Loneliness in a Connected World

Background Readings

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Foreword

Humans are social creatures. This primal human instinct to be together has led us to form intimate bonds with one another, to share our experiences, and to form long-lasting communities. Yet, despite this innate desire to connect, feelings of loneliness and isolation prevail. As Jill Lepore notes, “Loneliness is grief, distended.” It is an elusive condition often described as being disconnected, abandoned, or alone, often exacerbated by a lack of trust and intimacy even when others are around. Worse, loneliness has well documented consequences for physical health and well-being, as well.

We are now six months into a global pandemic which has been marked by physical isolation, restrictions on public gatherings, and a mass migration to online education and remote working—conditions ripe for escalating anxiety, agitation, and depression. The moment demands that we address the global health crisis to better understand loneliness, its relationship to technology and social connection, and ultimately its impact on our overall public health.

To begin to unpack the challenges and uncover solutions, Aspen Digital, in collaboration with Facebook, is hosting a series of roundtables to explore the intersection of loneliness, technology, and social connection. This first roundtable titled, “Loneliness in a Connected World,” will focus on current research and measurement strategies, and will examine specific characteristics of loneliness as it relates to technology and social media. We hope that these discussions will play a critical role in informing loneliness research, as well as potential areas for industry investment to advance the future of loneliness and social connection.

In the Aspen tradition, the following readings provide a common starting point for discussion by highlighting trends and emerging issues and providing contrasting viewpoints for how to approach the topic. As such, we have included pieces that focus on how we currently understand loneliness and what we may need to better understand in the context of our digital world. This includes pieces that reflect on how loneliness has been historically defined and framed, as well as the various methodological tools to examine it both online and offline. The collection urges the reader to consider the multiple lenses by which loneliness has been presented, discussed, and analyzed.

We recognize the vast amount of excellent and ongoing research in this space. The goal of these discussions is to highlight this work and identify how we may move forward in our appreciation for what loneliness permits and prevents for human flourishing.

We look forward to hearing your thoughts and feedback.

Vivian Schiller
Executive Director
Aspen Digital
CANTICLE 6
by May Sarton

Alone one is never lonely: the spirit
adventures, waking
In a quiet garden, in a cool house,_abiding single there;
The spirit adventures in sleep, the sweet thirst-slaking
When only the moon’s reflection touches the wild hair.
There is no place more intimate than the spirit alone:
It finds a lovely certainty in the evening and the morning.
It is only where two have come together bone against bone
That those alonenesses take place, when, without warning
The sky opens over their heads to an infinite hole in space;
It is only turning at night to a lover that one learns
He is set apart like a star forever and that sleeping face
(For whom the heart has cried, for whom the frail hand burns)
Is swung out in the night alone, so luminous and still,
The waking spirit attends, the loving spirit gazes
Without communion, without touch, and comes to know at last
Out of a silence only and never when the body blazes
That love is present, that always burns alone, however steadfast.
Part I. What we need to know about loneliness
The History of Loneliness
Jill Lepore, The New Yorker, March 30, 2020

Until a century or so ago, almost no one lived alone; now many endure shutdowns and lockdowns on their own. How did modern life get so lonely?

The female chimpanzee at the Philadelphia Zoological Garden died of complications from a cold early in the morning of December 27, 1878. “Miss Chimpanzee,” according to news reports, died “while receiving the attentions of her companion.” Both she and that companion, a four-year-old male, had been born near the Gabon River, in West Africa; they had arrived in Philadelphia in April, together. “These Apes can be captured only when young,” the zoo superintendent, Arthur E. Brown, explained, and they are generally taken only one or two at a time. In the wild, “they live together in small bands of half a dozen and build platforms among the branches, out of boughs and leaves, on which they sleep.” But in Philadelphia, in the monkey house, where it was just the two of them, they had become “accustomed to sleep at night in each other’s arms on a blanket on the floor,” clutching each other, desperately, achingly, through the long, cold night.

The Philadelphia Zoological Garden was the first zoo in the United States. It opened in 1874, two years after Charles Darwin published “The Expression of the Emotions in Man and Animals,” in which he related what he had learned about the social attachments of primates from Abraham Bartlett, the superintendent of the Zoological Society of London:

Many kinds of monkeys, as I am assured by the keepers in the Zoological Gardens, delight in fondling and being fondled by each other, and by persons to whom they are attached. Mr. Bartlett has described to me the behavior of two chimpanzees, rather older animals than those generally imported into this country, when they were first brought together. They sat opposite, touching each other with their much protruded lips; and the one put his hand on the shoulder of the other. They then mutually folded each other in their arms. Afterwards they stood up, each with one arm on the shoulder of the other, lifted up their heads, opened their mouths, and yelled with delight.

Mr. and Miss Chimpanzee, in Philadelphia, were two of only four chimpanzees in America, and when she died human observers mourned her loss, but, above all, they remarked on the
behavior of her companion. For a long time, they reported, he tried in vain to rouse her. Then he “went into a frenzy of grief.” This paroxysm accorded entirely with what Darwin had described in humans: “Persons suffering from excessive grief often seek relief by violent and almost frantic movements.” The bereaved chimpanzee began to pull out the hair from his head. He wailed, making a sound the zookeeper had never heard before: *Hah-ah-ah-ah-ah*. “His cries were heard over the entire garden. He dashed himself against the bars of the cage and butted his head upon the hard-wood bottom, and when this burst of grief was ended he poked his head under the straw in one corner and moaned as if his heart would break.”

Nothing quite like this had ever been recorded. Superintendent Brown prepared a scholarly article, “Grief in the Chimpanzee.” Even long after the death of the female, Brown reported, the male “invariably slept on a cross-beam at the top of the cage, returning to inherited habit, and showing, probably, that the apprehension of unseen dangers has been heightened by his sense of loneliness.”

Loneliness is grief, distended. People are primates, and even more sociable than chimpanzees. We hunger for intimacy. We wither without it. And yet, long before the present pandemic, with its forced isolation and social distancing, humans had begun building their own monkey houses. Before modern times, very few human beings lived alone. Slowly, beginning not much more than a century ago, that changed. In the United States, more than one in four people now lives alone; in some parts of the country, especially big cities, that percentage is much higher. You can live alone without being lonely, and you can be lonely without living alone, but the two are closely tied together, which makes lockdowns, sheltering in place, that much harder to bear. Loneliness, it seems unnecessary to say, is terrible for your health. In 2017 and 2018, the former U.S. Surgeon General Vivek H. Murthy declared an “epidemic of loneliness,” and the U.K. appointed a Minister of Loneliness. To diagnose this condition, doctors at U.C.L.A. devised a Loneliness Scale. Do you often, sometimes, rarely, or never feel these ways?

*I am unhappy doing so many things alone.*
*I have nobody to talk to.*
*I cannot tolerate being so alone.*
*I feel as if nobody really understands me.*
*I am no longer close to anyone.*
There is no one I can turn to.
I feel isolated from others.

In the age of quarantine, does one disease produce another?

“Loneliness” is a vogue term, and like all vogue terms it’s a cover for all sorts of things most people would rather not name and have no idea how to fix. Plenty of people like to be alone. I myself love to be alone. But solitude and seclusion, which are the things I love, are different from loneliness, which is a thing I hate. Loneliness is a state of profound distress. Neuroscientists identify loneliness as a state of hypervigilance whose origins lie among our primate ancestors and in our own hunter-gatherer past. Much of the research in this field was led by John Cacioppo, at the Center for Cognitive and Social Neuroscience, at the University of Chicago. Cacioppo, who died in 2018, was known as Dr. Loneliness. In the new book “Together: The Healing Power of Human Connection in a Sometimes Lonely World” (Harper Wave), Murthy explains how Cacioppo’s evolutionary theory of loneliness has been tested by anthropologists at the University of Oxford, who have traced its origins back fifty-two million years, to the very first primates. Primates need to belong to an intimate social group, a family or a band, in order to survive; this is especially true for humans (humans you don’t know might very well kill you, which is a problem not shared by most other primates). Separated from the group—either finding yourself alone or finding yourself among a group of people who do not know and understand you—triggers a fight-or-flight response. Cacioppo argued that your body understands being alone, or being with strangers, as an emergency. “Over millennia, this hypervigilance in response to isolation became embedded in our nervous system to produce the anxiety we associate with loneliness,” Murthy writes. We breathe fast, our heart races, our blood pressure rises, we don’t sleep. We act fearful, defensive, and self-involved, all of which drive away people who might actually want to help, and tend to stop lonely people from doing what would benefit them most: reaching out to others.

The loneliness epidemic, in this sense, is rather like the obesity epidemic. Evolutionarily speaking, panicking while being alone, like finding high-calorie foods irresistible, is highly adaptive, but, more recently, in a world where laws (mostly) prevent us from killing one another, we need to work with strangers every day, and the problem is more likely to be too much high-calorie food rather than too little. These drives backfire.
Loneliness, Murthy argues, lies behind a host of problems—anxiety, violence, trauma, crime, suicide, depression, political apathy, and even political polarization. Murthy writes with compassion, but his everything-can-be-reduced-to-loneliness argument is hard to swallow, not least because much of what he has to say about loneliness was said about homelessness in the nineteen-eighties, when "homelessness" was the vogue term—a word somehow easier to say than "poverty"—and saying it didn’t help. (Since then, the number of homeless Americans has increased.) Curiously, Murthy often conflates the two, explaining loneliness as feeling homeless. To belong is to feel at home. "To be at home is to be known," he writes. Home can be anywhere. Human societies are so intricate that people have meaningful, intimate ties of all kinds, with all sorts of groups of other people, even across distances. You can feel at home with friends, or at work, or in a college dining hall, or at church, or in Yankee Stadium, or at your neighborhood bar. Loneliness is the feeling that no place is home. “In community after community,” Murthy writes, “I met lonely people who felt homeless even though they had a roof over their heads.” Maybe what people experiencing loneliness and people experiencing homelessness both need are homes with other humans who love them and need them, and to know they are needed by them in societies that care about them. That’s not a policy agenda. That’s an indictment of modern life.

In “A Biography of Loneliness: The History of an Emotion” (Oxford), the British historian Fay Bound Alberti defines loneliness as “a conscious, cognitive feeling of estrangement or social separation from meaningful others,” and she objects to the idea that it’s universal, transhistorical, and the source of all that ails us. She argues that the condition really didn’t exist before the nineteenth century, at least not in a chronic form. It’s not that people—widows and widowers, in particular, and the very poor, the sick, and the outcast—weren’t lonely; it’s that, since it wasn’t possible to survive without living among other people, and without being bonded to other people, by ties of affection and loyalty and obligation, loneliness was a passing experience. Monarchs probably were lonely, chronically. (Hey, it’s lonely at the top!) But, for most ordinary people, daily living involved such intricate webs of dependence and exchange—and shared shelter—that to be chronically or desperately lonely was to be dying. The word “loneliness” very seldom appears in English before about 1800. Robinson Crusoe was alone, but never lonely. One exception is “Hamlet”: Ophelia suffers from “loneliness”; then she drowns herself.

Modern loneliness, in Alberti’s view, is the child of capitalism and secularism. "Many of the divisions and hierarchies that have developed since the eighteenth century—between self
and world, individual and community, public and private—have been naturalized through the politics and philosophy of individualism,” she writes. “Is it any coincidence that a language of loneliness emerged at the same time?” It is not a coincidence. The rise of privacy, itself a product of market capitalism—privacy being something that you buy—is a driver of loneliness. So is individualism, which you also have to pay for.

Alberti’s book is a cultural history (she offers an anodyne reading of “Wuthering Heights,” for instance, and another of the letters of Sylvia Plath). But the social history is more interesting, and there the scholarship demonstrates that whatever epidemic of loneliness can be said to exist is very closely associated with living alone. Whether living alone makes people lonely or whether people live alone because they’re lonely might seem to be harder to say, but the preponderance of the evidence supports the former: it is the force of history, not the exertion of choice, that leads people to live alone. This is a problem for people trying to fight an epidemic of loneliness, because the force of history is relentless.

Before the twentieth century, according to the best longitudinal demographic studies, about five per cent of all households (or about one per cent of the world population) consisted of just one person. That figure began rising around 1910, driven by urbanization, the decline of live-in servants, a declining birth rate, and the replacement of the traditional, multigenerational family with the nuclear family. By the time David Riesman published “The Lonely Crowd,” in 1950, nine per cent of all households consisted of a single person. In 1959, psychiatry discovered loneliness, in a subtle essay by the German analyst Frieda Fromm-Reichmann. “Loneliness seems to be such a painful, frightening experience that people will do practically everything to avoid it,” she wrote. She, too, shrank in horror from its contemplation. “The longing for interpersonal intimacy stays with every human being from infancy through life,” she wrote, “and there is no human being who is not threatened by its loss.” People who are not lonely are so terrified of loneliness that they shun the lonely, afraid that the condition might be contagious. And people who are lonely are themselves so horrified by what they are experiencing that they become secretive and self-obsessed—“it produces the sad conviction that nobody else has experienced or ever will sense what they are experiencing or have experienced,” Fromm-Reichmann wrote. One tragedy of loneliness is that lonely people can’t see that lots of people feel the same way they do.

“During the past half century, our species has embarked on a remarkable social experiment,” the sociologist Eric Klinenberg wrote in “Going Solo: The Extraordinary Rise and Surprising
Appeal of Living Alone,” from 2012. “For the first time in human history, great numbers of people—at all ages, in all places, of every political persuasion—have begun settling down as singletons.” Klinenberg considers this to be, in large part, a triumph; more plausibly, it is a disaster. Beginning in the nineteen-sixties, the percentage of single-person households grew at a much steeper rate, driven by a high divorce rate, a still-falling birth rate, and longer lifespans over all. (After the rise of the nuclear family, the old began to reside alone, with women typically outliving their husbands.) A medical literature on loneliness began to emerge in the nineteen-eighties, at the same time that policymakers became concerned with, and named, “homelessness,” which is a far more dire condition than being a single-person household: to be homeless is to be a household that does not hold a house. Cacioppo began his research in the nineteen-nineties, even as humans were building a network of computers, to connect us all. Klinenberg, who graduated from college in 1993, is particularly interested in people who chose to live alone right about then.

I suppose I was one of them. I tried living alone when I was twenty-five, because it seemed important to me, the way owning a piece of furniture that I did not find on the street seemed important to me, as a sign that I had come of age, could pay rent without subletting a sublet. I could afford to buy privacy, I might say now, but then I’m sure I would have said that I had become “my own person.” I lasted only two months. I didn’t like watching television alone, and also I didn’t have a television, and this, if not the golden age of television, was the golden age of “The Simpsons,” so I started watching television with the person who lived in the apartment next door. I moved in with him, and then I married him.

This experience might not fit so well into the story Klinenberg tells; he argues that networked technologies of communication, beginning with the telephone’s widespread adoption, in the nineteen-fifties, helped make living alone possible. Radio, television, Internet, social media: we can feel at home online. Or not. Robert Putnam’s influential book about the decline of American community ties, “Bowling Alone,” came out in 2000, four years before the launch of Facebook, which monetized loneliness. Some people say that the success of social media was a product of an epidemic of loneliness; some people say it was a contributor to it; some people say it’s the only remedy for it. Connect! Disconnect! The Economist declared loneliness to be “the leprosy of the 21st century.” The epidemic only grew.

This is not a peculiarly American phenomenon. Living alone, while common in the United States, is more common in many other parts of the world, including Scandinavia, Japan,
Germany, France, the U.K., Australia, and Canada, and it’s on the rise in China, India, and Brazil. Living alone works best in nations with strong social supports. It works worst in places like the United States. It is best to have not only an Internet but a social safety net.

Then the great, global confinement began: enforced isolation, social distancing, shutdowns, lockdowns, a human but inhuman zoological garden. Zoom is better than nothing. But for how long? And what about the moment your connection crashes: the panic, the last tie severed? It is a terrible, frightful experiment, a test of the human capacity to bear loneliness. Do you pull out your hair? Do you dash yourself against the walls of your cage? Do you, locked inside, thrash and cry and moan? Sometimes, rarely, or never? More today than yesterday?
We're Not Wired to Be This Alone

When the lockdown began — the orders to avoid travel, to avoid friends, to “shelter in place,” to shrink our worlds to the slightest physical dimensions endurable — my first impression was of how quickly and ingeniously we adapted. Abracadabra: Classrooms went online. Physicians and therapists used Zoom to see patients. Happy hour happened on FaceTime.

We’re going to realize, I thought, how much can be accomplished without the muss and fuss of meeting in person. Many of our activities will migrate into cyberspace forevermore.

Weeks later, I think the opposite. I know of exactly no one who’s satisfied with this way of doing things. Friends who have scores of faithful email and text-message correspondents tell me that they nonetheless feel out of touch and out of sorts. Colleagues who regarded the occasional opportunity to work from home as a gift concede that the office is looking better and better all the time. It has virtues beyond free pens and paper clips. It has, well, other people.

I’m suddenly a digital whirlwind, exponentially more fluent in emoticons and emojis than before. I never knew there was such bounty, such variety. But there’s not a one of them, no matter how colorful, that has the melting warmth of a flesh-and-blood smile that’s happening right in front of me, unmediated by keypad or keystroke.

Last week an eagle-eyed friend of mine, Eric Johnson, sent me an article by The Times’s Mike Isaac and Sheera Frenkel, in case I’d missed it, about the pressure on Facebook to manage the intensified use of the platform during this chapter of forbidden proximity. That subject interested him less than this particular passage:

“"The strain has been compounded by Facebook’s work force adapting to working from home, which had been discouraged in the past. The company’s executives have long preached internally that face-to-face meetings and in-person collaboration were central to Facebook’s success. The importance of in-person conversation was so great that employees at offices from Singapore to New York were frequently asked to travel to the company’s headquarters in Menlo Park, Calif., for quarterly meetings.”

Think about that, Eric wrote: “The champions of digital connection don’t actually believe in it when it comes to their own business.”

We’re not wired for “social distancing,” that ugly new oxymoron. We didn’t evolve to be physically separated from the humans at the core of our lives. It’s unnatural. More than that, it’s unhealthy.

A quickly growing body of journalism explores the possible wages of the isolation now thrust upon us. “In a time of distancing due to coronavirus, the health threat of loneliness looms”
was the headline on an article last week by Joanna Silberner on the medical news website Stat. It spotlighted a recent report — by Dan Blazer, a Duke University psychiatrist and epidemiologist, and a committee of other scientists and policymakers — that linked loneliness in elderly people to increased risks of heart disease, stroke, dementia, high cholesterol, diabetes and more.

In The New Yorker, Robin Wright cited a 2015 analysis by Julianne Holt-Lunstad, a neuroscientist and psychologist at Brigham Young University, who integrated the findings of 70 studies to conclude that “loneliness increased the rate of early death by 26 percent; social isolation led to an increased rate of mortality of 29 percent, and living alone by 32 percent — no matter the subject’s age, gender, location, or culture.”

I called Blazer and then Holt-Lunstad to ask whether use of digital communication could significantly mitigate those negative outcomes. Both said that my question was unanswerable in terms of the available science.

But both also said that, in their guts, they didn’t believe that the pandemic would teach us that such connection is anywhere close to the real thing.

Blazer noted that we have five senses: sight, hearing, smell, touch and taste. Only the first two come into play when we interact with someone online.

“I’ve worked with older people for many years, and sometimes, just putting a hand on their arm can make a big difference in being able to communicate with them,” he said.

Holt-Lunstad came up with a great metaphor for digital versus actual encounters. An online conversation, she said, “is kind of like processed food. It’s better than nothing.” It’s a convenience in the clutch, satiating in the moment and easily consumed by enormous numbers of people. Some forms of it have some nutrition. But it’s not an optimal or sustainable long-term diet.

And it has additives that make it more alluring and even addictive. For processed foods, those are high fructose corn syrup, monosodium glutamate and other flavor enhancers. For social media, those are likes, shares and favorites, which confer a hollow affirmation from people who won’t ever leave chicken soup at our doorsteps or, for that matter, cross the thresholds of our homes.

I keep thinking of those famous studies about the importance of touch to infants and how those deprived of it suffer greatly. We adults also suffer without it, if not quite as much.

When we connect only via laptop and smartphone screens, there are no handshakes, no hugs.

And when we clink glasses virtually, they don’t make a sound.
One is the Loneliest Number: The History of a Western Problem
Fay Bound Alberti, Aeon, September 12, 2018

‘God, but life is loneliness,’ declared the writer Sylvia Plath in her private journals. Despite all the grins and smiles we exchange, she says, despite all the opiates we take:

when at last you find someone to whom you feel you can pour out your soul, you stop in shock at the words you utter – they are so rusty, so ugly, so meaningless and feeble from being kept in the small cramped dark inside you so long.

By the 21st century, loneliness has become ubiquitous. Commentators call it ‘an epidemic’, a condition akin to ‘leprosy’, and a ‘silent plague’ of civilisation. In 2018, the United Kingdom went so far as to appoint a Minister for Loneliness. Yet loneliness is not a universal condition; nor is it a purely visceral, internal experience. It is less a single emotion and more a complex cluster of feelings, composed of anger, grief, fear, anxiety, sadness and shame. It also has social and political dimensions, shifting through time according ideas about the self, God and the natural world. Loneliness, in other words, has a history.

The term 'loneliness' first crops up in English around 1800. Before then, the closest word was 'oneliness', simply the state of being alone. As with solitude – from the Latin 'solus' which meant ‘alone’ – ‘oneliness’ was not coloured by any suggestion of emotional lack. Solitude or oneliness was not unhealthy or undesirable, but rather a necessary space for reflection with God, or with one’s deepest thoughts. Since God was always nearby, a person was never truly alone. Skip forward a century or two, however, and the use of ‘loneliness’ – burdened with associations of emptiness and the absence of social connection – has well and truly surpassed oneliness. What happened?

The contemporary notion of loneliness stems from cultural and economic transformations that have taken place in the modern West. Industrialisation, the growth of the consumer economy, the declining influence of religion and the popularity of evolutionary biology all served to emphasise that the individual was what mattered – not traditional, paternalistic visions of a society in which everyone had a place.

In the 19th century, political philosophers used Charles Darwin’s theories about the ‘survival of the fittest’ to justify the pursuit of individual wealth to Victorians. Scientific medicine, with its emphasis on brain-centred emotions and experiences, and the classification of the body into ‘normal’ and abnormal states, underlined this shift. The four humours (phlegmatic, sanguine, choleric, melancholic) that had dominated Western medicine for 2,000 years and made people into ‘types’, fell away in favour of a new model of health dependent on the physical, individual body.

In the 20th century, the new sciences of the mind – especially psychiatry and psychology – took centre-stage in defining the healthy and unhealthy emotions an individual should
experience. Carl Jung was the first to identify ‘introvert’ and ‘extravert’ personalities (to use the original spelling) in his *Psychological Types* (1921). Introversion became associated with neuroticism and loneliness, while extroversion was linked to sociability, gregariousness and self-reliance. In the US, these ideas took on special significance as they were linked to individual qualities associated with self-improvement, independence and the go-getting American dream.

The negative associations of introversion help to explain why loneliness now carries such social stigma. Lonely people seldom want to admit they are lonely. While loneliness can create empathy, lonely people have also been subjects of contempt; those with strong social networks often avoid the lonely. It is almost as though loneliness were contagious, like the diseases with which it is now compared. When we use the language of a modern epidemic, we contribute to a moral panic about loneliness that can aggravate the underlying problem. Presuming that loneliness is a widespread but fundamentally individual affliction will make it nearly impossible to address.

For centuries, writers have recognised the relationship between mental health and belonging to a community. Serving society was another way to serve the individual – because, as the poet Alexander Pope put it in his poem *An Essay on Man* (1734): ‘True self-love and social are the same’. It’s not surprising, then, to find that loneliness serves a physiological and social function, as the late neuroscientist John Cacioppo argued: like hunger, it signals a threat to our wellbeing, born of exclusion from our group or tribe.

‘No man is an island,’ wrote the poet John Donne in a similar spirit, in *Devotions Upon Emergent Occasions* (1624) – nor woman either, for each one formed ‘a piece of the continent, a part of the main.’ If a ‘clod be washed away by the sea, Europe is the less … any man’s death diminishes me, because I am involved in mankind’. For some of us, Donne’s remarks take on special poignancy in light of the UK’s departure from Europe, or the narcissism of Donald Trump’s US presidency. They also return us to medical metaphors: Donne’s references to the body politic being destroyed is reminiscent of modern loneliness as a physical affliction, a plague of modernity.

We urgently need a more nuanced appraisal of who is lonely, when and why. Loneliness is lamented by politicians because it is expensive, especially for an ageing population. People who are lonely are more likely to develop illnesses such as cancer, heart disease and depression, and 50 per cent more likely to die prematurely than non-lonely counterparts. But there is nothing inevitable about being old and alone – even in the UK and the US where, unlike much of Europe, there isn’t a history of inter-familial care of the aged. Loneliness and economic individualism are connected.

Until the 1830s in the UK, elderly people were cared for by neighbours, friends and family, as well as by the parish. But then Parliament passed the New Poor Law, a reform that abolished financial aid for people except the aged and infirm, restricting that help to those in workhouses, and considered poverty relief to be loans that were administered via a bureaucratic, impersonal process. The rise of city living and the breakdown of local communities, as well as the grouping of the needy together in purpose-built buildings,
produced more isolated, elderly people. It is likely, given their histories, that individualistic countries (including the UK, South Africa, the US, Germany and Australia) might experience loneliness differently to collectivist countries (such as Japan, China, Korea, Guatemala, Argentina and Brazil). Loneliness, then, is experienced differently across place as well as time.

None of this is meant to sentimentalise communal living or suggest that there was no social isolation prior to the Victorian period. Rather, my claim is that human emotions are inseparable from their social, economic and ideological contexts. The righteous anger of the morally affronted, for instance, would be impossible without a belief in right and wrong, and personal accountability. Likewise, loneliness can exist only in a world where the individual is conceived as separate from, rather than part of, the social fabric. It’s clear that the rise of individualism corroded social and communal ties, and led to a language of loneliness that didn’t exist prior to around 1800.

Where once philosophers asked what it took to live a meaningful life, the cultural focus has shifted to questions about individual choice, desire and accomplishment. It is no coincidence that the term ‘individualism’ was first used (and was a pejorative term) in the 1830s, at the same time that loneliness was in the ascendant. If loneliness is a modern epidemic, then its causes are also modern – and an awareness of its history just might be what saves us.
Part II. How we learn to understand loneliness
The Welfare Effects of Social Media (Excerpt)
By Hunt Allcott, Luca Braghieri, Sarah Eichmeyer, and Matthew Gentzkow*

The rise of social media has provoked both optimism about potential societal benefits and concern about harms such as addiction, depression, and political polarization. In a randomized experiment, we find that deactivating Facebook for the four weeks before the 2018 US midterm election (i) reduced online activity, while increasing offline activities such as watching TV alone and socializing with family and friends; (ii) reduced both factual news knowledge and political polarization; (iii) increased subjective well-being; and (iv) caused a large persistent reduction in post-experiment Facebook use. Deactivation reduced post-experiment valuations of Facebook, suggesting that traditional metrics may overstate consumer surplus.

Social media have had profound impacts on the modern world. Facebook, which remains by far the largest social media company, has 2.3 billion monthly active users worldwide (Facebook 2018). As of 2016, the average user was spending 50 minutes per day on Facebook and its sister platforms Instagram and Messenger (Facebook 2016). There may be no technology since television that has so dramatically reshaped the way people get information and spend their time. Speculation about social media’s welfare impact has followed a familiar trajectory, with early optimism about potential benefits giving way to widespread concern about possible harms. At a basic level, social media dramatically reduce the cost of connecting, communicating, and sharing information with others. Given that interpersonal connections are among the most important drivers of happiness and well-being (Myers 2000; Reis, Collins, and Berscheid 2000; Argyle 2001; Chopik 2017), this could be expected to bring widespread improvements to individual welfare. Many have also pointed to wider social benefits, from facilitating protest and resistance in autocratic countries, to encouraging activism and political participation in established democracies (Howard et al. 2011, Kirkpatrick 2011).

More recent discussion has focused on an array of possible negative impacts. At the individual level, many have pointed to negative correlations between intensive social media use and both subjective well-being and mental health. Adverse outcomes such as suicide and depression appear to have risen sharply over the same period that the use of smartphones and social media has expanded. Alter (2018) and Newport (2019), along with other academics and prominent Silicon Valley executives in the “time well-spent” movement, argue that digital media devices and social media apps are harmful and addictive. At the broader social level, concern has focused particularly on a range of negative political externalities. Social media may create ideological “echo chambers” among like-minded friend groups, thereby increasing political polarization (Sunstein 2001, 2017; Settle 2018).

Furthermore, social media are the primary channel through which misinformation spreads online (Allcott and Gentzkow 2017), and there is concern that coordinated disinformation...
campaigns can affect elections in the United States and abroad. In this paper, we report on a large-scale randomized evaluation of the welfare impacts of Facebook, focusing on US users in the run-up to the November 2018 midterm elections. We recruited a sample of 2,743 users through Facebook display ads, and elicited their willingness-to-accept (WTA) to deactivate their Facebook accounts for a period of four weeks ending just after the election. We then randomly assigned the 61 percent of these subjects with WTA less than $102 to either a Treatment group that was paid to deactivate, or a Control group that was not. We verified compliance with deactivation by regularly checking participants’ public profile pages. We measured a suite of outcomes using text messages, surveys, emails, direct measurement of Facebook and Twitter activity, and administrative voting records. Less than 2 percent of the sample failed to complete the endline survey, and the Treatment group’s compliance with deactivation exceeded 90 percent.

Our study offers the largest-scale experimental evidence available to date on the way Facebook affects a range of individual and social welfare measures. We evaluate the extent to which time on Facebook substitutes for alternative online and offline activities, with particular attention to crowd out of news consumption and face-to-face social interactions. We study Facebook’s broader political externalities via measures of news knowledge, awareness of misinformation, political engagement, and political polarization. We study the impact on individual utility via measures of subjective well-being, captured through both surveys and text messages. Finally, we analyze the extent to which forces like addiction, learning, and projection bias may cause suboptimal consumption choices, by looking at how usage and valuation of Facebook change after the experiment.

Our first set of results focuses on substitution patterns. A key mechanism for effects on individual well-being would be if social media use crowds out face-to-face social interactions and thus deepens loneliness and depression (Twenge 2017). A key mechanism for political externalities would be if social media crowds out consumption of higher-quality news and information sources. We find evidence consistent with the first of these but not the second. Deactivating Facebook freed up 60 minutes per day for the average person in our Treatment group. The Treatment group actually spent less time on both non-Facebook social media and other online activities, while devoting more time to a range of offline activities such as watching television alone and spending time with friends and family. The Treatment group did not change its consumption of any other online or offline news sources and reported spending 15 percent less time consuming news.

Our second set of results focuses on political externalities, proxied by news knowledge, political engagement, and political polarization. Consistent with the reported reduction in news consumption, we find that Facebook deactivation significantly reduced news knowledge and attention to politics. The Treatment group was less likely to say they follow news about politics or the President, and less able to correctly answer factual questions about recent news events. Our overall index of news knowledge fell by 0.19 standard deviations. There is no detectable effect on political engagement, as measured by voter turnout in the midterm election and the likelihood of clicking on email links to support political causes. Deactivation significantly reduced polarization of views on policy issues and a measure of exposure to
polarizing news. Deactivation did not statistically significantly reduce affective polarization (i.e., negative feelings about the other political party) or polarization in factual beliefs about current events, although the coefficient estimates also point in that direction. Our overall index of political polarization fell by 0.16 standard deviations. As a point of comparison, prior work has found that a different index of political polarization rose by 0.38 standard deviations between 1996 and 2018 (Boxell 2018).

Our third set of results looks at subjective well-being. Deactivation caused small but significant improvements in well-being, and in particular in self-reported happiness, life satisfaction, depression, and anxiety. Effects on subjective well-being as measured by responses to brief daily text messages are positive but not significant. Our overall index of subjective well-being improved by 0.09 standard deviations. As a point of comparison, this is about 25–40 percent of the effect of psychological interventions including self-help therapy, group training, and individual therapy, as reported in a meta-analysis by Bolier et al. (2013). These results are consistent with prior studies suggesting that Facebook may have adverse effects on mental health. However, we also show that the magnitudes of our causal effects are far smaller than those we would have estimated using the correlational approach of much prior literature. We find little evidence to support the hypothesis suggested by prior work that Facebook might be more beneficial for “active” users: for example, users who regularly comment on pictures and posts from friends and family instead of just scrolling through their news feeds.

Our fourth set of results considers whether deactivation affected people’s demand for Facebook after the study was over, as well as their opinions about Facebook’s role in society. As the experiment ended, participants reported planning to use Facebook much less in the future. Several weeks later, the Treatment group’s reported usage of the Facebook mobile app was about 11 minutes (22 percent) lower than in Control. The Treatment group was more likely to click on a post-experiment email providing information about tools to limit social media usage, and 5 percent of the Treatment group still had their accounts deactivated nine weeks after the experiment ended. Our overall index of post-experiment Facebook use is 0.61 standard deviations lower in Treatment than in Control. In response to open-answer questions several weeks after the experiment ended, the Treatment group was more likely to report that they were using Facebook less, had uninstalled the Facebook app from their phones, and were using the platform more judiciously. Reduced post-experiment use aligns with our finding that deactivation improved subjective well-being, and it is also consistent with the hypotheses that Facebook is habit forming in the sense of Becker and Murphy (1988) or that people learned that they enjoy life without Facebook more than they had anticipated.

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Deactivation caused people to appreciate Facebook’s both positive and negative impacts on their lives. Consistent with our results on news knowledge, the Treatment group was more likely to agree that Facebook helps people to follow the news. About 80 percent of the Treatment group agreed that deactivation was good for them, but they were also more likely to think that people would miss Facebook if they used it less. In free response questions, the Treatment group wrote more text about how Facebook has both positive and negative impacts on their lives. The opposing effects on these specific metrics cancel out, so our overall index of opinions about Facebook is unaffected.

Our work also speaks to an adjacent set of questions around how to measure the economic gains from free online services such as search and media. In standard models with consumers who correctly optimize their allocation of time and money, researchers can approximate the consumer surplus from these services by measuring time use or monetary valuations, as in Brynjolfsson and Oh (2012); Brynjolfsson, Eggers, and Gannamaneni (2018); Corrigan et al. (2018); and others. But if users do not understand the ways in which social media could be addictive or make them unhappy, these standard approaches could overstate consumer surplus gains. Sagioglu and Greitemeyer (2014) provides suggestive evidence: while their participants predicted that spending 20 minutes on Facebook would make them feel better, it actually caused them to feel worse. Organizations such as Time to Log Off argue that a 30-day “digital detox” would help people align their social media usage with their own best interest.

To quantify the possibility that deactivation might help the Treatment group to understand ways in which their use had made them unhappy, we elicited willingness-to-accept at three separate points, using incentive-compatible Becker-DeGroot-Marschak (1964) mechanisms. First, on October 11, we elicited WTA to deactivate Facebook for weeks 1–4 of the experiment, between October 12 and November 8. We immediately told participants the amount that they had been offered to deactivate ($102 for the Treatment group, $0 for Control), and thus whether they were expected to deactivate over that period. We then immediately elicited WTA to deactivate Facebook for the next four weeks after November 8, i.e., weeks 5–8. When November 8 arrived, we then re-elicited WTA to deactivate for weeks 5–8. The Treatment group’s change in valuation for weeks 5–8 reflects a time effect plus the effect of deactivating Facebook. The Control group’s parallel valuation change reflects only a time effect. Thus, the difference between how Treatment versus Control change their WTAs for deactivation for weeks 5–8 reflects projection bias, learning, or other unanticipated experience effects from deactivation.
After weighting our sample to match the average US Facebook user on observables, the median and mean willingness-to-accept to deactivate Facebook for weeks 1–4 were $100 and $180, respectively. These valuations are larger than most estimates in related work by Brynjolfsson, Eggers, and Gannamaneni (2018); Corrigan et al. (2018); Mosquera et al. (2018); and Sunstein (forthcoming). A standard consumer surplus calculation would aggregate the mean valuation across the estimated 172 million US Facebook users, giving $31 billion in consumer surplus from four weeks of Facebook. However, consistent with our other results that deactivation reduced demand for Facebook, deactivation caused WTA for weeks 5–8 to drop by up to 14 percent. This suggests that traditional consumer surplus metrics overstate the true welfare gains from social media, though a calculation that adjusts for the downward WTA revision would still imply that Facebook generates enormous flows of consumer surplus.

What do our results imply about the overall net welfare impact of Facebook? On the one hand, Facebook deactivation increased subjective well-being, and 80 percent of the Treatment group reported that deactivation was good for them. On the other hand, participants were unwilling to give up Facebook unless offered fairly large amounts of money: even after they had deactivated for four weeks, which should have allowed at least some learning or “detox” from addiction. It is not entirely clear whether one should prioritize the survey measures or monetary valuations as normative measures of consumer welfare. Benjamin et al. (2012) suggests that subjective well-being measures like ours are not a complete measure of what people are trying to maximize when they make decisions, but Bohm, Lindén, and Sonnegård (1997); Mazar, Ko˝szegi, and Ariely (2014); and other studies make clear that monetary valuations are not closely held and can be easily manipulated. We think of these tensions as fodder for future research.

Our results should be interpreted with caution, for several reasons. First, effects could differ with the duration, time period, or scale of deactivation. A longer period without Facebook might have less impact on news knowledge as people find alternative news sources, and either more or less impact on subjective well-being. Effects might be different for our pre-election deactivation than for deactivation in other periods. Furthermore, the effects of deactivating a large share of Facebook users would likely be different due to network effects, so our parameters are most relevant for individuals independently determining their own Facebook use. Second, our sample is not fully representative. Our participants are relatively young, well-educated, and left-leaning compared to the average Facebook user; we included only people who reported using Facebook more than 15 minutes per day; and people willing to participate in our experiment may also differ in unobservable ways. Third, many of our outcome variables are self-reported, adding scope for both measurement error and experimenter demand effects. However, Section IVF finds no evidence of demand effects, and our non-self-reported outcomes paint a similar picture to the survey responses.

The causal impacts of social media have been of great interest to researchers in economics, psychology, and other fields. We are aware of 12 existing randomized impact evaluations of Facebook. The most closely related is the important paper Mosquera et al. (2018), which was
made public the month before ours. That paper also uses Facebook deactivation to study news knowledge and well-being, finding results broadly consistent with those reported here. Online Appendix Table A1 details these experiments in comparison to ours. Our deactivation period is substantially longer and our sample size an order of magnitude larger than most prior experimental work, including Mosquera et al. (2018). We measure impacts on a relatively comprehensive range of outcomes, and we are the only one of these randomized trials to have submitted a pre-analysis plan. Given the effect sizes and residual variance in our sample, we would have been unlikely to have sufficient power to detect any effects if limited to the sample sizes in previous experiments. Our work also relates to quasi-experimental estimates of social media effects by Müller and Schwarz (2018) and Enikolopov, Makarin, and Petrova (2018).

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Video: Mapping the Network Structure of the Personal Data Challenge

The following presents a different methodological tool to explore system changes by leveraging mapping techniques.

This video describes an ecological network approach developed by Vibrant Data Labs for #WETHEDATA (wethedata.org) to gather collective expert input about the network structure of the problem, and boil it down to a few core principles for catalyzing a new Personal Data Economy.

Could this approach be applied to the space of loneliness and technology?
Quality not quantity: loneliness subtypes, psychological trauma, and mental health in the US adult population

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Abstract

Purpose Loneliness is a recognised public-health concern that is traditionally regarded as a unidimensional construct. Theories of loneliness predict the existence of subtypes of loneliness. In this study, latent class analysis (LCA) was used to test for the presence of loneliness subtypes and to examine their association with multiple mental health variables.

Methods A nationally representative sample of US adults (N = 1839) completed the De Jong Gierveld Loneliness Scale, along with self-report measures of childhood and adulthood trauma, psychological wellbeing, major depression, and generalized anxiety.

Results When treated as a unidimensional construct, 17.1% of US adults aged 18–70 were classified as lonely. However, the LCA results identified four loneliness classes which varied quantitatively and qualitatively: ‘low’ (52.8%), ‘social’ (8.2%), ‘emotional’ (26.6%), and ‘social and emotional’ (12.4%) loneliness. The ‘social and emotional’ class were characterised by the highest levels of psychological distress, followed by the ‘emotional’ class. The ‘social’ loneliness class had similar mental health scores as the ‘low’ loneliness class. Childhood and adulthood trauma were independently related to the most distressed loneliness classes.

Conclusions Current findings provide support for the presence of subtypes of loneliness and show that they have unique associations with mental health status. Recognition of these subtypes of loneliness revealed that the number of US adults aged 18–70 experiencing loneliness was twice as high as what was estimated when loneliness was conceptualized as a unidimensional construct. The perceived quality, not the quantity, of interpersonal connections was associated with poor mental health.

Keywords Loneliness · Latent class analysis · Mental health
Introduction

Loneliness is increasingly recognised as a global health concern [1], and is known to be correlated with, and predictive of, psychological and physical disorders [2, 3]. The number of people experiencing loneliness varies across nations. Prevalence rates of loneliness in nine former Soviet Union countries ranged from 4.4% (Azerbaijan) to 17.9% (Moldova) [4]. In a nationally representative sample of Danish adults, 21% of people reported being either moderately (16.4%) or severely (4.6%) lonely [5]. In Quebec, 14.5% of individuals aged 15 years and older reported loneliness [6]. No study has yet examined the prevalence rates of loneliness amongst the adult population of the United States (US); however, a nationally representative survey of US adults aged 45 years and older found that 35% reported loneliness [7]. The relatively high rate of loneliness in this US study was likely due to the use of an older adult sample given that loneliness rises substantially in older age [5]. Determining the prevalence rate of loneliness is exceptionally challenging as there is no established diagnostic algorithm for classifying loneliness. Moreover, variation in the methods used to measure loneliness (single-item vs. multiple-item scales) and to classify individuals as “being lonely” (a certain response option for a single-item measure or use of a given cut-off score for multi-item scales) is likely to lead to considerable variation in estimates of the prevalence rates of loneliness.

Loneliness is typically treated as a unidimensional construct, and consequently, prevalence rates of loneliness tends to be determined based on whether or not an individual exceeds a total score [e.g., 5–7]. However, many have challenged the assumption that loneliness is a unidimensional construct and have instead argued that multiple types of loneliness exist [8]. Weiss’ [9] multidimensional theory of loneliness, for example, distinguishes between ‘social’ (deficiencies of social integration) and ‘emotional’ (deficiencies of close attachments) loneliness. Factor analytic studies indicate that measurement models which distinguish between these dimensions of loneliness are superior to unidimensional models [10, 11], and that social and emotional loneliness are only moderately correlated [12]. Failure to recognise naturally occurring subtypes of loneliness may, therefore, lead to unreliable estimates of the prevalence rate of loneliness.

Further support for the existence of subtypes of loneliness comes from studies indicating distinct antecedents of social and emotional loneliness. Social loneliness has been shown to be related to reductions in social network size, whereas emotional loneliness has been shown to be related to deficits in intimate partner relationships [13]. Additionally, males tend to display higher social and lower emotional loneliness, while females show the opposite pattern. Social and emotional loneliness also share similar risk-correlates such as partnership status, increasing age, low subjective wellbeing, widowhood, and lower levels of self-esteem [10, 13]. Childhood and adulthood traumatisation have both been linked to an increased likelihood of experiencing loneliness [14–18], and loneliness has been shown to mediate the relationship between traumatic exposure and psychiatric morbidity [19]. No study has yet investigated the relationship between loneliness and childhood and adulthood trauma simultaneously, and more importantly, no study has yet examined if the developmental timing of traumatic exposure is differentially associated with proposed subtypes of loneliness. The existing literature is also inconclusive regarding the relationship between loneliness subtypes and mental health status. For example, some studies have found depression and anxiety to be associated with social loneliness [20, 21]; others have found depression to be more strongly associated with emotional loneliness [21–23]; and yet others show that depression is similarly related to social and emotional loneliness [24].

The inconsistent findings are likely due to multiple factors including variation in the measurement of loneliness, the use of non-representative samples, and imprecise methods of classifying loneliness subtypes. Traditionally, purported subtypes of loneliness are represented by summed subscale scores from measures of loneliness, and these subscales are known to be moderately correlated [12]. This method does not discriminate between different types of loneliness and leaves results vulnerable to the effects of multicollinearity. The application of latent class analysis (LCA) offers a methodologically rigorous approach to (1) determining if unique subtypes of loneliness exist, and (2) if so, isolating these subtypes through the construction of non-overlapping, homogeneous classes of individuals (e.g., ‘emotionally lonely’ individuals and ‘socially lonely’ individuals). To date, however, only one study has used LCA methods to determine if distinct subtypes (or latent classes) of loneliness exist [25]. In this study of Northern Irish adolescents who completed the UCLA-Loneliness Scale [26], four distinct loneliness classes were identified. The classes differed quantitatively (‘low’, ‘moderate’, and ‘high’ loneliness classes) and qualitatively (one class was characterised by high levels of ‘social loneliness’). Moreover, the classes were also found to significantly differ in relation to their risk of psychiatric morbidity.

Given the possible therapeutic and prevention implications of identifying naturally occurring loneliness subtypes in the population, as well as the extant methodological limitations in this field of research, the current study, based on a nationally representative sample of US adults aged 18–70 years, was performed to investigate five objectives:
1. To determine the prevalence rate of loneliness in the US adult population aged 18–70 years using a standard method employed in the literature when loneliness is conceptualised as a unidimensional construct.

2. Using LCA techniques, we examined if qualitatively distinct subtypes of loneliness existed as predicted by Weiss’ [9] multidimensional theory of loneliness (i.e., ‘social’ and ‘emotional’ loneliness). We predicted that multiple latent classes of loneliness would be identified. Loneliness classes that differed on purely quantitative grounds (e.g., ‘high’, ‘medium’, and ‘low’ loneliness classes) would falsify the hypothesis that subtypes of loneliness exist. Evidence of qualitatively distinct classes (e.g., classes that have similar levels of loneliness but are markedly distinct in their profile of loneliness) would support the hypothesis that subtypes of loneliness exist.

3. We examined if loneliness subtypes were differentially related to psychological wellbeing, major depressive disorder (MDD), and generalized anxiety disorder (GAD).

4. We examined if specific relationships existed between loneliness subtypes and antecedent risk-factors including childhood and adulthood traumatization.

5. We investigated if the relationships between childhood and adulthood traumatization and psychological wellbeing, MDD, and GAD, respectively, were influenced by the specific subtype of loneliness that one was characterised by.

**Methods**

**Participants and procedures**

This study used a nationally representative household sample of non-institutionalised adults currently residing in the United States. Data were collected in March 2017 using an online research panel randomly recruited through probability-based sampling. To be included in the current study, respondents had to be aged between 18 and 70 years at the time of the survey, and have experienced at least one traumatic event in their lifetime. A total of 3953 participants were screened to meet the inclusion criteria and a total of 1839 people qualified as valid cases (eligibility rate = 46.3%). The survey design oversampled among females and minority populations (African American and Hispanic), each at a 2:1 ratio. To adjust for this oversampling, and to ensure the nationally representative nature of the sample, the data were weighted to be representative of the entire US adult population aged 18–70 years. All self-report surveys were completed on-line and the median time of completion was 18 min. Individuals received no payment for participation, but were incentivised to participate through entry into a raffle for prizes. The study received ethical approval from the Research Ethics committee of the institution to which the first author is affiliated.

The mean age of the weighted sample was 44.55 years (SD = 14.89) and included a similar number of males (48%, n = 883) and females (52%, n = 956). The majority of the sample was married (55.3%, n = 1016) and 8.1% (n = 149) indicated that they were co-habiting with a partner. These individuals were subsequently combined to reflect a group that were ‘in a relationship’. The remainder of the sample indicated that they were single (23.3%, n = 428), divorced (10.9%, n = 202), or widowed (2.4%, n = 44). These individuals were combined to reflect a group that were ‘not in a relationship’. The majority of the sample were ‘White, Non-Hispanic’ (63.8%, n = 1173), followed by ‘Hispanic’ (16.9%, n = 310), ‘Black, Non-Hispanic’ (11.8%, n = 217), ‘Other, Non-Hispanic’ (6.3%, n = 115), and ‘2 + Races, Non-Hispanic’ (1.3%, n = 24). Approximately one-third of the sample reported that their highest level of educational achievement was a ‘Bachelor’s degree or higher’ (31.8%, n = 585), while similar amounts indicated ‘some college’ (30.3%, n = 558), or ‘finishing high school’ (28.7%, n = 528), and 9.1% (n = 168) indicated that they ‘did not finish high school’. Nearly half of the sample earned US$75,000 or more per year (48.5%, n = 891), 29.8% (n = 547) earned between US$35,000 and US$74,999 per year, 11.0% (n = 202) earned between US$20,000 and US$34,999 per year, and 10.8% (n = 199) earned between US$0–US$19,999 per year.

**Measures**

**Loneliness**

The six-item De Jong Gierveld Loneliness Scale [27] was used to measure feelings of social and emotional loneliness, each measured by three items. The emotional loneliness items are phrased in a negative manner and the social loneliness items are phrased in a positive manner. All items were answered using a three-point Likert scale of ‘Very much agree’ (1), ‘Somewhat agree’ (2), and ‘Do not agree’ (3). Following the scoring guidelines provided by the scale authors [27], all items were dichotomised to reflect the ‘presence’ (1) or ‘absence’ (0) of an indicator of loneliness. For the emotional loneliness items, agreement responses were taken to indicate item endorsement, while for the social loneliness items, disagreement responses were taken to indicate item endorsement. This measure has been shown to be reliable and valid in large-scale general population surveys [28]. The internal reliability (Cronbach’s alpha) of the full scale (α = 0.81) and the ‘social’ (α = 0.88) and ‘emotional’ (α = 0.74) subscales were satisfactory within the current sample. There is no agreed upon cut-off score for the six-item De Jong Gierveld Loneliness Scale to identify...
loneliness cases. In the current study, we followed the recommendations of Shevlin et al. [29] that caseness for loneliness should be determined by selecting only those individuals with a score 1 standard deviation above the sample mean.

**Childhood and adulthood traumatic exposure**

A modified version of the Life Events Checklist for DSM-5 [30] was used to measure traumatic exposure during childhood and adulthood. Individuals answered on a ‘Yes’ (1) or ‘No’ (0) basis if they had experienced any of 14 common traumatic events ‘before the age of 18’ (childhood) or ‘at or after the age of 18’ (adulthood). Three items from the Adverse Childhood Experiences questionnaire [31] assessing physical abuse, sexual abuse, and neglect were also used to supplement the measurement of childhood trauma. Summed total scores of childhood (0–17) and adulthood (0–14) trauma were calculated.

**Psychological wellbeing**

Psychological wellbeing was assessed using the five-item World Health Organization Well-Being Index (WHO-5) [32]. The WHO-5 is an internationally validated measure of positive psychological health. A recent review of 213 international studies supported the reliability and validity of the scale [33]. Respondents are asked to indicate how they have been feeling over the past 2 weeks to each positively phrased statement along a six-point Likert scale ranging from ‘At no time’ (0) to ‘All of the time’ (5). Scores range from 0 to 25, with higher scores reflecting greater psychological wellbeing. Scores ≤13 are indicative of poor mental health and the possible presence of a psychiatric disorder [34]. The reliability of the WHO-5 among the current sample was high (α = 0.93).

**Major depressive disorder (MDD) and generalized anxiety disorder (GAD)**

Symptoms of MDD and GAD were measured using the eight-item Patient Health Questionnaire Depression Scale (PHQ-8) [35] and the Generalized Anxiety Disorder 7-item Scale (GAD-7). These scales assess the symptoms of MDD and GAD in-line with DSM-5 criteria (the PHQ-8 excludes one item reflecting the suicidality/self-harm symptom for MDD). For both measures respondents indicate how often they have been bothered by each symptom over the last 2 weeks using a four-point Likert scale ranging from ‘Not at all’ (0) to ‘Nearly every day’ (3). Scores on the PHQ-8 range from 0 to 24 and scores on the GAD-7 range from 0 to 21. In both cases, higher scores reflect greater symptomatology, and scores ≥10 are considered indicative of diagnostic status [35, 36]. The PHQ-8 [37] and the GAD-7 [38] have demonstrated excellent psychometric properties. The internal reliability of the PHQ-8 (α = 0.93) and the GAD-7 (α = 0.94) were excellent within the current sample.

**Data analysis**

The analytic process for the current study included three linked phases and all analyses were conducted using Mplus 7.4 [39]. First, LCA was performed based on binary responses to the six De Jong Gierveld Loneliness Scale items so as to determine the optimal number of latent classes of loneliness. The fit of six models (1–6 classes) were assessed and all models were estimated using robust maximum likelihood [40]. Missing data were low (1.5%) and the models were estimated using all available information. To avoid solutions based on local maxima, 500 random sets of starting values were used followed by 100 final stage optimizations. The relative fit of the latent class models were compared using three information theory based fit statistics: the Akaike information criterion (AIC) [41], the Bayesian information criterion (BIC) [42] and the sample-size-adjusted BIC (ssBIC) [43]. The model that produces the lowest value on each criterion can be judged to be best. Additionally, the Lo–Mendell–Rubin adjusted likelihood ratio test (LMR-A) [44] was used to compare models with increasing numbers of latent classes, whereby a non-significant value suggests that the model with one less class should be accepted. Evidence from simulation studies indicates that the BIC is the best index to identify the correct number of latent classes [45].

Second, mean differences on the mental health variables (psychological wellbeing, MDD, and GAD) were compared across the identified latent classes. To avoid shifts in the latent classes due to the inclusion of auxiliary variables, an automatic Bolck–Croon–Hagenaars (BCH) method [46] was implemented. The BCH method has been shown in simulation studies to outperform alternative approaches such as the ‘3-step method’ or the ‘Lanza method’ [47, 48]. The BCH method overcomes the primary limitation of the 3-step method (shifting latent classes as a result of the inclusion of auxiliary variables) due to the fact that it “uses a weighted multiple group analysis, where the groups correspond to the latent classes, and thus the class shift is not possible because the classes are known” [49, p. 2]. Additionally, unlike the Lanza method, the BCH method does not require homogeneity of variance for the auxiliary variables.

Third, a manual BCH method [49] was conducted to evaluate: (1) the unique associations between five covariates (age, sex, relationship status, childhood trauma, and adulthood trauma) and class membership; and (2) class-specific associations between these covariates and psychological wellbeing, MDD, and GAD. This manual BCH process is completed in two steps. In the first step, the latent class
measurement model is estimated and the BCH class weights are saved. In the second step, the general auxiliary model is evaluated. In this case, the latent classes were (1) simultaneously regressed on all covariates, and (2) the mental health variables were simultaneously regressed on all covariates conditional on the latent class variable. This analytical process allows for the effect of each covariate on class membership to be determined without any shift in the latent classes, and for the class-specific relationships between the covariates and the mental health variables to be determined simultaneously.

### Results

#### Objective 1—prevalence rate of loneliness in the US adult population when treated as a unidimensional construct

The mean score for the six-item De Jong Gierveld Loneliness Scale was 1.76 (SD = 1.77). A total of 17.1% (n = 307) of the sample had a mean score of loneliness greater than 1 SD above the sample mean and were, therefore, classified as lonely.

#### Objective 2—LCA results

The BIC and ssaBIC results were lowest for the four-class solution, suggesting its statistical superiority, however, the LMR-A became non-significant at four-classes suggesting the superiority of a three-class solution. Based on the simulation work of Nylund et al. [44] which indicated that the BIC is the best method for determining the optimal class solution, along with the interpretability of the different class solutions, it was determined that the four-class model was the best representation of the latent class structure of loneliness. The profile plot of the four-class solution is presented in Fig. 1 and all fit indices for the LCA are presented Table 1.

Class 1 was the largest (52.8%, n = 984) and was characterised by low probabilities of endorsing each loneliness item. This class was labelled the ‘low loneliness’ class. Class 2 was the smallest (8.2%, n = 138) and was characterised by low probabilities of endorsing the emotional loneliness items and high probabilities of endorsing the social loneliness items. This class was labelled the ‘social loneliness’ class. Class 3 (26.6%, n = 472) was characterised by high probabilities of endorsing the emotional loneliness items and low probabilities of endorsing the social loneliness items.

![Fig. 1 Latent class profile of loneliness](image-url)

**Table 1** LCA fit statistics based on responses to the De Jong Gierveld Loneliness Scale (N = 1815)

<table>
<thead>
<tr>
<th>Classes</th>
<th>Log likelihood</th>
<th>AIC</th>
<th>BIC</th>
<th>ssaBIC</th>
<th>LMR-A (p)</th>
<th>Entropy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>−6350</td>
<td>12,712</td>
<td>12,745</td>
<td>12,726</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>2</td>
<td>−5464</td>
<td>10,955</td>
<td>11,027</td>
<td>10,986</td>
<td>1737 (&lt;0.001)</td>
<td>0.84</td>
</tr>
<tr>
<td>3</td>
<td>−5156</td>
<td>10,352</td>
<td>10,462</td>
<td>10,399</td>
<td>605 (&lt;0.001)</td>
<td>0.82</td>
</tr>
<tr>
<td>4</td>
<td>−5057</td>
<td>10,169</td>
<td>10,317</td>
<td>10,231</td>
<td>194 (0.203)</td>
<td>0.83</td>
</tr>
<tr>
<td>5</td>
<td>−5042</td>
<td>10,153</td>
<td>10,340</td>
<td>10,232</td>
<td>29 (0.415)</td>
<td>0.87</td>
</tr>
<tr>
<td>6</td>
<td>−5031</td>
<td>10,144</td>
<td>10,370</td>
<td>10,240</td>
<td>22 (0.395)</td>
<td>0.87</td>
</tr>
</tbody>
</table>

Best-fitting model in bold
This class was labelled the ‘emotional loneliness’ class. Finally, class 4 (12.4%, n = 222) was characterised by high probabilities of endorsing all loneliness items. This class was labelled the ‘social and emotional loneliness’ class.

**Objective 3—class differences on mental health variables**

There were statistically significant overall differences between the classes on psychological wellbeing, MDD, and GAD, and all pairwise comparisons between the latent classes were statistically significant (see Table 2). The pattern of results was similar across all mental health variables. There was a clear gradient of psychological distress across classes with the ‘low loneliness’ class the least distressed, followed by the ‘social loneliness’ class, then the ‘emotional loneliness’ class, and then the ‘social and emotional loneliness’ class being the most distressed. These results indicate that while the experience of social loneliness is associated with slight diminutions in overall mental health, relative to the low loneliness class, the experience of emotional loneliness has a substantially greater, and more negative impact on overall mental health status. Furthermore, the combination of social and emotional loneliness is associated with the poorest mental health status.

**Objective 4—correlates of class membership**

Table 3 reports the results of a multinomial logistic regression analysis assessing the unique associations between class membership and each covariate. Compared to the ‘low loneliness’ class, membership of the ‘social loneliness’ class was significantly associated with younger age. Membership of the ‘emotional loneliness’ class was significantly associated with younger age, being female, not being in a relationship, and an increased number of childhood traumas.

### Table 2 Tests of differences of means (standard errors) across loneliness classes (N = 1815)

<table>
<thead>
<tr>
<th>Class</th>
<th>Psychological wellbeing</th>
<th>Depression</th>
<th>Generalized anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1: Low loneliness</td>
<td>18.20 (0.18)</td>
<td>1.17 (0.10)</td>
<td>1.23 (0.10)</td>
</tr>
<tr>
<td>Class 2: Social loneliness</td>
<td>15.93 (0.89)</td>
<td>2.78 (0.62)</td>
<td>2.48 (0.45)</td>
</tr>
<tr>
<td>Class 3: Emotional loneliness</td>
<td>11.96 (0.39)</td>
<td>7.06 (0.38)</td>
<td>6.06 (0.34)</td>
</tr>
<tr>
<td>Class 4: Social and emotional loneliness</td>
<td>7.10 (0.48)</td>
<td>10.64 (0.63)</td>
<td>8.96 (0.58)</td>
</tr>
<tr>
<td>Overall test (Wald $\chi^2$)</td>
<td>618.19***</td>
<td>463.14***</td>
<td>357.05***</td>
</tr>
</tbody>
</table>

Pairwise tests (Wald $\chi^2$)

| Class 1 vs. 2                  | 6.24*                   | 6.61*       | 7.34*               |
| Class 1 vs. 3                  | 192.40**                | 211.94**    | 169.53**            |
| Class 1 vs. 4                  | 480.21**                | 225.55**    | 172.38**            |
| Class 2 vs. 3                  | 16.52**                 | 34.51**     | 40.06**             |
| Class 2 vs. 4                  | 71.31**                 | 74.18**     | 72.35**             |
| Class 3 vs. 4                  | 57.29**                 | 21.89**     | 17.00**             |

Statistical significance = **p < 0.001, *p < 0.01

*All tests have 3 degrees of freedom

b All tests have 1 degree of freedom

### Table 3 Correlates of class membership based on results of a multinomial logistic regression analysis (N = 1772)

<table>
<thead>
<tr>
<th>Class 2: Social loneliness $B$ (SE) [OR]</th>
<th>Class 3: Emotional loneliness $B$ (SE) [OR]</th>
<th>Class 4: Social and emotional loneliness $B$ (SE) [OR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>−0.03 (0.01)** [0.97]</td>
<td>−0.02 (0.01)** [0.98]</td>
</tr>
<tr>
<td>Sex</td>
<td>−0.21 (0.25) [0.81]</td>
<td>0.59 (0.18)** [1.80]</td>
</tr>
<tr>
<td>Relationship</td>
<td>−0.17 (0.29) [0.84]</td>
<td>0.64 (0.18)** [1.90]</td>
</tr>
<tr>
<td>Adult trauma</td>
<td>0.09 (0.07) [1.09]</td>
<td>0.04 (0.06) [1.04]</td>
</tr>
<tr>
<td>Child trauma</td>
<td>0.08 (0.07) [1.08]</td>
<td>0.25 (0.05)** [1.28]</td>
</tr>
</tbody>
</table>

Reference group for all analyses if Class 1 (the ‘Low Loneliness’ class)

Sex is scored (0 = male, 1 = female); relationship status is scored (0 = married or in a relationship, 1 = widowed, divorced, or single)

$B$ unstandardized beta value, SE standard error, OR odds ratio

Statistical significance = *p < 0.01, **p < 0.001
Membership of the ‘social and emotional loneliness’ class was significantly associated with younger age, being female, an increased number of childhood traumas, and an increased number of adulthood traumas.

Objective 5—class-specific associations between covariates and mental health variables

The results of the class-specific associations between each covariate and each mental health variable are presented in Table 4. In the ‘low loneliness’ class, the model explained almost no variance in each of the mental health variables. Adulthood trauma was significantly associated with poorer psychological wellbeing, and higher levels of MDD and GAD. Additionally, being female was significantly associated with increased levels of MDD and GAD. In the ‘social loneliness’ class, the model explained > 10% of variance in each mental health variable, and increased frequency of adulthood trauma was significantly and positively associated with MDD and GAD scores. In the ‘emotional loneliness’ class, the model explained > 20% of variance in MDD and GAD scores, and < 10% of variance in psychological wellbeing scores. Increased frequency of childhood trauma was significantly associated with lower levels of psychological wellbeing, and higher levels of MDD and GAD. Finally, in the ‘social and emotional loneliness’ class, the model explained a robust percentage of variance in MDD (27%) and GAD (35%) scores, but substantially less variance in psychological wellbeing (6%) scores. Increased frequency of adulthood trauma was significantly associated with psychological wellbeing and MDD scores; being female was significantly associated with increased levels of MDD and

Table 4 Class-specific association between each covariate and all mental health variables (N = 1772)

<table>
<thead>
<tr>
<th>Class</th>
<th>Psychological wellbeing β (SE)</th>
<th>Depression β (SE)</th>
<th>Generalized anxiety β (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1: Low loneliness (52.8%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.03 (0.04)</td>
<td>−0.00 (0.03)</td>
<td>−0.04 (0.03)</td>
</tr>
<tr>
<td>Sex</td>
<td>−0.05 (0.04)</td>
<td>0.07 (0.02)**</td>
<td>0.10 (0.03)***</td>
</tr>
<tr>
<td>Relationship status</td>
<td>0.01 (0.04)</td>
<td>−0.03 (0.03)</td>
<td>0.00 (0.03)</td>
</tr>
<tr>
<td>Adult trauma</td>
<td>−0.15 (0.05)***</td>
<td>0.09 (0.04)*</td>
<td>0.08 (0.04)*</td>
</tr>
<tr>
<td>Childhood trauma</td>
<td>0.08 (0.05)</td>
<td>0.01 (0.04)</td>
<td>−0.00 (0.04)</td>
</tr>
<tr>
<td>R²</td>
<td>0.02</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Class 2: Social loneliness (8.2%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>−0.21 (0.12)</td>
<td>0.07 (0.08)</td>
<td>0.05 (0.08)</td>
</tr>
<tr>
<td>Sex</td>
<td>0.05 (0.16)</td>
<td>−0.08 (0.14)</td>
<td>−0.05 (0.11)</td>
</tr>
<tr>
<td>Relationship status</td>
<td>0.13 (0.15)</td>
<td>−0.14 (0.12)</td>
<td>−0.14 (0.10)</td>
</tr>
<tr>
<td>Adult trauma</td>
<td>−0.27 (0.19)</td>
<td>0.29 (0.12)**</td>
<td>0.30 (0.11)**</td>
</tr>
<tr>
<td>Childhood trauma</td>
<td>0.04 (0.18)</td>
<td>−0.02 (0.15)</td>
<td>−0.05 (0.14)</td>
</tr>
<tr>
<td>R²</td>
<td>0.17</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Class 3: Emotional loneliness (26.6%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>−0.07 (0.08)</td>
<td>0.08 (0.09)</td>
<td>−0.11 (0.08)</td>
</tr>
<tr>
<td>Sex</td>
<td>−0.15 (0.08)</td>
<td>0.13 (0.09)</td>
<td>0.22 (0.08)</td>
</tr>
<tr>
<td>Relationship status</td>
<td>0.11 (0.07)</td>
<td>0.03 (0.08)</td>
<td>−0.06 (0.08)</td>
</tr>
<tr>
<td>Adult trauma</td>
<td>−0.01 (0.11)</td>
<td>0.12 (0.13)</td>
<td>0.12 (0.14)</td>
</tr>
<tr>
<td>Childhood trauma</td>
<td>−0.17 (0.05)***</td>
<td>0.33 (0.10)***</td>
<td>0.35 (0.10)***</td>
</tr>
<tr>
<td>R²</td>
<td>0.08</td>
<td>0.21</td>
<td>0.25</td>
</tr>
<tr>
<td>Class 4: Social and emotional loneliness (12.4%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.00 (0.08)</td>
<td>−0.28 (0.11)</td>
<td>−0.34 (0.10)***</td>
</tr>
<tr>
<td>Sex</td>
<td>−0.15 (0.11)</td>
<td>0.33 (0.15)*</td>
<td>0.38 (0.14)**</td>
</tr>
<tr>
<td>Relationship status</td>
<td>0.01 (0.10)</td>
<td>−0.05 (0.14)</td>
<td>−0.03 (0.13)</td>
</tr>
<tr>
<td>Adult trauma</td>
<td>−0.23 (0.09)**</td>
<td>0.38 (0.15)**</td>
<td>0.28 (0.17)</td>
</tr>
<tr>
<td>Childhood trauma</td>
<td>0.03 (0.10)</td>
<td>0.08 (0.20)</td>
<td>0.21 (0.19)</td>
</tr>
<tr>
<td>R²</td>
<td>0.06</td>
<td>0.27</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Sex is scored (0 = male, 1 = female); Relationship status is scored (0 = married or in a relationship, 1 = widowed, divorced, or single)

β standardized beta value, SE standard error, OR odds ratio

Statistical significance = *p < 0.05, **p < 0.01, ***p < 0.001
GAD; and younger age was significantly associated with higher levels of GAD.

**Discussion**

Loneliness is typically treated as a unidimensional construct and prevalence rates have been derived from this conceptualization [4–7]. However, theoretical models and empirical data suggest that loneliness may in fact be multidimensional in nature [8–12], and if so, prevalence estimates are likely to be in error. Moreover, empirical findings regarding the risk-factors for loneliness are also likely to be in error if the construct is not conceptualised in an accurate manner. The objective of this study was to investigate whether subtypes of loneliness were identifiable within a nationally representative sample of US adults aged 18–70; and if so, to determine how recognition of loneliness subtypes would influence the prevalence rate of loneliness, as well as the associations with risk-factors and mental health variables.

Using a typical method employed in the literature for determining prevalence rates when loneliness is treated as a unidimensional construct [29], we found that 17.1% of US adults aged 18–70 would have been classified as experiencing loneliness. This finding is generally consistent with population prevalence rates from similarly aged representative samples from Quebec (14.0%), Denmark (21.0%), Armenia (10.7%), Belarus (8.9%), Georgia (12.3%), Moldova (17.9%), and Ukraine (10.8%) [4–6]. However, the LCA results indicated that loneliness was not unidimensional in nature. Two of the four classes, the ‘social’ and ‘emotional’ loneliness classes, differed qualitatively. These findings not only provided novel empirical support for the longstanding theoretical predictions of Weiss [9] and Russell et al. [21], but they also indicated that classifying individuals as lonely based on a particular cut-off score is possibly misguided as such an approach fails to recognise naturally occurring subtypes of loneliness.

Based on the LCA results, approximately one-in-eight US adults aged 18–70 (12.4%) were characterised by the simultaneously presence of social and emotional loneliness. This class had mean levels of psychological wellbeing, MDD, and GAD that were reflective of psychiatric morbidity. Additionally, approximately one-in-four US adults aged 18–70 (26.6%) were characterised exclusively by the experience of emotional loneliness. This group of people, while less psychologically distressed than the ‘social and emotional loneliness’ class, were nonetheless characterised by mean levels of psychological wellbeing, MDD, and GAD that were also reflective of psychiatric morbidity. The combined proportion of individuals in these latent classes of loneliness who were characterised by clinically relevant levels of psychological distress was 39.0%. This finding indicates that by recognising naturally occurring subtypes of loneliness, the number of people experiencing a form of loneliness that is likely to be of clinical relevance is more than double the number identified when loneliness is conceptualised as a unidimensional construct (39.0% vs. 17.1%).

Although another 8.2% of the population were characterised exclusively by the experience of social loneliness, individuals in this latent class were characterised by mental health scores reflective of healthy psychological functioning. Individuals characterised by ‘social loneliness’ had mental health scores that were not meaningfully different from individuals in the ‘low loneliness’ class. Our results show that when subtypes of loneliness are identified in a methodological rigorous manner, it is ‘emotional’ but not ‘social’ loneliness that is associated with poorer psychological health. These findings suggest that not all types of loneliness are necessarily detrimental to one’s mental health. More importantly, these results indicate that the perception of inadequate close attachments to others is considerably more detrimental to one’s mental health than the perception of inadequate social integration. To put it another way, it is the quality, not the quantity, of interpersonal connections that makes the difference when it comes to one’s psychological health.

Support for the discriminant validity of the loneliness subtypes was found in relation to the specific correlates of class membership. For example, being single, divorced, or widowed increased the likelihood of belonging to the ‘emotional loneliness’ class by nearly two-times, but had no association with membership of the ‘social loneliness’ class. Similarly, females were approximately two-times more likely than males to belong to the ‘emotional loneliness’ class, but no sex differences were evident in relation to membership of the ‘social loneliness’ class; findings that are generally consistent with prior observations [10, 13]. Childhood traumatization was associated with ‘emotional’ but not ‘social’ loneliness, with every childhood traumatic experience increasing the odds of belonging to the ‘emotional loneliness’ class by 28%. It appears therefore that traumatization during childhood is associated with feelings of insufficient interpersonal attachments in later life. Childhood trauma has been demonstrated to disrupt healthy attachment relationships throughout life [50] and to lead to social withdrawal and social isolation [51]. It was interesting to note that childhood and adulthood trauma were independently associated with an increased likelihood of belonging to the ‘social and emotional loneliness’ class. The current study was the first to simultaneously assess the relationship between loneliness and both childhood and adulthood trauma, and our results indicated that traumatic exposure in these different developmental periods were positively associated with feelings of deficiencies in both social network size and intimate connections. Current results add to a growing literature attesting...
to the importance of trauma history in understanding the characteristic nature of the experience of loneliness [14–19].

Although distinguished by multiple factors, membership of the ‘social’, ‘emotional’, and ‘social and emotional’ loneliness classes was associated with younger age. These findings are consistent with the existing literature that loneliness follows a ‘U-shaped distribution’ of increasing levels of loneliness in early adulthood before declining through adulthood and then peaking again in older adulthood [5]. Given that this sample did not include individuals over the age of 70, it is unsurprising that age was negatively correlated with all types of loneliness.

The importance of trauma history in the context of loneliness was further demonstrated by the results of the class-specific analyses. Amongst the ‘low-loneliness’ class, adulthood traumatization was significantly associated with poorer psychological wellbeing, MDD, and GAD. Of note, adulthood trauma was significantly associated with MDD and GAD for those characterised by ‘social loneliness’, whereas, childhood trauma was significantly associated with MDD, GAD, and psychological wellbeing for those characterised by ‘emotional loneliness’. Our results show that not only are the loneliness subtypes differentially associated with childhood and adulthood trauma, but the relationship between mental health status and developmental timing of traumatic exposure is dependent upon the specific subtype of loneliness that one experiences. These findings support the value of considering different types of social/interpersonal clinical interventions depending on trauma history. Social interventions are likely to be of benefit to those with adult trauma; interpersonal/attachment interventions are likely to be of benefit to those with childhood trauma; and social and interpersonal interventions are likely to be of benefit to those with a history of both childhood and adulthood trauma.

A particularly curious finding was that the explanatory power of the regression models was highly dependent upon the type of loneliness being experienced, and, whether one considered positive or negative mental health indicators. Trauma history and demographic factors explained almost no variation in psychological wellbeing, MDD, and GAD scores for those in the ‘low-loneliness’ class (1–2% of variance explained) and explained a higher percentage of variation in each mental health variable (11–17% of variance explained) for those in the ‘social loneliness’ class. Furthermore, these variables explained a substantial level of variation in MDD and GAD scores for those individuals in both the ‘emotional’ (21% and 25%, respectively) and ‘social and emotional’ (27% and 35%, respectively) loneliness classes. However, the same variables accounted for very little variance in psychological wellbeing scores amongst the ‘emotional’ (8%) and ‘social and emotional’ (6%) loneliness classes. One might have expected that factors such as sex, age, relationship status, and traumatic history would contribute to an understanding of mental health variables irrespective of the type of loneliness one was characterised by; however, our results demonstrate that the explanatory power of these variables was highly dependent on (1) whether one was lonely or not, (2) the type of loneliness that one was experiencing, and (3) whether indicators of positive or negative mental health were being considered. These results have important implications for how clinical researchers should think about how loneliness might moderate the relationship between well recognised risk-factors and mental health.

The nationally representative nature of the sample, along with the application of sophisticated latent variable modelling techniques to identify subtypes of loneliness and their relationship to a variety of risk-factors and mental health variables, overcomes many of the limitations of the existing literature in this area. However, the current study is not without its limitations. For example, old age is a period of life where loneliness increases however the current sample did not include any members of the population over the age of 70. It will be important to replicate this study amongst cohorts of the population that include persons over the age of 70. Additionally, the study findings are reflective of the US adult population, and therefore, the cross-cultural validity of these findings is unknown. It will be particularly important to determine if current findings replicate in culturally distinct populations. Finally, the cross-sectional nature of the study precludes any inferences regarding the predictive relationships between traumatic exposure and loneliness class membership, or, the predictive relationships between trauma history and mental health status dependent upon one’s loneliness subtype.

In sum, the current study provides empirical support for the existence of distinct subtypes of loneliness. Our study findings highlight the importance of recognising subtypes of loneliness given the considerable variation in mental health status, the unique associations with demographic and traumagenic variables, and the influence that these subtypes of loneliness have on the associations between established risk-factors (e.g., childhood and adulthood traumatization) and mental health status. The current findings also revealed that as a result of recognizing the naturally occurring subtypes of loneliness, the number of US adults aged 18–70 who experienced loneliness of a type that is associated with serious mental health difficulties is more than twice as high as the figure obtained when loneliness is treated as a unidimensional construct. Finally, our findings revealed that the perception of reduced quality, not quantity, of interpersonal relationships was associated with poor psychological health. From a societal perspective, and in the interests of reducing the burden of psychological distress, efforts should be made to enhance the quality of social connections as opposed to promoting the virtues of larger social networks.
Author contributions PH, MS, MC, and JMP developed the study concept. PH, MS, GM, and RF conducted the statistical analyses. JMP wrote the introduction. TK, FV, and MC contributed to the writing of the discussion. All authors reviewed, revised, and contributed to the writing of the final version of the manuscript. All authors have approved the final version of the paper for submission.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

References


Optional Readings

Does the ‘hikikomori’ syndrome of social withdrawal exist outside Japan?: A preliminary international investigation

The garden of forking paths: Why multiple comparisons can be a problem, even when there is no “fishing expedition” or “p-hacking” and the research hypothesis was posited ahead of time
Andrew Gelman and Eric Loken, Columbia Statistics, 14 Nov 2013