

Enhancing relationships through technology: directions in parenting, caregiving, romantic partnerships, and clinical practice

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Media coverage of research on phones and social media over the last decade has prompted widespread concern and one-size-fits-all guidance to limit screen time. Recognizing the limitations of screen time as a metric, researchers are now studying technology use in terms of affordances, individual differences, and longitudinal patterns. The current review examines technology use by parents, caregivers, couples, and clinicians. Individuals in these roles navigate risks, such as privacy violations, with benefits such as improved communication, empathy, and progress toward shared goals. Successful approaches vary by relationship type but have commonalities such as engaging with the technologies used by the other person to open up sensitive conversations, negotiate conflict, and illuminate patterns that would otherwise be hard to detect. To enhance relationships, some individuals depart from the intended use of technologies, for example, adapting connected devices for emotional communication or drawing on games to cope with social anxiety. One promising way in which individuals adapt technology to improve communication involves sharing technologies that were designed for personal use. This review highlights the importance of context, motivation, and the nuances of use to understand how technologies can be optimally used in personal and clinical relationships.

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Advice for screen-time limits and digital minimalism have flooded the popular press over the last decade. Because they act as portals to social media, games, and other technologies, phones are argued to distract individuals from close relationships. Massachusetts Institute of Technology (MIT) professor Sherry Turkle, who for decades has studied complex psychological dynamics with technology, expressed caution as her attention turned to phones. In *Alone Together* and *Reclaiming Conversation*, Turkle points to ways in which texting and other digital communications offer escapes from difficult conversations and threaten

empathic abilities.^{1,2} Supporting this concern are findings that people commonly feel ignored as a result of household members' phone use^{3,4} and that the mere visibility of a phone impairs interpersonal connection.⁵ Jean Twenge's *Atlantic* article, "Have Phones Destroyed a Generation?"⁶ which associates screen time with loneliness and depressive symptoms among teens, shifted the public conversation from concern to alarm.

Research is shifting away from sweeping questions about the psychological effects of screens to more specific inqui-

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CONNECTING DURING COVID-19 AND BEYOND

When I wrote this article, I was pushing against widely held concerns that screens deteriorated relationships and well-being. I asserted that we could not boil diverse experiences with technology into a single metric of screen time or discuss the effects of technologies as if we passively absorbed them. We shape our experiences with technologies, adapting them as we pursue relational and personal goals.

Since the onset of physical distancing due to COVID-19, the public conversation about technology has changed. "[Coronavirus Ended the Screen-Time Debate. Screens Won.](#)" cheered a *New York Times* headline in March. Celebratory news coverage of live-streamed concerts, Minecraft graduations, and Animal Crossing weddings replaced dire warnings to limit screen time. There was hope that we could get through the pandemic by coming together virtually.

But as stay-at-home orders have extended and it becomes clear that we will not be returning to life as we knew it, the ebullience about technology has dimmed. Concerns have risen about security in videoconferencing, irreversible privacy concessions in contact tracing, and socioeconomic disparities in technology access. There is, to say the least, Zoom fatigue. To meaningfully connect, we will need to do more than show up online. Now, more than ever, it's important to use technology intentionally.

Five directions to build on as we connect during and after the pandemic:

1. Being with each other. Staring at coworkers' faces, up close, for hours on end, is [exhausting](#). Adults working from home could take a cue from kids. One mom described her 7-year-old's online playdates as a form of show and tell: All they do is share their toys and newly discovered virtual backgrounds. Looking at something together can be more engaging than looking at each other. Videochat can also be dialed down for a low fidelity co-presence. With the shift to online classes and increased individual work during the pandemic, some university students leave video calls on for hours at a time to help each other stay on task. They don't talk much and rarely look at the video feed, but the lightweight persistent connection holds them accountable to each other.
2. Seeing more of each other. Colleagues who formerly interacted in an office are now virtually in each others' homes and drawing on contextual cues to forge deeper connections. One director's impressions of her hard-working teammates are reinforced: color-coordinated pillows appear behind her fastidious assistant, while a no-nonsense higher up reveals his basement surroundings and even the cardboard box supporting his laptop. Others find colleagues more relatable as they catch glimpses of children, pets, and living spaces. Not everyone wants to reveal themselves or their homes, however, and sensitivity to the cultural and individual factors underlying these boundaries is critical. The revealing of personal space is especially salient in therapy, which traditionally required meeting in person. Trained to listen within the boundaries of a session, some therapists feel invasive and personally uncomfortable peering into patients' domestic lives. One therapist I interviewed felt ambushed when she saw her video therapy client, a man in his thirties, in his kitchen wearing a "onesie." Along with awkward revelations, there are rich cues in patients' homes that therapists can draw on to deepen their understanding of that person's struggles. Similarly, when a patient comments on something in a therapist's home, it is an opportunity to open the conversation and deepen rapport.
3. Drawing boundaries. As we open up our homes on videoconferencing, work encroaches into home life. We are more exposed. Deliberate impression management tactics and accidental behavioral residue are both on display. Transitional spaces evaporate. There is no true equivalent of a hallway conversation or a morning commute. As spatial divisions blur, boundaries of time become more important. Some business professionals are trying out the therapy "50-min hour" and strictly ending calls at the end of the day.
4. Matching helpers with people in need. The closing of clinical offices and the rise in mental health needs during the pandemic have fueled innovation to disrupt what is often a frustrating and drawn-out process of finding a therapist. Demand for existing teletherapy services such as Talkspace has increased, and several grassroots efforts, including [NYC COVID Care Network](#) and [Project Parachute](#), have cropped up to match volunteer therapists with essential workers and frontline medical workers. [Berkeley Mutual Aid](#) matches older adults and others in need with a volunteer "buddy" for the duration of the pandemic rather than dispatching a random volunteer to drop off groceries on a given day. I suspect that this relational model to developing matching criteria, which grapples with complex psychological, social, and economic factors along with more pragmatic ones such as location and availability, will be critical as we think about the future of mental health care.
5. Intergenerational participation. The shift to video gatherings has both opened and closed doors to participation. One 50-year-old woman led a Passover Seder for the first time, hosting her extended family and friends over video in a way that would not have been possible in her compact New York City apartment. Not knowing the prayers as well as some family members was no longer a barrier as she could cut and paste from the Haggadahs she found online into a sharable file. But video gatherings are less accessible to many older adults and school-age children. One friend has a strategy for giving everyone a voice. Before video calls with her extended family, she invites her daughters to get online with their grandmother. The girls hold up stuffed animals, puppet-style, and their grandmother pretends to chat with the toys. The grandmother and granddaughters love this warm-up to the main call, where they may not have a chance to engage as much as others. A father takes similar effort to enable his daughter's online piano lesson, sitting beside her the entire time streaming video to the teacher (*Figure 1*). Without the right devices, internet bandwidth, and human support, vulnerable populations face risks of disconnection.

As we cope with the pandemic over time, we will learn more about what enhances connection in different situations and cultural contexts. We should never insist that someone turn on video or engage in a shared online activity. And setting limits on availability may require trial and error. One person's boundary may be another person's trigger, as the song goes. Matching services designed to increase access to care will not meet everyone's needs and run the risk of commoditizing therapy. Most importantly, inclusivity goes beyond age considerations. Meaningful interventions need to address the socioeconomic disparities that determine access to technology and health care.

Box 1. Connecting during COVID-19 and beyond.

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ries. Instead of examining screen time, which collapses all technology use into a single metric, researchers are studying differences associated with particular platforms, characteristics of users, and social media elements, such as groups of features that allow for self-representation or messaging.⁷ Longitudinal analyses of communication exchanges, location patterns, and other data captured by the phone are revealing contemporary social norms and how those vary by personality and other individual differences.^{8,9} To model the complexity of all the platforms and channels used over the course of a day, with their different affordances, content, and networks, “screenome” analyses examine images of individuals’ screens, captured at frequent intervals throughout the day.¹⁰

But as we all know from personal experience, the effects of technology depend not only on what apps we use or for how long, but also on our motivations. Learning to use Snapchat to communicate with one’s teenage niece involves far more effort, with the potential of far more reward, than browsing the app as a pastime. It doesn’t make sense to study technologies as if they were pills or injections. We shape the experiences we have with technologies and the results of those experiences.

In the sections below, I discuss how technology can be shaped in positive ways by parents, caregivers, romantic partners, and clinicians. I add examples from my interviews of individuals pushing technologies beyond their intended use to enhance relationships. These individuals use phones, apps, social media, and smart devices such as lights in creative ways to start difficult conversations, empathize, and express emotions. The value comes not in the particular technologies they use, which could just as easily create distance as closeness, but in the care with which they are applied. Through these examples and the surrounding research, we see the importance of using technology with intention, creativity, and sensitivity.

The COVID-19 pandemic has increased the urgency of using technology in ways that strengthen our relationships. Much of the world has been working, learning, and socializing online for months, and many important activities will remain virtual for the foreseeable future. This period of physical distancing has shed light on what we need from technology and each other. In the synopsis that opens this article (see *Box 1 “Connecting during COVID-19 and*

beyond”), I describe promising directions for using technology to meaningfully connect during the pandemic and beyond.

Parenting

Concerns about technology may be most strongly felt by parents, most of whom report worrying that their kids spend too much time in front of screens.¹¹ Parental anxiety stems from the inability to control all the content and people one’s kids encounter online,¹² along with heavily publicized research on mental health risks. Jean Twenge presented a correlation between screen time and teen unhappiness, along with the co-occurrence of mobile phone adoption and increased depressive symptoms, loneliness, and suicidality among teens in the United States, as a call to action.^{6,13} Parents were encouraged to set firm screen-time limits, and these limits were even formalized in medical recommendations. Subsequent analyses of the same data set and meta-analyses find very small associations of teen well-being with social media and phone use.¹⁴⁻¹⁶ Since most of the studies on this topic are correlational, there is no certainty about causality or the absence of confounding factors. Alongside cautionary findings are ethnographic and survey studies that illustrate the importance of social media and digital communication for teens’ social development and well-being.^{17,18}

The takeaway is not that social media or phones are benign. It is that they can’t be studied as a singular thing. They are experienced differently depending in part on factors such as social-emotional vulnerability, socioeconomic status, and gender. The feelings of connection and exclusion social media are amplified for kids who report social-emotional well-being.¹⁸ Similarly, kids from lower-income families are more likely to encounter bullying and other hurtful experiences online.^{19,20} Finally, teenage girls may be more likely than boys to use social media in a way that leads to negative social comparison^{21,22} and teenage girls with depressive symptoms tend to increase their social media use over time.²³

Sweeping panic about phones and social media is probably unwarranted and unhelpful, but there are issues for parents to address. For example, parents should talk with kids about their interpretations of streams of social media images, reminding them that these are curated “highlight

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reels²⁴ rather than realistic representations of their friends' lives. Threats to their kids' privacy cannot be managed by parents alone (see ref 25 for needed policy changes), but parents can help their kids manage these risks. Rather than shielding their children from privacy infractions and other online harm, parents can help kids learn to anticipate risks and take actions to recover from negative events.²⁶

An alternative to parental restrictions, such as rigid screen-time limits, are parenting approaches based on connection. Sonia Livingstone and Alicia Blum Ross share observations from a multiyear project, *Parenting for a Digital Future*, of families who use technologies in accordance with values, for example, promoting creative expression and learning.^{27,28} As these families use technology in ways they think are intrinsically valuable,

there is less handwringing about how much time is spent on these activities.²⁷ In addition, they tend to share decision-making, negotiate rather than impose policies, listen to children's views, and share "digital pleasures," such as games, music, and taking photos.²⁷

Mimi Ito, director of the Connected Learning Lab at the University of California, Irvine, suggests parents learn the games and other technologies used by their kids so that they can play them together and talk about them. Ito points out that kids should be enlisted as collaborators to generate solutions for technology concerns both in the household and society.¹²

The effects of technology depend not only on what apps we use or for how long, but also on our motivations. We shape the experiences we have with technologies

I have been impressed by how some of the parents and kids I've interviewed have communicated about technology, and how they have drawn on technology to facilitate communication. Things as simple as contracts

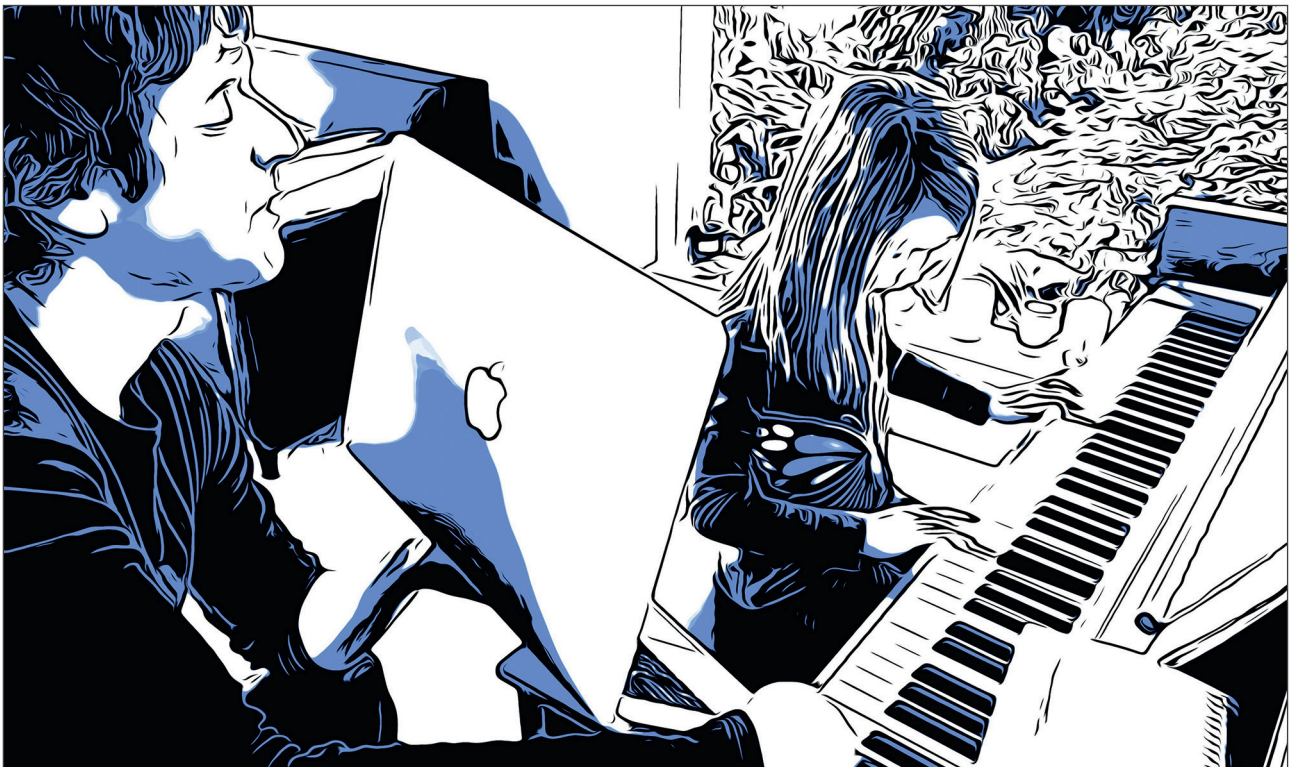


Figure 1. A father streams video to his daughter's remote piano teacher.

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have allowed some families to set norms for phone use. I've also been struck by parents who share self-help apps to either process conflict with a child or to help a child manage stress. One woman told me about how she used an anger management app with her son. She opened the app when she sat down with him to talk with him about a disruption he had caused at school. Together they swiped through the images of fire that represented stages of anger and conflict. She told him how ashamed she was to get a call from his school, and he described how mad he had been at the teacher who punished him merely for playing. While pointing to the images in the app and sharing their feelings, they started to see one another's perspectives.^{29,30} In another example, a young man used smart lights to resolve a conflict with his parents: they wanted to know where he was in the evenings, but he found this to be burdensome and invasive. He devised a compromise in which the colors of the lights at home automatically changed depending on how far away he was (using IFTTT - If This Then That), giving his parents the information they wanted while preserving his feeling of autonomy.³¹

The flexibility and experimentation in these examples may become increasingly important qualities of parenting as technologies work their way into more facets of daily life. Writer John C. Havens imagines disturbing future scenarios in which kids prefer to have stories read to them by robots than their parents, also depicted in the television show *Humans*, and smart home devices turn against parents, rating their fitness to raise children.^{32,33} Such scenarios convey the urgency of prioritizing human relationships over those with machines. Rather than training kids to be polite to Alexa, perhaps parents should de-emphasize Alexa as an entity. More importantly, they should find ways to use conversational agents and other household technologies to strengthen parent-child communication. For example, some parents find that using timers on Alexa or Google Home eases tension about time limits: their kids are less apt to argue with the smart speaker, particularly if they help determine the allotted time. Other parents use these timers to help their kids manage homework or other tasks. One mom described a scaffolding approach in which she works with her teenage son to develop a plan for his homework and estimate the time required for each part of an assignment. Then her son proceeds on his own, setting timers on Alexa as he starts each chunk of work. This system helps him stay focused and has allowed him to take on more independence with his schoolwork. His mom can step back from

micromanaging, which they both appreciate. Timers might also help parents listen as teens work out solutions to their problems,³⁴ for example, by committing to spend 10 minutes acting as a sounding board and resisting the urge to advise.

Romantic relationships

Banksy's image, "Mobile Lovers," of a man and woman locked in an embrace, but each looking toward their phones, speaks to concerns that phones have eroded intimacy. Many see themselves in that image and in the frequently reported survey findings that people would rather go without sex than their phones, that phones are the last thing they touch at night and the first thing they glance at in the morning, and so on. For some, this misplacement of intimacy onto a device follows a slippery slope of distraction, and for others, it offers an intentional escape from relationship pressures. One woman described how she and her husband each crawl into bed with their laptops and phones. Exhausted from work and getting her two young kids fed and to sleep, she is too tired to care if he is watching porn. The escape to devices feels essential in these moments, even though she realizes it may not serve their relationship well over time.

There are also ways that technologies can enhance a couple's connection. This can involve using technologies as they were designed or pushing them beyond their intended use. Long-distance couples rely on texting, video calling, and other technologies. Some couples toss images back and forth throughout the day, others "hang out" on platforms like FaceTime for hours at a time, not necessarily talking but just being together, apart. Other couples repurpose technologies, such as smart lights, not designed for communication. One couple, who lived in different cities because of their jobs, set up smart lights in each of their apartments. Periodically the woman came home to find her home colorfully lit up and immediately felt the affection of her partner.^{30,31} Research in the area of Intimate Computing has explored how everyday objects such as beds and teacups can mirror the behaviors and physiology of a remote partner³⁵ and even how the lights and sounds can be synchronized across homes.³⁶ Periodically, consumer products emerge based on these ideas, such as jewelry that allows one to sense the heartbeat of a romantic partner from afar.³⁷

Technology works its way into how couples negotiate conflict as well as how they express affection. One woman I

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spoke to prefers texting for working through disagreements with her partner because arguments heat up quickly in their face-to-face interactions. In texts, she can make her points without interruption. Self-tracking apps can also play a role. One man had a long-standing conflict with his wife over childcare responsibilities and had been feeling resentful. In the course of tracking his moods, he started thinking about how his wife was feeling. He expressed genuine curiosity in her feelings, which allowed them to approach other topics in a considerate, collaborative way.²⁹ Some people get creative with addressing reoccurring conflicts, drawing on technologies that are not typically marketed for communication. For example, one woman used smart lights as an ambient cue. She was at work one afternoon when her partner texted that he was bringing home a colleague for dinner. Impromptu hosting was not something she enjoyed. From the app on her phone, she changed a smart light in the window to a bold red, knowing that would grab her partner's attention when he came home. Later that night, they talked about the light and how they could socialize in ways that worked for both of them. Through the light, this woman externalized her anger and opened a dialogue that in the past had been met with defensiveness. Now it was understood that the conflict, like the light, could easily change.^{30,31}

Many of the same technologies can hurt or help a relationship. Location sharing, for example, can be used to coordinate plans or to surveil someone. Similarly, changing someone else's environment through their smart speakers or smart lights could feel like a hug or a frightening invasion. To have a positive role in a relationship, technologies need to be used with sensitivity and awareness about how they might affect another person. Contracts stipulating the terms of technology use, now common between parents and children, may also have value for couples. This should be an ongoing conversation about how technologies can be used to support a relationship.

Caregiving

Many adults find themselves caring for elderly parents at a distance. Increased lifespans and decreased birthrates have made it more likely that their parents, particularly their mothers, will be living on their own. Living alone allows independence, but it can make it more likely that an injury or illness goes undetected. Many older adults become cut off from social activities and community life, particularly

if they have mobility restrictions. Loneliness is common in later life and poses risks for chronic diseases that are comparable to smoking or obesity.³⁸

Technologies have been developed to address some needs of remote caregivers and their elderly parents, such as medication prompting and fall detection. Loneliness may be a harder problem to tackle. The solutions are not as obvious as offering social support. Loneliness involves sensitivity to rejection and protective withdrawal, where individuals avoid the very situations that could be rewarding.³⁹ Working one's way out of loneliness involves participating in communities and finding ways of helping other people.³⁹

Some of the well-publicized technologies for loneliness, companion robots, shortcut this complexity by offering human surrogates. Take Paro, the robot baby seal developed by Takanori Shibata in 2001 as a companion for older adults. Paro is responsive to touch and can make eye contact. Sherry Turkle, who observed elders interacting with Paro in a nursing home, noted that some elders found comfort in the robot's illusion of caring.⁴⁰ Turkle raises the concern of authenticity: "What is the value of interactions that contain no understanding of us and that contribute nothing to a shared store of human meaning?"⁴¹

The question of how to catalyze social interaction rather than replace it drove my research in the early 2000s. My colleagues at Intel and I developed a range of concepts for older adults and caregivers, including one that was like a Fitbit for social interaction. This display of social contact, generated by data from sensors, phone activity, and a journal, looked like a map of a solar system.⁴² The elder was represented by a circle in the center, around which rotated smaller circles representing family members and friends. In interviews with elders and caregivers who used the display in their homes for a field study, I learned how the displays worked their way into conversations between family members, offering them a way to talk about loneliness. One caregiver, busy with her own children and work, had been frustrated with her mother's social passivity. But over the course of these conversations about the display, she became more understanding of her mother's reluctance to invest in new friendships. The display gave them a vocabulary and license to address an otherwise taboo topic of loneliness, and these conversations, in turn, prompted her mother to initiate family visits and begin volunteering.^{30,42}

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One of the simplest but most profound prototypes that my colleagues and I developed was a light that turned on in an elder's home when her daughter or son returned home from work. Similarly, a light in the caregiver's home turned on when their mother or father was sitting in a favorite chair. We imagined the light might give reassurance to caregivers and help elders know when a caregiver was available for a phone call. But the value was more subtle than that. The light evoked a visceral connection. One participant described this indication that her daughter was home as "a warm vibe."⁴³

These subtle forms of connection are important to keep in mind as we consider the needs of caregivers and their elderly parents. Technologies specifically designed for older adults living alone and products such as home security cameras, marketed in part for remote monitoring of elders, tend to focus on health monitoring. Detecting falls and tracking medication adherence are part of caregiving, but ongoing communication is equally important. With sensitivity and reciprocity, caregivers can find ways of using many technologies, even those designed for remote monitoring, to stimulate conversations about daily life and challenges such as loneliness.

Clinician-patient relationships

Next, I explore how therapists and other clinicians can guide their patients in using a range of technologies, including mental health apps, and how they can get the most benefit from technologies that are part of their practice, such as videoconferencing. Therapists should try to appreciate the nuances of how individuals adapt technology to work through relationship challenges, discussed in previous sections. Conversation about a patients' use of technology may surface issues for discussion, highlight patterns that would otherwise be hard to see, and illustrate the contexts of a patient's struggles.

Therapists have the opportunity to guide patients as they use apps, wearables, and other technologies designed for emotional well-being and use these as adjuncts to therapy. Presuming privacy regulations take effect to restrict the exchange of user data, mental health apps and wearables offer a promising means to extend therapy into daily life. Mood tracking, whether by self-report or sensors, may illuminate patterns that would otherwise be hard to detect and prompt patients to recall events that occurred between

sessions. Micro-interventions, such as prompts to practice perspective-shifting and other cognitive exercises, can help patients apply therapy to cope with personal and professional stressors as they arise.

Ideally, mental health apps will extend help to the many people who do not have access to treatment. In keeping with this view, most consumer health apps are designed as a standalone form of self-help. The efficacy and long-term appeal of these consumer apps have not yet been demonstrated, however.^{44,45} Advances in functionality and adaptive learning might allow these apps to sustain the attention of end-users. But it is also possible that the premise of individual use is flawed. It runs counter to the social basis for most popular apps and to the idea that progress in psychotherapy is dependent on the alliance between patient and therapist. Individuals can certainly bond with technologies,^{30,46} as was reported with the artificial intelligence (AI) therapist, Woebot,⁴⁷ but human dialogue about one's data and use of the interventions remains important. In a field test of a mobile therapy app, some participants got more value from the app as they discussed it with family or other close contacts, for example.²⁹ Mental health apps may attract more sustained use when they prompt supportive interpersonal dialogue. Clinicians could engage in such dialogue, collaborating with patients as they use apps to track therapy-related goals, whether those are consumer apps or ones developed for use with a therapist.^{48,49} I suspect that clinicians could also help patients tailor apps to their particular needs, for example, by scheduling prompts for interventions around anticipated stressors.

Therapists should attend to how patients can use a wide range of technologies, not just mental health apps, to support their goals and values. For example, therapists can listen for ways in which patients actively communicate with friends or compare themselves negatively with others on social media. They can encourage patients to reflect on their emotional states as they are using different apps and adjust their use accordingly. They can also explore how the social media and productivity tools that are already a part of patients' lives can aid self-reflection. One woman I interviewed described how she preferred Excel spreadsheets to mood apps for reflecting on her grief. In Excel, she could use her own words and images, which was far more helpful to her than an emotion checklist. Similarly, one man I spoke with found that he could manage his anger at work by setting a

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time delay on his outbound email messages. This gave him a window of time to rephrase a potentially hurtful message. Other people I've interviewed have used games to help themselves and others suffering from social anxiety. For example, one woman drew an isolated relative back into the family fold through *Words with Friends*, a game that highlighted his strong vocabulary and gave him a comfortable way to interact with family members. Instagram and Reddit are also used to seek emotional support, sometimes with anonymous, secret, or temporary accounts to describe stigmatizing experiences and find similar others.^{50,51} These examples of individuals adapting everyday technologies as mental health tools are elaborated in *Left to Our Own Devices*.³⁰ Ideally, therapists will help patients sort through ways of using diverse technologies as adjuncts to therapy.

Videoconferencing and other tools used by a therapist can similarly be optimized for connection. With video, therapists can see into a patient's home where there are cues to routines, interactions, and personality.⁵² One physician described to me how video allowed her to appreciate the extent of a patient's hoarding and social phobia. She could see how clutter covered every inch of the woman's home and physically blocked her from leaving. There is also opportunity to build trust by sharing cues about oneself. With her telemedicine patients, this same clinician experimented with different ways of positioning the camera. Initially, it focused on her against a blank white wall. Then she changed where she sat so that an old wooden armoire and plants appeared in the background. Patients were set at ease by these trappings, and as they commented on them, drew connections to their own homes and families. By revealing more of herself, she felt that she created more reciprocity and trust, which allowed for better care.³⁰

Virtual reality (VR) and augmented reality (AR), studied for treating a range of mental health concerns,^{53,54} can also be used collaboratively. In VR treatment, patients typically experience simulations, for example of a feared situation, as they are coached by a therapist in the same physical room. In an approach designed to extend access to treatment, a patient's avatar interacts with a preprogrammed therapist avatar in a simulated environment.⁵⁵ Interactions with others in a shared virtual environment can be powerful,⁵⁶ and I have seen how a shared experience of AR/VR in a medical context, specifically, a surgeon and patient jointly examining a hologram of the patient's anatomy, strengthened trust and

enhanced treatment.³⁰ By extension, it may be helpful in some situations for individuals with mental-health concerns to experience simulations simultaneously with clinicians or other patients. It may also help for patients to discuss their experiences with VR and AR in forums, as individuals with social anxiety have shared their use of the AR game, *Pokémon Go*.⁵⁷

Perhaps the most profound shift in the clinical relationships will be in the area of assessment. Digital phenotyping, involving analysis of data from digital devices, including speech, voice, location, activity, and interaction data, may give precision to mental health diagnoses.⁵⁸ Additionally, social media activity, including the sentiment of text and even the gradient of images, has been associated with different emotional states.^{59,60} These digital and social media analyses may lead to a much more nuanced and empirically based classification of mental illness and more precise means of evaluating interventions. These same analyses are fraught with privacy concerns, from targeted advertising to profiling that could cause social or professional harm. Emotional surveillance may also undermine mental health by interfering with individuals' feeling of control over what they keep private and what they share. These risks need to be considered along with the potential benefits of assessing mental health through digital traces.

Conclusion

In this review, I have examined how technology can be used intentionally to enhance parenting, caretaking, romantic, and clinical relationships. This connection-oriented technology use differs to some degree across these types of relationships. To connect with children and support their autonomy, parents can engage with the games and social media their kids are using. Through that engagement, they may find openings to talk about kids' interests, friendships, and anxieties. Caregivers of elderly adults can use technology not just for health monitoring but also to prompt conversations. Romantic partners can creatively use digital communication to bridge conflict and physical distance. And by talking with patients about how they use mental health apps, social media, and other technology, therapists may be able to see patterns that otherwise wouldn't be obvious.

There are also common principles across the relationship types. First, prioritizing a relationship over technology

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sometimes requires deviating from the intended use of technology. In some of the examples above, individuals used smart lights for emotional communication and leveraged popular games to cope with social anxiety. Second, technologies meant for their individual use can be brought into relationships and used jointly. Whether it's a mother using a self-help app with a child to process an argument or a clinician joining a patient in an immersive AR simulation, interactive use can foster connection. As these examples show, respect for the privacy of the other person is critical to cultivating a close connection. The focus is on sharing rather than surveillance.

These principles may have value for researchers as well as end-users. The parents, caregivers, couples, and clinicians described above use technology as a bridge. When they examine others' data or share technology, they try

to understand the needs and struggles of another person. Researchers should similarly try to learn about individuals' motivations for specific interactions. Longitudinal analysis of communication, location, mood, and activity from phones is allowing contextually rich assessment of sociability and well-being.^{8,61} A situated understanding of interpersonal motivations and struggles will complement that research, shedding light on how individuals can change the way they engage with technologies, and how the technologies themselves should change, to support important relationships. ■

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