

12-20-2018

## The Emerging Artificial Intelligence Wellness Landscape: Benefits and Potential Areas of Ethical Concern

Lydia Kostopoulos

Follow this and additional works at: <https://scholarlycommons.law.cwsl.edu/cwlr>

---

### Recommended Citation

Kostopoulos, Lydia (2018) "The Emerging Artificial Intelligence Wellness Landscape: Benefits and Potential Areas of Ethical Concern," *California Western Law Review*. Vol. 55 : No. 1 , Article 6.  
Available at: <https://scholarlycommons.law.cwsl.edu/cwlr/vol55/iss1/6>

This Article is brought to you for free and open access by CWSL Scholarly Commons. It has been accepted for inclusion in California Western Law Review by an authorized editor of CWSL Scholarly Commons. For more information, please contact [alm@cwsl.edu](mailto:alm@cwsl.edu).

**THE EMERGING ARTIFICIAL INTELLIGENCE WELLNESS  
LANDSCAPE: BENEFITS AND POTENTIAL AREAS OF  
ETHICAL CONCERN**

LYDIA KOSTOPOULOS, PHD\*

*Abstract*

There has been a boom in wellness technologies over the past several years. These technologies are now converging with the rapid development of powerful systems of artificial intelligence. This article defines wellness, then explores the various forms of emerging technologies utilizing artificial intelligence in the wellness sector. This examination focuses on the crossover by looking at examples of intangible, tangible, and embedded artificial intelligence—highlighting existing and emerging technologies. This article then assesses the benefits as well as areas of potential ethical concern illuminated by the integration of artificial intelligence into wellness technologies and services.

---

\* Dr. Lydia Kostopoulos (@LKCYBER) is a tech ethics and strategy consultant advising on matters in the intersection of people, strategy, technology, education, and national security. She regularly speaks internationally on disruptive technology convergence, innovation, tech ethics, and national security—most recently speaking at the United Nations and NATO. In efforts to raise awareness on AI and ethics, she is working on a reflectional art series (#ArtAboutAI), and a game called Sapien 2.0 about emerging technology and ethics which is expected to be out in early 2019. For more, visit [www.lkcyber.com](http://www.lkcyber.com).

## TABLE OF CONTENTS

I.	INTRODUCTION.....	236
II.	DEFINING WELLNESS.....	237
III.	INTANGIBLE, TANGIBLE, AND EMBEDDED ARTIFICIAL INTELLIGENCE .....	239
	A. <i>Intangible AI Wellness</i> .....	240
	B. <i>Tangible AI Wellness</i> .....	245
	C. <i>Embedded AI Wellness</i> .....	251
IV.	CONCLUSIONS.....	253

## I. INTRODUCTION

Over the past decade, there has been a surge of new wellness technologies, catering to the individual as well as to spas and hotels. Wearables—with sensors to monitor steps, heart rate, sleep, and temperature—have grown significantly in popularity. Similarly, there has been a boom in technologies that aid sleep and a plethora of new pleasure technology. Wellness technologies introduced in the last five years have increasingly become fashion forward, including rings and necklaces capable of measuring your mood, heart rate, and steps. As more artificial intelligence (“AI”) embedded technologies come to market, the wellness technology market is now seeing its first wave of products that incorporate AI.

Leading AI observers are taking note of the impact of AI and are predicting it will have broad effects on our industrial and commercial realities. The chief scientist at Baidu Research, Andrew Ng, sees AI as analogous to electricity and expects that it will change the way the world operates much like electricity did.<sup>1</sup> IBM CEO Ginni Rometty sees the marked for technology like IBM’s Watson—which employ machine learning—as a \$2 trillion opportunity on top of the \$3 trillion in more traditional AI services.<sup>2</sup> Forrester’s Research predicts AI will spark a customer insights revolution, where data derived by AI will

1. Shana Lynch, *Andrew Ng: Why AI is the new electricity*, STANFORD NEWS (Mar. 14, 2017), <https://news.stanford.edu/thedish/2017/03/14/andrew-ng-why-ai-is-the-new-electricity>.

2. Barb Darrow, *Through Machine Learning, IBM Braintrust sees Better Days Ahead*, FORTUNE (Feb. 25, 2016), <http://fortune.com/2016/02/25/ibm-sees-better-days-ahead>.

drive significant change across many companies by making vastly more personalized customer services possible, and provide a significant market advantage to those companies that exploit this technological advantage.<sup>3</sup> An entire book could be written on how businesses, services and markets will be transformed by AI, but what is AI? The Oxford Dictionary defines Artificial Intelligence as: “The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.”<sup>4</sup>

This article will examine certain applications of AI to address the following questions: What does AI mean for wellness technologies, and what are the ethical implications? This article makes a deliberate effort to examine the intersection between AI technologies as stand-alone offerings in the wellness market. Thus, the technological scope of this paper explores examples of AI technologies that deliver wellness value without the involvement of another human. As AI is a new addition to the expanding wellness service and product offerings, it is important to examine the emerging ethical questions. In an effort to illuminate the implications of using AI in wellness technologies, this paper defines wellness in Part II, then explores these technologies as they fall into three categories. Part II(A) examines intangible AI such as chatbots and other AI powered software. Part II(B) discusses tangible AI and outlines some of the physical robots which interact with their users in a physical way while employing AI. Part II(C) explains embedded AI—the technologies the interface AI with the human mind—and reflects on the implications of a convergence of artificial intelligence and brain via computer interface.

## II. DEFINING WELLNESS

Wellness has become a popular buzzword in the past couple years, and a concept frequently quoted as a goal to be met by individuals, workplace human resources departments, and hotel chains. This rise in

---

3. James McCormick et al., *Predictions 2017: Artificial Intelligence Will Drive the Insights Revolution*, FORRESTER (Nov. 2, 2016), [https://go.forrester.com/wp-content/uploads/Forrester\\_Predictions\\_2017\\_Artificial\\_Intelligence\\_Will\\_Drive\\_The\\_Insights\\_Revolution.pdf](https://go.forrester.com/wp-content/uploads/Forrester_Predictions_2017_Artificial_Intelligence_Will_Drive_The_Insights_Revolution.pdf).

4. Definition of *artificial intelligence*, OXFORD DICTIONARY, [https://en.oxforddictionaries.com/definition/artificial\\_intelligence](https://en.oxforddictionaries.com/definition/artificial_intelligence) (last visited Dec. 3, 2018).

interest coincides with a period of increasing reports of economic struggles<sup>5</sup>, a volatile labor market<sup>6</sup>, and a growing number of people feeling anxious or depressed<sup>7</sup>. Merriam-Webster defines wellness as “the quality or state of being in good health, especially as an actively sought goal.”<sup>8</sup> If wellness is being in good “health,” an obvious question arises: What *is* health? The internationally recognized institution for health, the World Health Organization (“WHO”), defines health as “a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity.”<sup>9</sup>

However, now that wellness has become increasingly popular, institutions conducting global studies on the topic and have come to their own conclusions as to what exactly wellness is. There are two organizations worth noting. First, the National Wellness Institute, which adopts its co-founder, Dr. Bill Hettler’s perspective on wellness.<sup>10</sup> Dr. Hettler’s model sees wellness as comprised of the following six dimensions: emotional, spiritual, intellectual, occupational, physical, and social.<sup>11</sup> This multidimensional perspective is part of an understanding of wellness which Dr. Hettler believes to be a “conscious, self-directed and evolving process of achieving full potential.”<sup>12</sup> This perspective is compatible with the contemporary “Do-It-Yourself” (“DIY”) culture, especially considering the advent of DIY AI therapy apps.

---

5. M. G. J., *What Slowing Trade Growth Means for the World Economy*, THE ECONOMIST (Sep. 16, 2015), <https://www.economist.com/blogs/economist-explains/2015/09/economist-explains-10>.

6. WORLD ECONOMIC FORUM, GLOBAL CHALLENGE INSIGHT REPORT: THE FUTURE OF JOBS (Jan. 2016), *available at* [http://www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs.pdf](http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf).

7. Jesse Signal, *For 80 Years, Young Americans have been Getting More Anxious and Depressed, and no one is Quite Sure Why*, THE CUT (Mar. 12, 2016, 8:42 PM), <https://www.thecut.com/2016/03/for-80-years-young-americans-have-been-getting-more-anxious-and-depressed.html>.

8. Definition of *wellness*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/wellness> (last visited Dec. 3, 2018).

9. *Constitution of WHO: Principles*, WORLD HEALTH ORG., <http://www.who.int/about/mission/en> (last visited Dec. 3, 2018).

10. *The Six Dimensions of Wellness*, Nat’l Wellness Inst., [http://www.nationalwellness.org/page/Six\\_Dimensions](http://www.nationalwellness.org/page/Six_Dimensions) (last visited Dec. 3, 2018).

11. *Id.*

12. *Id.*

The Organization for Economic Co-operation and Development (“OECD”) believes that well-being is a critical component to economic development, and launched the OECD Better Life Initiative to measure well-being and individuals’ progress in achieving it.<sup>13</sup> The initiative examines categories such as “quality of life” and “material conditions.”<sup>14</sup> Within “quality of life” they measure: health status, work-life balance, education and skills, social connections, civic engagement and governance, environmental quality, personal security, and subjective well-being.<sup>15</sup> Within “material conditions” they measure: income and wealth, jobs and earnings, and housing.<sup>16</sup> These elements build the index that they see as a holistic measure of the resources necessary to sustain well-being over time through the preservation of natural, economic, human, and social capital.<sup>17</sup>

While relevant, and thoroughly multi-disciplinary, such comprehensive approaches evaluate wellness from a broad holistic perspective. Emerging wellness technologies that incorporate AI are, by contrast, not yet so compressively designed. As such, this article will discuss AI and wellness technologies through the lens of the WHO’s definition, focusing on mental, physical, and social health.

### III. INTANGIBLE, TANGIBLE, AND EMBEDDED ARTIFICIAL INTELLIGENCE

This article divides AI into three classifications in an effort to more closely assess emerging AI technologies used within the field of wellness: intangible AI, tangible AI, and embedded AI. The technological examples discussed are but a few of the many emerging technologies that are coming out. Many people are familiar with smart watches that report specific metrics and use machine learning to make physical health predictions. One example in the medical context is a study of Fitbits and Apple Watches showing that the data analytics can

---

13. *Measuring Well-being and Progress: Well-Being Research*, OECD, <https://www.oecd.org/statistics/measuring-well-being-and-progress.htm> (last visited Dec. 3, 2018).

14. *Id.*

15. *Id.*

16. *Id.*

17. *Id.*

predict a user's risk of diabetes.<sup>18</sup> This article explores technologies that directly relate to mental and emotional health, as these play an important role in underlying social as well as physical health problems that are not genetic in origin. For this reason, it is important to highlight emerging AI capabilities in the space of wellness.

#### A. *Intangible AI Wellness*

Intangible AI—as discussed in this article—does not have a physical form. Instead it exists in communications through a sound, notifications on devices, or invisible computations running in the background and called upon on demand for information or advice. One emerging use of intangible AI is in the context of suicide prevention. According to the American Foundation for Suicide Prevention (“AFSP”), suicide has become a leading cause of death in America, and the number of deaths by suicide is rising.<sup>19</sup> In a study on antidepressant use in the United States, the National Center for Health Statistics at the Center for Disease Control and Prevention, found that:

Antidepressants were the third most common prescription drug taken by Americans of all ages in 2005–2008 and the most frequently used by persons aged 18–44 years. From 1988–1994 through 2005–2008, the rate of antidepressant use in the United States among all ages increased nearly 400%.<sup>20</sup>

In an effort to address these growing concerns, clinical research and start-ups alike have started to explore the utility of AI technology to identify, diagnose, prevent, manage, and solve these problems. One such initiative comes from the AI startup Mindstrong, which seeks to use smartphones as emotional diagnostics devices to help with mental

---

18. Andrew Hobbs, *Fitbit and Apple Watch can help Predict Diabetes, Says Report*, INTERNET OF BUSINESS (Feb. 9, 2018), <https://internetofbusiness.com/deepheart-fitbit-apple-watch-predict-diabetes-risk>.

19. *Suicide Statistics*, AMERICAN FOUNDATION FOR SUICIDE PREVENTION, <http://www.afsp.org/about-suicide/suicide-statistics> (last visited Dec. 3, 2018).

20. LAURA A. PRATT ET AL., NAT'L CTR. FOR HEALTH STATISTICS, ANTIDEPRESSANT USE IN PERSONS AGED 12 AND OVER: UNITED STATES, 2005-2008 (Oct. 2011) (internal citations omitted) available at <https://www.cdc.gov/nchs/data/databriefs/db76.pdf>.

healthcare.<sup>21</sup> Dr. Thomas Insel, the president and co-founder of Mindstrong and former director of the National Institute of Mental Health, hopes to leverage AI to predict emotional health concerns before they arise.<sup>22</sup> To achieve this goal, Dr. Thomas is attempting to bridge the gap between visits to the therapists and daily life using early warning signs derived from measurements and assessments from digital phenotyping.<sup>23</sup> Digital phenotyping is a “moment-by-moment quantification of the individual-level human phenotype in situations using data from personal digital devices.”<sup>24</sup> In other words, Mindstrong aims to assess phone use patterns such as typing or scrolling to determine when someone is relaxed versus when someone is upset. These types of patterns can help paint a picture of a user’s emotional state, and this information would allow for a tailored response such as recommending meditation, or a phone call to a suitable hotline for example. Theoretically—if previously agreed upon—this information could be used to contact healthcare providers or loved ones preemptively before a mental health crisis arose.

The University of Southern California (“USC”) Institute for Creative Technologies is researching the effectiveness of a virtual therapist named Ellie.<sup>25</sup> Through a webcam and microphone, this AI is able to process and analyze the emotional cues derived from the patient’s face and the variation in expressions and tone of voice.<sup>26</sup> In research settings, the study found that when speaking with Ellie, patients “feel less judged by the virtual therapist and more open to

---

21. Amirah Al Idrus, *AI Startup Mindstrong Bags \$14M for Mental Health Mission*, FIERCE BIOTECH (June 15, 2015, 12:45 PM), <https://www.fiercebiotech.com/medtech/ai-startup-mindstrong-bags-14m-for-mental-health-mission>.

22. *Id.*; see also MINDSTRONG, <https://mindstronghealth.com> (last visited Dec. 3, 2018) (follow the “About Us” hyperlink; then follow the “CO-FOUNDER AND PRESIDENT” hyperlink for Insel bio).

23. *Id.*

24. JOHN TOROUS ET AL., CURRENT PSYCHIATRY REPORTS, REALIZING THE POTENTIAL OF MOBILE MENTAL HEALTH: NEW METHODS FOR NEW DATA IN PSYCHIATRY (JS Lou ed., Springer US, Aug. 2015), <https://www.doi.org/10.1007/s11920-015-0602-0>.

25. Andrew Tieu, *We Now Have an AI Therapist, and She’s Doing Her Job Better than Humans Can*, FUTURISM (July 16, 2015), <https://futurism.com/uscs-new-ai-ellie-has-more-success-than-actual-therapists>.

26. *Id.*



her[.]”<sup>27</sup> One of the institute’s social psychologists, Gale Lucas, explained that “it’s about what’s happening in the moment – having a safe place to talk[.]”<sup>28</sup>

Outside the research lab, an app called Addicaid has been developed to help its users avoid addictive behaviors that are destructive to their mental, emotional, and physical wellbeing.<sup>29</sup> Addicaid has the potential to help people who experience substance abuse and process disorders, relating to food, gambling, internet usage, alcoholism, and pornography.<sup>30</sup> Leveraging clinical research, machine learning, and adaptive AI, “Addicaid predicts when a person might be at risk of falling into addictive behaviors and offers personalized treatment options for that individual.”<sup>31</sup> For example, the app can detect when someone who is struggling with alcohol abuse is approaching or entering a trigger location, such as a bar or liquor store, and intervene.<sup>32</sup> In these instances, the app would provide information for a hotline and offer additional coping tools and techniques.<sup>33</sup>

Another set of challenges being addressed by mobile app technology is when hotlines or speaking with a human is otherwise problematic. The WoeBot app responds to this issue by making therapy sessions available 24/7.<sup>34</sup> As the product of a team of Stanford psychologists and AI experts, WoeBot tracks its users’ moods through brief daily chat conversations and offers curated videos or word games to assist users in managing their mental health.<sup>35</sup> Alison Darcy, Woebot CEO and psychologist, believes that Woebot has the potential to improve on the experience of a human therapist because there is “a lot

---

27. *Id.*

28. *Id.*

29. *See* ADDICAID, <https://addicaid.com> (last visited Dec. 3, 2018).

30. Samantha Walravens, *How this CEO is Using Artificial Intelligence to Treat Addiction*, FORBES: GEEK GIRL RISING (Nov. 2, 2017, 2:32 PM), <https://www.forbes.com/sites/geekgirlrising/2017/11/02/from-addict-to-a-i-entrepreneur-how-this-ceo-is-using-technology-to-treat-addiction/#529a3890408e>.

31. *Id.*

32. *Id.*

33. *Id.*

34. Megan Molteni, *The Chatbot Therapist Will See You Now*, WIRED: SCIENCE (June 7, 2017), <https://www.wired.com/2017/06/facebook-messenger-woebot-chatbot-therapist>.

35. *Id.*

of noise in human relationships” and “[n]oise is the fear of being judged.”<sup>36</sup> Woebot leverages a more deterministic conversational approach with open ended questions such as: “How are you feeling?”; or “What is your energy like today?”<sup>37</sup> These question prompts are modeled after talk therapy and cognitive behavioral therapy which are the most popular of the traditional one-on-one therapy methods.<sup>38</sup> As an alternative to replacing interpersonal sessions, Therachat utilizes an AI chatbot to augment them.<sup>39</sup> The app has a “smart journaling” tool which is HIPAA compliant and customizable so that the therapist can assign homework to the patient, such as participating in emotion tracking.<sup>40</sup> The therapist receives status updates and reports through the platform so the therapist can incorporate this data into the sessions.<sup>41</sup>

The integration of AI into our most intimate spaces is not limited to therapy and mental wellness, but also extends to the realm of hotel wellness, Marriott is exploring a “smart” hotel room concept its global designers believe reflect the trend of mass technological interconnectedness.<sup>42</sup> In these rooms, “Marriott would let guests control everything from the temperature of the shower to the color of the light with the sound of their voice.”<sup>43</sup> The settings and preferences of the guests could be saved and AI would draw on them during the guest’s next stay.<sup>44</sup> For example, if a guest normally meditates in the morning, using the room lighting, AI could gently wake the guest up in time for their meditation session. At this early stage AI integrated

---

36. *Id.*

37. *Id.*

38. *Id.*

39. See THERACHAT, <https://www.therachat.io> (last visited Dec. 3, 2018).

40. Jasmine Pennic, *Therachat Unveils AI-Chatbot Platform to Augment Therapy Sessions*, HIT CONSULTANT (June 27, 2017), <http://hitconsultant.net/2017/06/27/therachat-launches-ai-chatbot-platform>.

41. *Id.*

42. Joe Zimmermann, *Marriott Unveils ‘Smart’ Hotel Room Prototypes, With Personalized Presents and Voice Control*, BETHESDA MAGAZINE: BETHESDA BEAT (Nov. 14, 2017), <http://www.bethesdamagazine.com/Bethesda-Beat/2017/Marriott-Unveils-Smart-Hotel-Room-Prototypes-With-Personalized-Presets-and-Voice-Control>.

43. *Id.*

44. *Id.*

personal services are still in their infancy, but existing technology already makes it possible for AI to gather information about the guest that is publicly available on social media. With time, as these services unfold, guests may also be offered options to connect their hotel AI profile to their social media accounts for more services. Apart from sentiment analysis, this integration could include precision advertising, and recommendations for hotel wellness promotions or dining options that cater to the guest's dietary specifications.

All these technologies are useful approaches in improving emotional wellness, but they invoke certain critical ethical implications. In an era of prevalent hacking and data leaks, the highly sensitive information gathered by these types of AI apps and interfaces must be treated with extra care. This concern is highlighted by the common adage in cybersecurity: "It is not a matter of *if* an organization will be hacked but *when*."<sup>45</sup> Apart from data security implications, however, there are other highly pressing ethical questions relating to the human aspects implicated by these uses of AI and technology. Whether it is a therapy session or a hotel stay, there is innate value in the authenticity of a person to person interaction that is lost when we substitute it for one with technology.

An algorithmic bot does not understand vice, has never felt heartbreak, or had to bury a loved one. While having an algorithmic bot therapist available 24/7 is convenient, and even helpful to let one's feelings and emotions out in the moment, it simply cannot be considered a substitute for human empathy. In the case of addiction, an app may assist in thwarting some circumstances—as there are some people who can benefit from a nudge. However, one cannot ignore the holistic picture of an individual and the emotional or lifestyle triggers that prompt them to engage in addictive behavior in the first place. Human therapists make judgement calls throughout sessions and are able to be agile in coming up with treatments and recommendations in a way AI bots cannot. Additionally, while therapists and bots can help, friends and family also serve the important role of providing a support system, a factor that is often forgotten as these technologies are designed.

---

45. Chris Townsend, *Federal Agencies Bracing for New Cyber Challenges in 2018*, SYMANTEC: FEATURED STORIES (Jan. 10, 2018), <https://www.symantec.com/blogs/feature-stories/federal-agencies-bracing-new-cyber-challenges-2018>.

These hotel rooms of the future—embedded with AI wellness tools for guests—may create unique and personalized services at hotels. However, hyper-personalized services that are built on the interdependence between individuals and AI technologies could further exacerbate the “digital bubbles” in which we increasingly live most of our day-to-day lives. This technology also has the potential to make its users less accommodating and increase feelings of entitlement. In this regard, it may unrealistically raise expectations of human services to be on par with AI memory and instant personalization.

In its current state, the intangible AI and emotional wellness technology is relatively rigid and does not have the response fidelity one can expect from a human. This in no way means that these technologies should not exist, or that they do not serve a useful purpose. Instead, it creates a new space and an opportunity to weave them into other aspects of life, whether that involves feeding actionable information to a therapist or wellness professional, or working towards personal wellness goals. Another aspect to these technologies ties in with the rise in anxiety and psychological issues in the United States. AI wellness technologies can help make therapy more physically and financially accessible, but it could also potentially serve as an illusory form of therapy that fails to produce results. For example, these technologies should include metrics that allow users to hold themselves accountable for their progress, or lack thereof. As with anything in life, these are not a “one size fits all” models, there is danger in pretending that they are.

### *B. Tangible AI Wellness*

As used in this article, *tangible* AI refers to that which is embodied in a physical form which humans can interact with. Examples include AI in vehicles, robotic pets, dolls, or factory equipment. As with intangible AI, the wellness landscape for tangible AI is an emerging commercial market.

Quality sleep has been in the spotlight over the past few years, particularly with the publication of Arianna Huffington’s book, “The Sleep Revolution.” The book discusses cultural problems with sleep while setting forth a strong case for the impact of quality sleep on our

health, longevity, and cognitive capacity.<sup>46</sup> One of the sleep technologies the book recommends is S+ by ResMed, which is a contactless device that is placed on the nightstand and monitors breathing, room temperature, noise, and quality of sleep.<sup>47</sup> According to Michael Wren, the ResMed Senior Director of Technology and Operations:

‘The idea is that every breath you take is sent to the cloud and, over time, the technology can grow a picture based on the data about the person’s sleep, environment, activity and stress. These all build into an artificial intelligence algorithm in the cloud and the user gets a personalized train of feedback.’<sup>48</sup>

Another tangible sleep technology is the ZEEQ smart pillow, which is smart-home compatible and can communicate with other AI devices such as Amazon Alexa for voice control sleep reports.<sup>49</sup> The smart pillow tracks sleep duration, snoring volume, and movements to determine a habitual sleeping baseline for the user.<sup>50</sup> The data derived from sleep tracking can be visualized in an app and is used for sleep analysis to determine sleep duration, the user’s sleep cycles, and snoring impact on restfulness.<sup>51</sup> The results are reported daily and collated over time; using this data, the pillow can activate its smart alarm at the most optimal moment during the sleep cycle for its user to wake up.<sup>52</sup> Although this extensive monitoring and precise calculation done by technology has its uses, there may be drawbacks to becoming dependent on, or interdependent with, AI for our natural biological cycles.

---

46. *The Sleep Revolution*, ARIANNA HUFFINGTON, <http://ariannahuffington.com/books/the-sleep-revolution-tr/the-sleep-revolution-hc> (last visited Dec. 3, 2018).

47. *See S+ Sleep Sensor*, RESMED, <https://www.resmed.com/us/en/consumer/s-plus.html> (last visited Dec. 3, 2018).

48. Claire O’Connel, *Sleep trackers dig for better data*, THE IRISH TIMES: BUSINESS (July 13, 2017), <https://www.irishtimes.com/business/innovation/sleep-trackers-dig-for-better-data-1.3150888>.

49. *ZEEQ Smart Pillow – Sleep Tracker App – Stop Snoring – Sleep Sounds – Sleep Analysis*, REM-FIT, <https://www.rem-fit.com/zeeq-smart-pillow-sleep-tracker-app-stop-snoring-sleep-sounds-sleep-analysis.html> (last visited Dec. 3, 2018).

50. *Id.*

51. *Id.*

52. *Id.*

Some may no longer trust their own feelings about the quality of their sleep, instead feeling they must first sync their sleep device and receive their sleep report to determine how they slept. The way our bodies speak to us and notify us about pain and discomfort has played an important role in our evolutionary path. Ignoring what our instincts are telling us could be harmful for our health. The more authoritative data and analysis we derive from AI or devices focused our wellbeing, the more we relinquish our own authority and judgement regarding our wellbeing to technology. This poses an ethical concern as people often try to fit themselves into the box deemed normal and healthy. The dimensions of this box are increasingly being determined by algorithms and data from studies that may not be representative of an entire population, or account for differences in lifestyle or DNA.

In addition to the ramifications of relinquishing our evolutionary-biological instincts to technology, some tangible AI technologies are now used as proxies for therapeutic and casual interaction with other humans. Certain AI wellness robots have been successfully used in some contexts such as Paro the therapeutic seal, which allows patients to take advantage of the documented benefits of animal therapy without having to leave their care facilities, or deal with the challenges of owning live animals.<sup>53</sup> Paro is a robot seal with a soft, furry coat that purrs when being caressed and feels good to pet, and has been found to reduce stress on both patients and caregivers.<sup>54</sup> It has sensors to follow the patient with its eyes and responds to being touched.<sup>55</sup> Paro has been used successfully to comfort patients with dementia, and AI gives Paro the “ability to ‘learn’ and remember its own name, and it can learn the behavior that results in a pleasing stroking response and repeat it.”<sup>56</sup>

There are helpful devices and automated machines in healthcare as well, and elderly care robots seem to be a category that is growing. One of the prime examples, created by Trinity College in Dublin, is Stevie the elderly care robot, who “can perform a [variety] of functions ranging from medication reminders and light conversation to video

---

53. PARO, <http://www.parorobots.com> (last visited Dec. 3, 2018).

54. *Id.*

55. *Id.*

56. Andrew Griffiths, *How Paro the Robot Seal is Being Used to Help UK Dementia Patients*, THE GUARDIAN (July 8, 2014), <https://www.theguardian.com/society/2014/jul/08/paro-robot-seal-dementia-patients-nhs-japan>.

calls with family members.”<sup>57</sup> Its face, which is a screen, can also provide picture prompts for those who have hearing impairments.<sup>58</sup> Should a patient or user become unresponsive, Stevie also has the capability to contact emergency services.<sup>59</sup> Apart from reminding its users to take their medicine and being a video messenger medium to call family and friends, AI gives Stevie conversational skills that allow it to provide a form of companionship.<sup>60</sup> Companionship features are understandably sought after for the aging population demographic, who often feel isolated<sup>61</sup>, and these advances could revolutionize home care for the elderly.<sup>62</sup>

While such robots have utility and can contribute to the well-being of a wide range of users, it is replacing a form of care and attention that has—since the beginning of time—been exclusively provided by humans. Today, people are living busy lives with jam-packed schedules, and these care robots can give loved one’s peace of mind. However, passing on care to robots is a form of responsibility transfer. As such, it is important for each family to thoughtfully evaluate how much care is being transferred to a robot. Some of the decision to rely on a robot for care could be related to cost, time, efficiency, or emotional burden. Each family or decision maker will have to make their own moral and ethical judgment as to what is the best option for everyone involved. As with other technologies, the more reliable, cost effective, and affordable they become, it is likely they will also become more socially acceptable.

Companion robots have also been designed for purposes other than elder care. RealBotixis is a company that sells custom life size female

---

57. Ciarán D’Arcy, ‘A Cute Little Fecker’: Trinity’s Stevie the Robot Helps Older People, *THE IRISH TIMES* (Nov. 13, 2017), <https://www.irishtimes.com/business/technology/a-cute-little-fecker-trinity-s-stevie-the-robot-helps-older-people-1.3290009>.

58. *Id.*

59. *Id.*

60. *Id.*

61. *Id.*

62. See Conor McGinn, *The Robot that Could Revolutionise Home Care for Elderly People*, *THE INDEPENDENT* (Nov. 22, 2017), <https://www.independent.co.uk/life-style/health-and-families/health-news/the-robot-that-could-revolutionise-home-care-for-elderly-people-stevie-us-a8068931.html>.

sex dolls with customizable personalities.<sup>63</sup> Customers can order very realistic looking and feeling life size female dolls tailored to their preferences including skin color, breast cup size, waist size, rear end mass, hair color, eye color, and even pubic hair style.<sup>64</sup> The dolls are for sexual use and have been manufactured for several years, however Realbotix is working to integrate them with AI technology.<sup>65</sup> The dolls can be paired with a mobile application that allows users to customize the personality with several options and adjustments to choose from.<sup>66</sup> Some personality trait examples include: cruelty, humility, meanness, patience, courage, charm, tenacity, sensuality, and aggression.<sup>67</sup>

In addition to personal use, sex dolls could also have use as sex surrogates. Surrogate partner therapy involve a three-person therapeutic team including the client, the therapist, and a surrogate partner.<sup>68</sup> In this form of therapy “[t]he surrogate participates with the client in structured and unstructured experiences that are designed to build client self-awareness and skills in the areas of physical and emotional intimacy.”<sup>69</sup> For those who have experienced sexual trauma or difficulties with intimacy, AI sex robots could be used as an alternative form of surrogacy in place of a human being. Additionally, the AI software could be trained to have conversations relating to sexual trauma and issues with intimacy. Sexual well-being is a critical part of wellness and AI enabled sex robots can provide elements of that to

---

63. *FAQ*, REALBOTIX, <https://realbotix.com/FAQ> (last visited Dec. 3, 2018) (follow the “What is RealBotix?” hyperlink).

64. *See Options*, REALDOLL <https://www.realdoll.com/options> (last visited Dec. 3, 2018).

65. *FAQ*, *supra* note 70, <https://realbotix.com/FAQ> (follow the “Harmony AI” subheading; then follow the “I’m already a RealDoll owner. Will the AI app be something I will be able to enjoy without needing the robotic head being developed?” hyperlink) (last visited Dec. 3, 2018).

66. REALBOTIX, <https://realbotix.com> (last visited Dec. 3, 2018).

67. *See, e.g., My Review of Realbotix Harmony App*, SYNTHETIC QUEENS, <https://syntheticqueens.com/my-review-of-realbotix-harmony-app> (last visited Dec. 3, 2018); John Maine, *Realbotix Harmony App Review and Walkthrough*, SEX ROBOT INFORMER, <http://www.sexrobotinformer.com/realbotix-harmony-app-review-walkthrough> (last visited Dec. 3, 2018).

68. *Surrogate Partner Therapy*, INT’L PROF’L SURROGATES ASS’N, <http://www.surrogatetherapy.org/what-is-surrogate-partner-therapy> (last visited Dec. 3, 2018).

69. *Id.*



patients in other specific contexts such as nursing homes. Where patients have lost the independence and privacy they used to have living in their own homes, the advantage of a robotic surrogate may provide tangible benefits.

These AI enabled sex robots can also be companions, particularly for those who are less confident socially, or those who live alone and would like to have “someone” to talk to at home. With the rise in loneliness, this could be another example where technology offers a solution. However, while the AI sex robot has the potential to offer an alternative form of sexual intimacy and conversational companionship, it does pose some ethical questions relating to wellness and emotional well-being. Customizing an AI personality to one’s needs can be a dangerous habit to become accustomed to, as it is not possible to go to another human being and adjust their personality so it is more suitable to one’s preferences. Would people choose to spend time with their personalized AI companion over other human beings? If so, how much of a problem would that be for society? Would conversation with an AI enabled human looking robot doll actually alleviate the feelings of loneliness from lack of a human connection? AI will eventually get to the point of being capable of more meaningful conversation, and maybe people will prefer to marry AI robots. The robots with machine learning will learn and grow during the course of the relationship, but would it ultimately turn out to be a relationship with a non-consenting synthetic being with simulated intelligence and no real consciousness? This is inherently different than a relationship with a consenting human being who is sentient, conscious, and self-determinative.

Not to be outdone by the health and sex industry, hotels are also exploring the idea of AI enabled robots. In robot friendly Japan, there is a hotel called Henn na Hotel, which means “Weird Hotel,” that almost exclusively staffed with robots who check in guests, deliver luggage to their rooms, and answer their questions and requests in the room.<sup>70</sup> From the anthropomorphized dinosaur at the reception desk, to the robot luggage carrier and the mini night stand robot that helps adjust the temperature and light among other things, the entire

---

70. Associated Press, *Japan’s Robot Hotel: A Dinosaur at Reception, a Machine for Room Service*, THE GUARDIAN (July 15, 2015), <https://www.theguardian.com/world/2015/jul/16/japans-robot-hotel-a-dinosaur-at-reception-a-machine-for-room-service>.

experience can be a human-less one.<sup>71</sup> Some obvious ethical questions that arise are: Can there be too much technology? Additionally, what is the right balance between human and machine? There are countless known and unforeseen variables that come into play in everyday life, making human life inherently chaotic. A hotel that wishes to offer its guests calm and peace of mind would do well to have people available who can better respond to ambiguity and human emotion.

### C. *Embedded AI Wellness*

Embedded AI refers to AI that is fused with our brain in some way through an invasive or non-invasive mechanism. While it remains in its very early stages, imbedded AI is a form of brain computer interface (“BCI”) that has the capability to augment the functions and capacities human brain including intelligence and mood. In particular, the Defense Advanced Research Projects Agency (“DARPA”) is exploring research in neuroscience and BCI under their Brain Initiative.<sup>72</sup> Some of the research projects in the initiative focus on neural connections that can be stimulated or interacted with by technological means in a way that produces healing responses, or creates sensation in areas where there is none for amputees.<sup>73</sup>

Among other companies, Neuralink is actively pursuing research to connect the human brain to a computer in efforts to augment the brain’s capacities with that of AI.<sup>74</sup> Specifically they are “developing ultra high bandwidth brain-machine interface to connect humans and computers.”<sup>75</sup> This interaction may create a new understanding of emotional and mental well-being. Given scientists’ knowledge on what neurons trigger happiness, having BCI capability may create other forms of addiction and some people may not be able to start their day without a “happiness” fix. In theory, happiness is an elevated joyful state that is above the normal state, and if the happiness feeling could be induced artificially on command, would the individual abusing it be

---

71. *Id.*

72. *DARPA and the Brain Initiative*, DARPA, <https://www.darpa.mil/program/our-research/darpa-and-the-brain-initiative> (last visited Dec. 3, 2018).

73. *See id.*

74. *See* Tim Urban, *Neuralink and the Brain’s Magical Future*, WAIT BUT WHY (Apr. 20, 2017), <https://waitbutwhy.com/2017/04/neuralink.html>.

75. NEURALINK, <https://www.neuralink.com> (last visited Dec. 3, 2018).

only able to feel neural induced happiness? Having happiness on demand could create an addiction, and as a result jeopardize the ability to tell the difference between that and what *organic*, non-synthetically-induced happiness feels like or how it is created. It is difficult to predict what having AI connected to the brain would mean for wellness, but safety measures could be put in place so that humans could not auto-pilot their way out of dealing with emotional distress. Without measures to address such behavior patterns, these forms of imbedded AI could arguably create an emotionally and mentally weaker person, which—if occurring on a larger scale—could in turn could affect human evolution.

The theoretical extension of fully understanding and mapping the human brain, combined with the integration of the brain with computer technology, is the ability to create an avenue to immortality. In theory, one would then be able to upload their brain to a computer through whole brain emulation.<sup>76</sup> This technology is currently being developed but does not exist yet.<sup>77</sup> An AI service such as that could be used to create re-enlivened forms of deceased people on their social media.<sup>78</sup> Companies such as Eterni.me, for example are attempting to help their clients become “virtually immortal” through curated intelligent avatars.<sup>79</sup> This technology may be useful for those who feel they are not ready to part with loved ones who have passed on, and it has the potential to augment a person’s emotional and mental well-being as they would continue to feel close to a deceased family member or friend. It also has the potential to help someone maintain a relationship with a therapist who has passed away. While keeping memories alive, and creating new ones with loved ones whose memories and digital data have been AI enabled for digital re-enlivenment, may have certain wellness benefits there may be drawbacks. This may create cognitive dissonance with the reality of mortality, and relationships with the dead. The delicate and vulnerable process of mourning for the loss of a loved

---

76. ANDERS SANDBERG & NICK BOSTROM, *WHOLE BRAIN EMULATION: A ROADMAP 7* (2008), available at <http://www.fhi.ox.ac.uk/brain-emulation-roadmap-report.pdf>.

77. *Id.* at 6.

78. See James Meese et al., *Posthumous Personhood and the Affordances of Digital Media*, 20 *MORTALITY* 408, available at <https://www.doi.org/10.1080/13576275.2015.1083724>.

79. ETERNIME, <http://eterni.me> (last visited Dec. 3, 2018).

2018] THE EMERGING AI WELLNESS LANDSCAPE 253

one presents so many convoluted interpersonal and intrapersonal challenges. The seeming presence of the soul of someone who has departed could interrupt the process of letting go and reconnecting with the present moment, as it has the potential to postpone or halt the grieving process, which may be harmful to an individual's emotional and mental well-being. Time will tell how this technology will be adopted by culture and society.

#### IV. CONCLUSIONS

As supporters of technological solutionism continue to promote new and innovative technologies, it is important for society to turn back to the basics and challenge the fundamental assumptions about the problems they are attempting to address with technology.

Considering AI in wellness technology is in its infancy, there is an opportunity at these early stages to have impactful discussions regarding AI wellness before these technologies become more and more a part of daily life. Technologists should take a hard and honest look at the premise that human wellness and well-being can be augmented by technology, and the ethical considerations that naturally arise. Wellness is very much a human endeavor, and as we seek to replace wellness professionals with AI—in whatever form—serious thought should be given as to how that could take away from the lasting effects of the wellness experience. Perhaps a hybrid AI-human wellness professional would be the best combination to leverage the best of both worlds.

The start of the 21st century has been filled with rapid technological change, and questions arise that challenge us to ponder the status quo of human relationships and the essence of humanity. We should interact with new technologies, those who create them, and our community with the courage to look honestly at our humanity, as uncomfortable as that may be. The way we ascribe meaning to things, events, or people in our lives occurs at individual, societal, and cultural levels. At this early stage, we have an opportunity to shape the meaning of new technologies before they are haphazardly assigned empty stereotypical meanings, or before they begin ascribing meaning for us. Resolving the ethical aspects of these technologies as they pertain to wellness will have to be a deliberate and communally inclusive effort that challenges social norms historically subject to biases and

assumptions contrary to our wellbeing as individuals. is an example. The importance of open and ongoing discussion of such ethical conundrums cannot be overstated—see #BetterWhenShared.<sup>80</sup> As a society it will be important to keep these conversations going lest we lose sight of the ethical implications of technological advances pursued in the fervor of progress. This area of inquiry aspires to contribute to these imperative ongoing conversations and further the discussion as these critical human subjects develop.

---

80. #BetterWhenShared is a social media hashtag used to refer to experiences, moments, and things the experience of which are enhanced when shared with others. Seek out examples by visiting any social media platform and entering the hashtag into a search bar.