities include subjective awareness, cognition, the ability to discern emotions and body language, the ability to communicate, the ability to feel (romantic and nonromantic) love, empathy, and compassion, and the ability to nurture. Social opportunities allow us to meet and re-meet one another and to form and maintain social connections. They include the opportunity to express respect, love, and kindness and to engage in shared activities and projects.

In short, all humans need the internal and external means to form meaningful social connections (regardless of whether they are perceived as meaningful), to belong.

Brownlee specifically articulates five kinds of arguments to justify the securitization of such internal and external needs, right after posing as a maxim a human right to the conditions necessary to realize a minimally good life. All five arguments support the suggestion that social connections are a necessary condition for a minimally good life. The first argument relies on empirical evidence demonstrating the necessity of social connections to child development and linking social isolation and loneliness to adverse health outcomes. Brownlee also provides empirical support for the claim that humans are biologically wired to belong.[17] The second argument is phenomenological-social connections enable our comprehension and experience of the world; they actually give meaning to our life. The third argument is noninstrumental, respect-based, or Kantian: we should acknowledge and respect others as social creatures just as we acknowledge that we are social creatures, and expect to be respected as such. She goes on to cite Aristotle, who argued that "For without friends no one would choose to live, though he had all other goods; even rich men and those in possession of office and of dominating power are thought to need friends most of all…"[18] For Aristotle, having friends (widely construed) enabled one to perceive and express one's virtue, meaning to find the good and the meaning in one's life. The fourth argument is reciprocity: being part of social connections also means that I am contributing to someone else's social connections. Social deprivation prevents me from doing that (again, as in point 4 above, I ignore this kind of argument here). The fifth argument seems to be political—being part of a social connection, or a community, allows us to benefit society and maintain communal camaraderie.

Brownlee's analysis of social deprivation does not wholly correspond to loneliness. We might imagine a person who has the internal and external means to maintain social connections, and who indeed has social connections, but still feels lonely—in that case Brownlee could hardly lament that that person is socially deprived. Brownlee does identify two variations of incidental social deprivation. One is long-term unwanted isolation that is inescapable without help, such as a physically impaired older widower who used to depend on his partner. Second is fractured contact, manifesting, for example, in infrequent visits by those with whom one has some sort of meaningful relationship.[19] Especially the last variation seems to be the closest to loneliness per se, but not quite—again, we can plausibly imagine someone who lives with his family and/or partner and still

[11]Mijuskovic, B. L. (2012). *Loneliness in philosophy, psychology, and literature* (3rd ed.). iUniverse.
[12]Lederman, Z. (2021). The bioethics of loneliness. *Bioethics*, *35*, 446–455.
[13]Brownlee, K. (2020). *Being sure of each other: An essay on social rights and freedoms* (p. 9). Oxford Oxford University Press.
[14]Ibid: 16.
[15]Ibid: 18.
[16]Ibid: 8.
[17]Further support for an evolutionary basis of our need to belong is provided by Shultz, S., Opie, C., Atkinson, Q. D. (2011). Stepwise evolution of stable sociality in primates. *Nature*, *479*, 219–222; see also Cacioppo, J. T., & Patrick, W. (2009). *Loneliness: Human nature and the need for social connection*. W. W. Norton.
[18]Ross, D., & Brown, L. *The Nicomachean Ethics (Oxford World's Classics)* (p. 142). Oxford University Press.
[19]Brownlee, op. cit. note 13, pp. 40–41.

feels lonely. Nonetheless, as mentioned, her account is undeniably the most nuanced normative analysis that can be applied more or less to loneliness. She argues that a right against social loneliness mostly guarantees a minimal threshold of external and internal means necessary to ensure persistent social connections. The responsibility to guarantee such a minimal threshold falls primarily on governments that must

> …facilitate opportunities for us to connect, to incentivize us to connect and even, sometime, to compel us to connect. Since interacting with strangers is often a necessary precursor to establishing persistent connections, and since interacting also gives us chances to practice our social skills and learn about our abilities to attract friends and partners, our governments may need to set up specific forums and venues…[20]

Other individuals, however, also bear some responsibility: first, not to negatively affect our capacity to form social connections and, second, to allow us to form and maintain social connections, particularly when we are more vulnerable.

One cause of such vulnerability is sickness, or—as Covid has taught us—the threat of sickness. Even in the presence of hospitals in the 19th century, illness and death were domestic events. In that domestic context, as one historian notes, "Ill-health presented a particular challenge to the balance between solitude and sociability in the home."[21] The ill person remained alone in his room, unable to complete or at least allowed to evade household chores. The sick were perhaps not socially isolated, but they were all of a sudden forced to tread the line between sociality and aloneness. Already in that space between the ill and the healthy, between the alone and the social, individuals were urged by some commentators to take responsibility for their lives and prepare themselves for the good death.[22]

Covid once again forced individuals into that space, either by becoming sick or due to the individual or public risk of illness. Some scholars and major health organizations, both national and international, seem to have ignored the rich normative analysis of loneliness presented above, instead reverting to individual responsibility and the operational, nonnormative, definition of loneliness (some of the reports mentioned below were published prior to the publication of Brownlee's book, but her work was available in article form[23]).

This omission is disappointing from a strictly academic perspective. More importantly, such omission carries policy and practical implications. Two of them are presented here and they intertwine. First, the majority of said scholars and organizations seem to place a major emphasis on personal responsibility of oneself to help the lonely oneself. Second, these scholars and organizations seem to place an emphasis on technological solutions. Such solutions indeed have a role as a public health measure to mitigate loneliness. A conception of loneliness as a normative term understood the way Brownlee defines it, that is, the "right" way—entails, however, much more extensive commitment and action by other individuals, public health agencies, governments, and international healthcare organizations. What follows next then is a discussion of the responsibility to mitigate and prevent loneliness. Individuals are undoubtedly partially responsible, but so are governments, public health agencies, and other national and international bodies.

3 | WHOSE RESPONSIBILITY?

A quick Google search of the phrase "coping with loneliness" brings up multiple websites that basically advocate for self-help to curb loneliness. The Cigna website (a major insurance company based in the United States), for instance, details five recommendations for individuals who are feeling lonely: "Acknowledge your feelings of loneliness," "know when to engage or disengage with the online world…," "find a volunteer opportunity," "join a group or club…," "practice self-care."[24] Similarly, a YouTube clip by the Community Health Network urges people to communicate with others or go on a walk to fight off loneliness.[25] Ending Loneliness Together, an Australian network of organizations whose aim is to mitigate loneliness in Australia and elsewhere, has issued a leaflet with 10 recommendations to mitigate loneliness. These include chatting while keeping a distance, strengthening relations with household members, having the right perspective, exercising, and using technology.[26]

Similarly, The U.K. National Health Services website[27] lists seven suggestions on how one should stave off loneliness:

1. Explore ways to spend time together.
2. Be more social and check in regularly.
3. Share your feelings—but do not compare.
4. Do more things you enjoy.
5. Stay busy by learning something new.
6. Volunteer to help others.
7. Join an online community.

Scholars have mainly focused on individual responsibility for loneliness as well, distinguishing active coping, or efforts to increase social contact from regulative coping, or efforts to intervene cognitively to reduce the perceived need for social contact.[28]

[20]Ibid: 51.
[21]Vincent, op. cit. note 9, p. 102.
[22]Ibid.
[23]Brownlee, K. (2016a). I—The lonely heart breaks: On the right to be a social contributor. *Aristotelian Society Supplementary*, *90*(1); Brownlee, K. (2016b). Ethical dilemmas of sociability. *Utilitas*, *28*(1).

[24]Cigna. (2022, January). *How to deal with loneliness: 5 ways to stop feeling lonely*. https://www.cigna.com/individuals-families/health-wellness/how-to-deal-with-loneliness
[25](2022, January). *How to beat loneliness during COVID-19—Bing video*. https://www.bing.com/videos/search?q=covid+loneliness&docid=608050374412498355&mid=D4C47A0E893CBAF210AAD4C47A0E893CBAF210AA&view=detail&FORM=VIRE
[26](2022, January). *About us—Ending loneliness together*. https://endingloneliness.com.au/about-us/
[27]NHS. (2022, January). *Coping with loneliness during COVID-19—Every mind matters*. https://www.nhs.uk
[28]Schoenmakers, E. C., van Tilburg, T. G., & Fokkema, T. (2012). Coping with loneliness: What do older adults suggest? *Aging and Mental Health*, *16*, 353–360; Xiang, Y.-T., Yang, Y., Li, W.,

A group of psychiatrists, for instance, recommended that individuals stay connected with their social network, maintain basic needs and healthy activities, and manage emotions and psychiatric symptoms.[29]

The Inter-Agency Standing Committee (IASC) Reference Group on Mental Health and Psychosocial Support, after consulting 199 adults from 51 different countries, has issued a toolkit to mitigate several negative psychological impacts of Covid, including social isolation. The toolkit details several recommendations—all aimed at the lonely individual—including the following. 1. Have a daily routine 2. Engage in activities that are enjoyable 3. Talk to their family and friends regularly 4. Focus on activities that bring them joy and make these activities part of their daily routine 5. Try relaxation, meditation, breathing, and low-impact exercises 6. Consider cutting down on news updates (or at least find a balance) to reduce their stressful effects. 7. Draw on (or use) their strength, experience, and knowledge to deal with the situation.[30]

Recommendations targeting the individuals are not misplaced, as one certainly plays a role in coping with one's loneliness. The concern is rather that public health authorities and policy makers be content with relegating all responsibility unto the individual, thus relieving their own responsibility to assist those who are lonely. Such relegation of responsibility would prove to be an unwise and uninformed public health policy. Individuals may not even be aware that they are lonely; rather, they may label their reduced well-being as depression and rely on medications instead of attending to their loneliness. Second, as overcoming loneliness often requires other people, individuals may be dependent on their environment or external conditions as defined by Brownlee to enable and enrich human connections. Third, overcoming loneliness and actively engaging with other people may be difficult for some individuals, and some degree of "nudging" may be beneficial and morally justified in such instances. Fourth, loneliness is a complex psychological, philosophical, and social problem, and it may consequently require complex solutions.

One concrete example of relegating all responsibility unto the individual, as seen above, is by solely relying on technological solutions to alleviate loneliness, as if saying to the individual "there, we have provided you a computer—now it is completely up to you to cope with your loneliness." I thus turn to discuss technological solutions to loneliness.

4 | TECHNOLOGICAL SOLUTIONS AGAINST LONELINESS

The claim is not that technological solutions are ineffective against loneliness. Virtually all scholars and organizations acknowledge technological solutions at least as part of the solution to mitigate loneliness.[31] The empirical evidence that supports such technological solutions is indeed briefly reviewed below. Technological solutions, however, are arguably insufficient to wholly alleviate loneliness and should not be perceived as sufficient. Fortunately, this is acknowledged in two major reports published recently.

The National Academies of Sciences, Engineering, and Medicine (henceforth the National Academies report) issued a landmark report in 2020, lamenting the relative neglect of loneliness and social isolation as major social determinants of health. Unfortunately, the report focuses on people aged 50 years of age and older, but acknowledges that younger people suffer from loneliness as well. The report is unique in the literature on loneliness as it focuses on ways in which loneliness (and social isolation) may be addressed within the healthcare system. The report highlights, however, that successful prevention and mitigation will require involvement of public health and social care services. An ecological model of health is espoused, where factors affecting individual's well-being—specifically regarding loneliness and social isolation—are said to be a function of societal processes. Examples include public transportation, natural disasters, structural racism, changes in familial relations, and so forth. Most relevant to me here, the report mentions technological measures as potentially beneficial but encourages more research to elucidate potential harms as well. Lastly, the report also cites Aristotle: "A social instinct is implanted in all [people] by nature…."[32].

The World Health Organization issued a major report on loneliness and social isolation in 2021.[33] Unfortunately, again, the report focuses on the elderly, even while acknowledging the high prevalence in young adults. The report advocates the use of digital technology but is sensitive enough to acknowledge that it might be harmful and inadequate to mitigate loneliness by itself. The report finally identifies four levels of intervention: individual, relationship, community, and societal. Digital technology permeates throughout these levels: Individuals should make an effort using technological solutions to create and maintain relationships; communities should optimize the "digital inclusion" or their members; and societies or governments should promote laws and policies that address the digital divide where usually elderly individuals lack access to digital solutions or the adequate knowledge to use them.

The report identifies several potential ethical issues relating to the use of technology, including privacy infringement, informed consent, and allocative justice. As mentioned, the report emphasizes the potential shortfalls and concerns regarding technological solutions: "It is important to protect the right to remain offline and develop alternatives for those who cannot or do not wish to connect digitally."[34]

The potential advantages and disadvantages of technological solutions to loneliness are reviewed next. The reader may at this point feel the burning intuition that technological solutions to loneliness threaten something fundamental in human relations, that

Zhang, L., Zhang, Q., Cheung, T., & Ng, C. H. (2020). Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry, 7*, 228–229.

[29]Hwang, T.-J., Rabheru, K., Peisah, C., Reichman, W., & Ikeda, M. (2020). Loneliness and social isolation during the COVID-19 pandemic. *International Psychogeriatrics, 32*, 1217–1220.

[30]Inter-agency Standing Committee. (2021). *Living with the times: A mental health and psychosocial support toolkit for older adults during the COVID-19 pandemic*.

[31]Hwang, T.-J., et al., op. cit. note 29; Xiang, Y.-T., et al., op. cit. note 28.

[32]The National Academies of Sciences. (2020). *Social isolation and loneliness in older adults: Opportunities for the health care system* (p. 17) (this phrase does not appear in the copy of the author is using).

[33]World Health Organization, op. cit. note 2.

[34]Ibid: 10.

they threaten the very essence of what it is to be human. Intuitions, however, exist to merely motivate a normative deliberation; they cannot be its conclusion.

One of the traits that is often heralded as part of human essence and human interactions is empathy. Uncompromisingly capturing the intuition that empathy is only possible in face-to-face interactions, Sherry Turkle is concerned by the loss of the human opportunity to converse in a shared physical space and empathize due to the rise of technology and social media. She suggests that machines can only simulate empathy, which is not equivalent to actually experiencing and expressing empathy. Empathy is nourished by face-to-face conversation, and when we talk to machines, we forget how to converse with humans. Consequently, we neglect empathy, and we become alienated from what makes us human.[35]

5 | TECHNOLOGICAL SOLUTIONS AGAINST LONELINESS—JUSTIFICATIONS AND EMPIRICAL EVIDENCE

Digital technology is often used by people to relieve their loneliness and to connect with other people. There is no doubt that is descriptively true. There is also no doubt that during Covid, such use has increased, particularly during lockdowns, but also as people feared to come in contact with other people.[36] Technological solutions are strongly supported by theoretical arguments and empirical evidence as to their effectiveness.

Theoretically, virtual interactions may be similar to face-to-face interactions in morally and psychologically relevant ways. Empathy, for instance, indeed considered to be an essential element in human interactions, may require the experience of a lived body rather than strict embodiment, as is often thought. Virtual interactions may then allow space for and encourage empathy, the same way face-to-face interactions do.[37] Some technological solutions may even be perceived not as solutions at all, but rather as a natural evolution of the search for aloneness.[38] Facebook, in that sense, may be perceived descriptively as the newspaper for the young, allowing one to be alone while in company. It can then be seen normatively either positively, as enhancing one's capability for solitude, or negatively, as impoverishing it.[39] As one commentator puts it: "It is easier to be content with the absence of physical company if virtual contact can readily be made with friends and family…"[40]

Empirically, several technological solutions have been found to be effective[41] and are likely to be cost-effective as well. The use of a Care TV for instance, which makes use of a screen to facilitate contact with relatives and care services, has been shown to be effective.[42] Another video-based initiative that is potentially effective is the UnLonely Project, run by a nonprofit organization named The Foundation of Arts and Healing. The project includes the production and dissemination of short films to explore loneliness among people from various cultural and geographical contexts.[43]

Below, three main kinds of potential technological solutions to loneliness are reviewed.

5.1 | Social media

The use of social media, including Facebook, Snapchat, Instagram, and so forth, has been extremely common before Covid, and has of course increased during Covid.[44] As mentioned above, social media intuitively should increase feelings of social connectedness and allow for the kind of meaningful relations usually attributed to face-to-face interactions. If nothing else, Social media may simply allow individuals to preserve existing relationships.[45] While controversial, the evidence seems to suggest otherwise. One meta-analysis of observational studies demonstrated a positive correlation between loneliness and Facebook use, suggesting that loneliness simply drives individuals to use Facebook to a greater extent.[46] More telling, one experimental study of American college students has demonstrated that reduced time on social media decreased self-reported depression and loneliness.[47]

5.2 | Social robots

Social robots are human- or animal-shaped artificial intelligence systems, mobile or immobile, that have been heralded as potential aids against social isolation and loneliness as well as medical aids used in the care of the elderly and medical education.[48] They are designed to verbally communicate with their owners, provide reminders, and even attempt to assess their owner's mental state. One kind of a social robot, called ElliQ,[49] can tell random jokes and play cognitive games. While ElliQ looks like what one would have imagined a robot

[35]Turkle, S. (2016). *Reclaiming conversation: The power of talk in a digital age*. Penguin.
[36]Statista. (2022, February). *Social media use during COVID-19 worldwide—Statistics & facts*. https://www.statista.com/topics/7863/social-media-use-during-coronavirus-covid-19-worldwide/#dossierKeyfigures
[37]Osler, L. (2021). Taking empathy online. *Inquiry*, 1–28.
[38]Vincent, op. cit. note 9.
[39]Ibid.
[40]Ibid: 256.
[41]Poscia, A., Stojanovic, J., La Milia, D. I., Duplaga, M., Grysztar, M., Moscato, U., Onder, G., Collamati, A., Ricciardi, W., & Magnavita, N. (2018). Interventions targeting loneliness and social isolation among the older people: An update systematic review. *Experimental Gerontology*, *102*, 133–144.
[42]Ibid.
[43]The Foundation for Art & Healing. (2022, January). *About us*. https://www.artandhealing.org/about-foundation-art-healing/
[44]Statista, op. cit. note 36.
[45]Osler, L. (2020). Feeling togetherness online: A phenomenological sketch of online communal experiences. *Phenomenology and the Cognitive Sciences*, *19*, 569–588; Osler, op. cit. note 37; Song, H., Zmyslinski-Seelig, A., Kim, J., Drent, A., Victor, A., Omori, K., & Allen, M. (2014). Does Facebook make you lonely?: A meta analysis. *Computers in Human Behavior*, *36*, 446–452.
[46]Song, H., et al., op. cit. note 45.
[47]Hunt, M. G., Marx, R., Lipson, C., & Young, J. (2018). No more FOMO: Limiting social media decreases loneliness and depression. *Journal of Social and Clinical Psychology*, *37*, 751–768.
[48](2022, August). *Webinar: Social robots in healthcare*. YouTube. https://www.youtube.com/watch?v=gRzDnSSjLx8&list=PLKiYzqmsr55414gvwh8HnawNLfR6pjkia
[49]Intuition Robotics. (2022, February). *ElliQ, the sidekick for healthier, happier aging*.

should look like, PARO is a 5000$ US—worth robot shaped like a white seal that is able to communicate its "feelings" and move its flippers when touched.[50] Chatbots are often shapeless artificial intelligence systems usually used in automated voice services to simulate human-to-human conversation. Using artificial technology and neural networks, chatbots are also being used to engage in meaningful conversations with individuals and assess or predict their mental state.[51] The Woebot, for instance, functions as your personal therapist, interpreting your mood during your conversation and offering self-help strategies.[52]

The use of robots has anecdotally been proven to be effective.[53] The ENRICHME project examines whether robots may alleviate loneliness and the overall well-being of the elderly with mild cognitive impairment. In a pilot study of four participants in the intervention group compared with a control group, the former reported that the robot eased their loneliness and made the house friendlier.[54]

5.3 | VR

Substituting real-world sensory experience with a computer-generated one, VR has perhaps the greatest potential to effectively reduce loneliness.[55] VR may be employed either to simulate purely recreational activities or therapeutic encounters, such as the use of counseling avatars.[56] Such avatars simulate embodied humans who provide psychological care. Evidence of effectiveness or cost-effectiveness, however, seems to be lacking. One publication relies on three separate studies conducted with 54, 56, and 102, mostly university students from a leading university in the United States and concludes that interactions with avatars affected participants' behavior in the real world.[57] The authors claim that individuals reacted to avatars similarly to their reaction to other real humans. At the same time, however, the interaction with an avatar reduced the perceived quality of the parallel interaction that the participant had with another real human being.[58] VR may also specifically relieve loneliness among vulnerable populations, who are not able to physically participate in recreational activities. One small study, for instance, demonstrates that "public" singing in VR , benefited individuals with spinal cord injury.[59]

From a normative and public health policy perspectives, however, the question is whether virtual interactions can and should substitute face-to-face interactions. The "should" here is aimed not at individuals engaged in such interactions (although this may as well be a legitimate question) but rather at governments and public health bodies devoting resources to mitigate and prevent loneliness. In light of the discussion and evidence presented above, governments should certainly invest resources in developing and maintaining technological solutions to loneliness. At the same time, however, governments should not wholly or mostly rely on such measures, and leave it to individuals to cope with their own loneliness. Why? Because there is something in the essence of being an embodied human or in human interactions that requires real, physical contact with other humans. The next section tentatively explores what that thing may be.

6 | THE ESSENCE OF BEING HUMAN

"Human beings are fundamentally social animals. To have survived for millennia as hunter-gatherers in often harsh environments, individuals depended for their lives on strong bonds with a tightly knit social group. High-quality social connections are essential for our mental and physical health and our well-being—at all ages."[60]

As recognized by this quote from the WHO report, humans are essentially social creatures, in that we shape and recognize our identity through social interactions and find meaning in social connections.[61] Social connections are a prerequisite for personal autonomy.[62] We depend on social connections for our happiness, well-being, and health: "Human beings are social by nature, and high-quality social relationships are vital for health and well-being."[63]

The main question motivating this paper is whether online or any other technological solutions to the perceived lack of expected social connections- or loneliness—should be perceived as sufficient. One way to answer this question is empirical, by objectively and subjectively assessing peoples' experiences using such technologies. Some of that research is reviewed above, but from reviewing the literature, it is safe to say that the verdict is still out. The Australian study mentioned above, for instance, also found that technological solutions for loneliness were helpful, but not wholly adequate to alleviate it completely; participants needed human touch.

Another way to answer this question is theoretical and several strategies exist to drive the point home. Using a thought experiment—like that of the Nozickian machine—is one such strategy, meant to elicit

[50]Burton, A. (2013). Dolphins, dogs, and robot seals for the treatment of neurological disease. *The Lancet Neurology*, *12*, 851–852; PARO. (2022, Febraury). *Therapeutic robot*. http://www.parorobots.com/index.asp

[51]Fast Company. (2022, February). *5 ways technology can help fight the loneliness epidemic*. https://www.fastcompany.com/90515274/were-feeling-more-lonely-than-ever-here-are-5-ways-technology-can-help

[52]Woebot Health. (2022, February). *Relational agent for mental health*. https://woebothealth.com/

[53]Poscia, A., et al., op. cit. note 41.

[54](2019). 2019 annual scientific meeting. *Journal of American Geriatrics Society*, *67*, S1–S384.

[55]Pimentel, D., Foxman, M., Davis, D. Z., & Markowitz, D. M. (2021). Virtually real, but not quite there: Social and economic barriers to meeting virtual reality's true potential for mental health. *Journal is Frontiers in Virtual Reality*, 2. https://doi.org/10.3389/frvir.2021.627059

[56]Ibid.

[57]Miller, M. R., Jun. H., Herrera, F., Villa, J. Y., Welch, G., & Bailenson, J. N. (2019). Social interaction in augmented reality. *PLoS ONE*, *14*, e0216290.

[58]The methodology of the studies is complex, and describing them here will take too much space.

[59]Tamplin, J., Loveridge, B., Clarke, K., Li, Y., & J. Berlowitz, D. (2020). Development and feasibility testing of an online virtual reality platform for delivering therapeutic group singing interventions for people living with spinal cord injury. *Journal of Telemedicine and Telecare*, *26*, 365–375.

[60]World Health Organization, op. cit. note 2, p. 2.

[61]Nelson, H. L. (2001). *Damaged identities: Narrative repair*. Cornell University Press.

[62]Lederman, Z. (2019). Family for life and death: Family presence during resuscitation. *International Journal of Feminist Approaches to Bioethics*, *12*, 149–164.

[63]The National Academies of Sciences, op. cit. note 32, p. Xi.

intuitive dismay. Yet another strategy is to examine what exactly might be missing in online communication and perhaps other technological solutions. Empathy, as seen above, is one common response, but one that is not wholly convincing. As Lucy Osler convincingly argues, a feeling of togetherness, or more specifically what she calls we-togetherness, where humans feel empathy toward one another, may be achieved through online interactions and in fact may even be more significant and longer-lasting than face-to-face interactions.[64] Osler also convincingly demonstrates that expressivity, interactive communication, and empathic relations may be achieved through online communications and do not require face-to-face interactions.[65]

Another intuitive response is human physical contact, or simply human touch.

6.1 | Human touch

Touch seems to be an inseparable part of our social and intimate life. The sense of touch is couched in the skin, the largest organ in the human body, with several different kinds of touch receptors. Aristotle was highly impressed with the sense of touch that distinguished the superior humankind from the animals:

> While in respect of all the other senses we fall below many species of animals, in respect of touch we far excel all other species in exactness of discrimination. That is why man is the most intelligent of all animals.[66]

The organ of touch also distinguishes superior from inferior humans:

> …it is to differences in the organ of touch and to nothing else that the differences between man and man in respect of natural endowment are due; men whose flesh is hard are ill-endowed by nature, men whose flesh is soft, well endowed.[67]

Based on empirical observations, one author even argues that the sense of touch defines our human identity more than any other sense.[68] The lack of touch is then linked to pandemics, social distance, and loneliness:

> …as we lean toward conducting our relationships online and older people are said to be silently enduring an epidemic of loneliness, as we socially distance in the hope of quelling global pandemics, scientific evidence warns us to ignore this sense at our peril.[69]

Empirical evidence certainly supports the touch hypothesis, demonstrating that touch is important for people and that it can influence human interactions.[70] However, a theoretical analysis of touch as a necessary or at least significant panacea for loneliness, building perhaps upon historical[71] and bioethical[72] accounts of embodiments in medicine, is urgently needed.

Poetry may also be used to capture the importance of human touch to human essence. Spencer Michael Free, an American physician, was acutely aware of the importance of human touch:

> T is the human touch
> in this world that counts,
> The touch of your hand and mine,
> Which means far more
> to the fainting heart
> Than shelter and bread and wine.
> For shelter is gone when the night is o'er,
> And bread lasts only a day.
> But the touch of the hand
> And the sound of the voice
> Sing on in the soul always.[73]

What most kinds of technological solutions cannot achieve, then, is touch. Having said that, touch may be provided by humans with whom we have different kinds of relations, including romantic and nonromantic. Human touch may be pleasant or unpleasant. Moreover, romantic touch in general may be provided by animals or even by nonliving objects such as robots, and these kinds of touch may have similar salutary effects.[74] Furthermore, if we reduce the experience of touch to tactile receptors and neurophysiological phenomena, VR may indeed achieve the same effects. Whether all these kinds of touch can alleviate loneliness to the same degree again requires further empirical and theoretical analysis—if at all true, what is it about a specific kind of a pleasant human touch that is a fundamental part of human essence?

Another plausible sense that makes the physical encounter essential in addition to touch is smell.

6.2 | Smell

In contrast to the sense of touch, Aristotle believed that the human sense of smell is underdeveloped and inferior to that of animals. At the same time, however, the human organ of smell—the nose—is superior to that of animals as it is only active upon

[64]Osler, op. cit. note 45.
[65]Ibid.
[66]Aristotle. (2022). *The complete works*. De Anima. Pandora's Box. Book 9.
[67]Ibid.
[68]Higgins, op. cit. note 7.
[69]Ibid: chapter 5.
[70]Eckstein, M., Mamaev, I., Ditzen, B., & Sailer, U. (2020). Calming effects of touch in human, animal, and robotic interaction—Scientific state-of-the-art and technical advances. *Front Psychiatry*, *11*, 555058.
[71]Porter, R. (2003). *Flesh in the age of reason*. W. W. Norton & Company.
[72]Campbell, A. V. (2009). *The body in bioethics*. Routledge.
[73]All Poetry. (2022, March). *The human touch by Spencer Michael Free—Famous poems, famous poets*. https://allpoetry.com/poem/8579885-The-Human-Touch-by-Spencer-Michael-Free
[74]Eckstein, M., et al., note 70.

inspiration, while animals cannot but smell continuously. This makes the human nose superior because this way, humans can control what they smell while animals cannot.[75] Current evidence disproves both these claims.

While fish cannot distinguish between taste and smell, all terrestrial mammals have separate anatomical structures with some cerebral overlap. The olfactory system in general is the most ancient sensory system, and its basic structures in vertebrates have been conserved across 500 million years. The olfactory system consists of two subsystems: a main one and an accessory one. It was once thought that the function of the main olfactory system was to detect odorants, while that of the accessory one was to detect pheromones produced by other organisms. This theory, however, is now controversial; the main olfactory system has been shown to detect both odorants and pheromones.[76] Whatever the case might be, humans only possess the main olfactory system. Odorants are detected in specific cells found in the nasal cavity and are directly transmitted to the central nervous system (CNS) or cerebrum for perceptual processing. This distinguishes the olfactory sense from other senses that are initially processed in the thalamus prior to being transmitted to the cerebrum. The sense of smell is then a way for the CNS to directly communicate with the environment. In the cerebrum, olfactory information is processed in the limbic system, where emotions and memory are stored as well. Humans thus feel scents before smelling them.[77]

The human sense of smell, similar perhaps only to the sense of touch, cannot be shut down. Humans have to breathe to survive, and even oral breathing conveys some olfactory information. The human repertoire of scent discrimination was once thought to be limited, but the consensus nowadays is that the human ability to detect, process, and distinguish different scents is quite extensive.[78]

These evolutionary and biological traits of the sense of smell undoubtedly translate to it being significant to human lives and flourishing. As one anonymous reviewer of the present paper noted intuitively, intimate and nonintimate human relations rely heavily on smell. We are drawn to people with certain smells and shy away from people with other certain smells.

One must admit, however, that the experience of smell can plausibly be reduced to the mere activation of olfactory cells, meaning, to nothing but a physiological phenomenon. In this case, virtual reality may potentially stimulate wholesome olfactory-triggered sensations simply by using odorants, either natural or artificial. If this is true, then smell cannot be what distinguishes technological solutions to loneliness from other, nontechnological solutions.

Further empirical and theoretical research is obviously needed to wholly explore touch, smell, or other components of the human experience as essentially irreplaceable even with technological innovations.

As we enrich our scientific and theoretical understanding of loneliness, however, we should cater perhaps to the intuition that technological solutions are insufficient. Granted the normative aspect of loneliness, that is, that it is bad to be lonely and that someone should do something about it, community-level solutions are warranted, and these should be guided by the best evidence available.[79] The evidence so far supports the following interventions:

1. Community-based structured encounters and designated "gatekeepers" whose charge is to facilitate such encounters.
2. A combination of community-based, in-contact solutions with online solutions, for example, by having small-group instructional sessions on the use of Internet services.
3. Animal-assisted support, where animals are being cared for by humans and humans benefit from their presence.[80]

7 | SUMMARY

"Better understanding of digital interventions is necessary and especially of digital divides, potential harmful effects of digital interventions and whether virtual connections can supplement face-to-face social connections."[81]

Loneliness is a rich historical and philosophical concept, and is a major public health concern. The present author is building a case to make loneliness a major bioethics concern as well.

This paper heeds the call of the WHO seen in the quote above and seeks to better understand technological solutions to loneliness. The paper specifically explores whether virtual connections can supplement face-to-face connections, arguing that they cannot. The paper supports the use of technological solutions to loneliness as a matter of public policy but warns against relying solely on them. Available empirical evidence simply does not allow such reliance. More importantly, *even if technological solutions were empirically proven to be enough to mitigate loneliness as traditionally defined*, national and international health organizations should not solely rely on them because there is something in human essence that cannot and should not be provided through technological solutions. Put differently, the essence of what it means to be human or the essence

[75]Aristotle, op. cit. note 66, book 9.
[76]McGann, J. P. (2017). Poor human olfaction is a 19th-century myth. *Science*, *356*.
[77]Hoover, K. C. (2010). Smell with inspiration: The evolutionary significance of olfaction. *Yearbook of Physical Anthropology*, *143*, 63–74.
[78]Ibid., McGann, op. cit. note 76.
[79]Poscia, A., et al., op. cit. note 41.
[80]Black, K. (2012). The relationship between companion animals and loneliness among rural adolescents. *Journal of Pediatric Nursing*, *27*, 103–112; Gilbey, A., & Tani, K. (2015). Companion animals and loneliness: A systematic review of quantitative studies. *Anthrozoös*, *28*, 181–197. Although not all research concurs: Mueller, M. K., Richer, A. M., Callina, K. S., & Charmaraman, L. (2021). Companion animal relationships and adolescent loneliness during COVID-19. *Animals*, *11*.
[81]World Health Organization, op. cit. note 2, p. 9.

of human interactions cannot be wholly substituted by technological measures, sophisticated as they may be.

Human touch, for instance, may be a fundamental aspect in human essence and cannot be provided by most technological solutions.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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