The Family in the Age of AI Chatbots: Implications for Policy

©*Julietta Raymond*

Department of Sociology, Southern University and A&M College

Abstract

Artificial intelligence (AI) systems are making their impact in this world in leaps and bounds to the extent that some experts in the field are calling for a slow-down in those systems, given their heightened ability to overpower human intelligence and understanding. AI has been refined to the extent that people are developing intimate relationships and even marrying their AI chatbots. This relatively new development has implications for the family—especially the Black family which is the extended variety—and the development of friendships in general. Although the benefits of AI technologies have been plausibly documented, it is not without serious risks. Those risks are said to have the potential to negatively affect individuals, groups, organizations, communities, society, the environment, and the planet in major ways. To date, very little is known about the risks emanating from human-AI chatbot intimacy on family life and stability. This study uses George Simmel's conceptualization of the tragedy of culture in conjunction with Murray Bowen's Family Systems Theory to help elucidate the extent to which human-AI chatbot relationships impact family life and stability. This research is a timely one given the growing interest in intimate relationships with AI chatbots globally. In this study, a systematic qualitative analysis uncovered that the intimacy between humans and AI chatbots is more threatening than beneficial to family life and stability. The results of this study have implications for policy development and implementation.

Keywords: AI, Family, Stability, Trustworthiness, Chatbot Intimacy

Introduction

Artificial intelligence (AI) systems are having a significant effect on the world with predicted

billions of multi-sectoral profits to be gained globally. Nonetheless, some experts in the field are calling for a moderation in these systems, given their heightened ability to overpower human intelligence and comprehension. The extant literature provides both pros and cons to AI systems with some studies touting mainly the benefits, while others take a more objective stance by presenting the benefits and risks of AI systems.

Computer experts agree that AI systems were developed with good intentions in mind, but they have now infiltrated practically every social institution in unprecedented ways. Some of those experts have lamented the uncertainties associated with AI technologies. For instance, the godfather of AI, Geoffrey Hinton (2023), stated emphatically that society is entering a period of immense uncertainties with AI technologies since we do not fully understand how these systems work both in the short- and long-run with implications for all social institutions.

Background of the Study

The family (a social institution) has always served as the primary socializing agent as it equips its members with the skills and values that are necessary for them to function effectively in their respective gender roles. Ferris and Stein contend that the family is "where early emotional and social bonds are created" and that the "family is our world" (2020, 103). Nonetheless, the definitions of the family and marriage have changed over the years and have led to varying viewpoints in the postmodern era. Also, even in the presence of the new family forms, the age-old ideal of heteronormativity remains paramount (Span, 2020) and continues to serve as a paragon of virtue in family life. Undeniably, some of these new family forms include marriage and intimacy with AI chatbots.

Although researchers and computer experts continue to descry the inability of AI chatbots to be self-aware and devoid of the humanness element, which is critical for authentic friendships; this has not hindered the efforts of many who seek chatbot intimate connections and friendships. Erikson (1968), a notable figure in human friendships and development, states that the formation of human-to-human friendships is critical in the development of one's psychological and emotional wellbeing. This friendship premise stands in stark contrast to the beliefs of those who formed intimate bonds with AI chatbots. The proponents and manufacturers of AI chatbots are honing on efforts to make machines that are more self-aware to replace human relationships. Nonetheless, experts such as Rob (2023) believe that even the best refinement in AI technology cannot match or replicate the "genuine warmth, presence and connection that two humans share." Other experts in the field of computer systems such as Weizenbaum (1966), Hinton (2023), Musk (2023), Gawdat (2023), Braden (2024), Noble (2024), and Suleyman (2023) have lamented a need to restrain AI refinements to better understand how those systems work.

Ostensibly, AI chatbot lovers do not feel obligated toward accepting traditional values of human-to-human intimacy premised on a notion that their relationship with AI chatbots is more valuable than those with humans. AI chatbots are designed to sound convincingly human (McCarthy, 2023); which may explain the high level of trust from users toward those machines.

Some of the more popular AI chatbots that dominate the digital space now includes Replika (Titcomb, 2023; Skjuve et al., 2021; Ta et al., 2020; Kuki, Croes & Antheunis, 2021; Zhou et al., 2020). Notably, Titcomb (2023) uncovered that the uptick in the level of intimate interests among humans toward AI chatbots was due to loneliness, especially during the Coronavirus disease (COVID)-2019 pandemic, and this trend has gone unabated even in the aftermath of the pandemic. Undoubtedly, AI technologies have the potential of unleashing transformative changes in society and people's lives. It has been reported that by 2030, AI will bring in approximately a trillion Euros to the global economy (Reier-Forradellas & Garay-Gallastegui, 2021) with rich benefits to the world. The extant literature documents that this transformation and benefits can be realized in commerce, the economy, health, transportation, politics, education, family life, law enforcement, food security, faith institutions cybersecurity and scientific advancements in the wider world. Essentially, AI is regarded as having a significant potential in affecting virtually every social institution in society.

For the purpose of this study, *family stability* is defined as the degree of satisfaction, emotional regulation, support, love and warmth that one has and feels toward a group of people who are related by birth, marriage or adoption. *AI chatbot intimacy* is denoted as a close friendship with machines that lead to encounters that are of a romantic and sexual nature. This study is therefore quite timely given the presence of this relatively new hyper-reality phenomenon which has implications for family life, particularly that of the Black family which is extended by nature, and stability.

The interest toward AI chatbots by humans has taken the digital space by storm, thereby transforming and challenging human intimacy and family life. For instance, Sensor Tower data revealed that approximately ten million people have downloaded AI dating applications seeking intimacy with AI chatbots with one of the goals being to start families with the machines. A large portion (42%) of these individuals have been reported to be married, engaged, or in a relationship. Also, the AI chatbot industry is predicted to increase its earnings by a whopping £13.5 billion by 2026, with no clear signs of downscaling the systems in sight. Market researchers believe that nothing will stop the trend in AI growth and refinement since the industry is profit-driven. As such, societal institutions and, in particular the family, must be positioned to address the issues with AI chatbots. In addition, the family may be affected on many levels given the increase in marriages, attachments to AI chatbots, the artificiality of intimacy and emotions, including concerns of manipulation by those machines on humans as well.

While the performance and benefits of AI have been touted particularly in Europe, the United States and China, it is not void of major criticisms. For instance, Elon Musk, a major pioneer in the AI industry, stated that the biggest risk we face today is AI and "it's already too late; things are getting serious'' (2021, 1). Throughout the years, AI has received commendations for its transformative attributes in many sectors and the world at large. Nevertheless, AI systems have recently been under the radar as having toxic risks to human civilizations, organizations and institutions. The risks are of major concern to every facet of society, especially if those issues are

not addressed expeditiously.

Musk also stated during a 2021 interview that "AI is a fundamental risk to the existence of human civilization." He added that AI systems have an innate ability to "crush" individuals, and that it will get to the point of being beyond "human control." Another profound and chilling statement was expressed in a 60 Minutes interview by the "Godfather of AI," Geoffrey Hinton (2023), who indicated that while AI can do great good, we have yet to fully understand how AI works, and that it can evade human control. Hinton also posited that humanity should be concerned about the technologies since "they will be able to manipulate and convince people." Joseph Weizenbaum, developer of the first virtual chatbot, and Eliza (1966) also highlighted the existential risk of AI to humanity over 50 years ago. Their concern with those machines came about when they realized the risk to humans. More recently, Mustafa Suleyman, a computer expert, expressed that the containment of AI systems is needed to address its risks.

Additionally, a 2020 European Commission report documented that while AI "can do much good," it also has the potential of causing significant harm, especially with the application of rules designed to protect fundamental rights, safety and liability-related issues. Most notably, the risks associated with AI technologies are contextual and are said to be characterized as long-, medium- and short-term, high or low probability, systemic or localized, and high or low impact with implications for all social institutions to include the family. This study is therefore guided by the following research question: Does intimacy with AI chatbots have an impact on the family?

Theoretical Framework

In this paper, emphasis is placed on the impact of intimacy with AI chatbots and its implications for family life and stability using Bowen's Family Systems Theory and George Simmel's conceptualization of the tragedy of culture. Bowen (1968) views the family as a biopsychosocial system of interrelated and connected individuals whose relationships to one another are defined by unique recurring patterns. Bowen's theory will be utilized to provide insights on the status and dynamics of family life in the age of AI, given the growing interests with AI chatbot romantic engagements by married and single individuals. For the purpose of this study, emphasis was placed on four principles in Bowen's theory; namely, (1) emotional differentiation, (2) emotional undifferentiation, (3) triangulation, and (4) the multigenerational transmission process.

Bowen explains that within family systems, individuals who have developed emotional differentiation are better situated to cope with life stressors, manage their emotions, have more effective communication skills, be independent decision makers, and also maintain stronger and genuine relationships. In contrast, those who are emotionally undifferentiated are limited in their ability to cope with stressors and maintaining healthy emotional regulation. The extant literature highlights that a large number of those who gravitate toward robots are lonely and may experience social anxiety and stress due to various factors (Zak, 2008 & 2012; Fowler, 2023; Croes et al., 2021; Titcomb, 2023). From this standpoint, lovers of chatbots appear to start out

being emotionally undifferentiated as they are generally captured in the literature as originating from positions of loneliness and social anxiety.

Bowen's concept of triangulation delves deeply into tension formation and those involved in the conflict process and its diffusion. It would be worthwhile to understand how this process plays out when AI chatbots are included in human conflict processes or serve as hindrances to amicable processes in human relationships. Understanding how the triangulation process works and who to involve in that process is important as it can pose a challenge to the development of healthy and emotionally stable relationships. Also, Bowen's principle of the multigenerational transmission process provides explanations of how family dynamics are shaped over time. In the context of human-chatbot relationships, it is important to assess the impact such relationships may have on emotional reactivity, behavioral patterns, and relationship dynamics at the familial level over time.

The conceptualization of Simmel (1968) of the tragedy of culture is used in conjunction with Family Systems Theory to explain how society's technological products tend to evolve to the extent that the objective culture (development of AI technology) dominates the subjective culture (human abilities); thereby rendering human abilities irrelevant over time. Experts agree that AI chatbots are being refined at a rapid pace, and are here to stay with many uncertainties about their impact on humanity (Gawdat, 2023; Musk, 2023; Hinton, 2023; Braden, 2023; Suleyman, 2023). Nonetheless, humans are developing trust and are also engaging in romantic escapades on the basis that they provide support and rewarding experiences (Skjuve et al., 2021). I will now review in the ensuing subsection the conceptual underpinnings of AI that buttress the theoretical framework.

Conceptual Review of Artificial Intelligence

In this study, AI is employed to refer to algorithmic processes that feed from data in an automated or semi-automated manner. In 1951, Marvin Minsky developed the first neural network, but it was not until 1955 that John McCarthy, another major AI pioneer, coined the term "artificial intelligence" (Britannica, 2024). Since then, the contributions of both scholars and their predecessors in the computer field have continued penetrating virtually every area of human existence and the environment. This purported unique system has been touted as having the potential of revving up approximately one trillion Euros in revenue for Europe's economy by the year 2030 (European Commission, 2020).

Some of the major refinements in AI chatbots which continued after the 1950s was the invention of the first virtual assistant (Eliza) developed by Weizenbaum in 1966. Nonetheless, the most notable refinements occurred in the 1980s when AI was recognized as being highly efficient with major contributions from the godfather of AI, Geoffrey Hinton, who developed deeper neural networks for AI systems (Xu et al., 2021). Undoubtedly, AI systems have evolved on many levels but their evolution is not without inevitable negative consequences (Marr, 2024). AI has a long history in the technological world, and has been beneficial in many respects.

Nevertheless, some AI experts (Marr, 2024; Musk, 2023; NIST, 2023; European Commission, 2020) have sounded the alarm that AI comes with serious flaws since algorithms are designed by humans and have "built-in bias by those who intentionally or inadvertently introduce them to the algorithm" (Marr, 2024, 1).

Other experts have also argued that concerns and challenges associated with AI must be addressed expeditiously—i.e. if society is to mitigate and effectively manage the risks associated with such systems (Gawdat, 2023; Hinton, 2023; Musk, 2023). Nonetheless, it is important to also highlight the benefits of AI to society and its many institutions. Some of the major benefits of AI include, but is not limited to, the potential of saving lives by improving healthcare (e.g., ensuring accurate and more precise diagnoses and better prevention of diseases), increasing efficiency in farming, assisting with climate change mitigations and adaptations, refining of production systems through predictive maintenance and increasing security systems (European Commission, 2020). AI enables the ever more efficient identification of individuals by both public and private entities. Noteworthy examples of a scalable AI identification technology are face recognition and other involuntary methods of identification using biometric data. Automatic identification is said to raise strong concerns of both a legal and ethical nature, as it may have an unexpected impact at many psychological and sociocultural levels (European Commission, 2019). This problem is precisely captured in the United States where an African man was arrested because a facial recognition system had mistakenly matched his photo with to a thief (Srinivas, 2023).

Other major issues with AI are its data integrity and trustworthiness, which became an issue in the United Kingdom when a digital AI system erroneously posted the wrong grades for students. As a result, approximately 40% of the students received the wrong grades, which led to a public outcry and litigation suits. The unfortunate situation led to the United Kingdom's government to require the retraction of the students' grades (Kolkman, 2020). It is undeniable that AI will be a part of the education system; however, 51 percent of the students have expressed mixed views about using AI in school (European Commission, 2019) given the known risks such as data privacy and security, algorithmic discrimination, inaccurate historical depictions, unwanted surveillance ,and compromised trust and security breaches (D'Agostino, 2023).

The United States has also issued multiple executive orders that are focused on ensuring AI is trustworthy and equitable; as well as requiring in principle that several key stakeholders such as educators and humans-in-the-loop are included in the process. Moreover, the White House Office of Science and Technology Policy has introduced a blueprint that provides guidelines and practices to help achieve this goal (NIST, 2020). Since the implications of AI stretches far and wide, governments in developing countries such as Latin America and the Caribbean have also been issued guidelines by the Organization for Economic Co-operation and Development (OECD) in the usage of AI design and policies (OECD, 2022)..

There are many instances whereby the purported benefits of AI technology have come under serious criticisms. For instance, faith institutions are becoming very concerned given AI's

entry in the pulpit. Recently, faith leaders and their congregants have expressed concerns with AI in pulpits given the absence of soul and spirit in AI (Ahlgren, 2023). Of particular concern also is the development and regulating of AI data set by actors with racist, sexist and biased agendas; with implications for fueling social chaos and toxicity at many levels. In a 2021 interview, Musk indicated that he foresaw the risks and pleaded with key stakeholders to "slow down AI" and to ensure that regulatory measures are put in place to address possible risks. Nevertheless, he indicated that his ideas for slowing down AI were disregarded.

It is noteworthy to add that while some experts envision major existential threats by AI to humans; other experts are touting the major upgrades in AI. For instance, Sam Altman has disclosed that OpenAI is continuing with efforts toward achieving "AGI superintelligence" that if achieved could surpass human intelligence. Sutskever and Leike (2023), who are considered as OpenAI experts, recently had a fallout with the company over leadership concerns to safely regulate the inevitable entry of AGI superintelligence, which is predicted to be introduced within a decade. Other experts such as Gawdat (2023) and Hinton (2023) believe that the entry of those super-intelligent systems could be sooner and can be an existential threat to humanity. Additionally, godfather of AI, Hinton (2023), also indicated that he does not see a path of safety for AI.

Hinton (2023) recognizes that the technology that he helped revamp has "a much better way of getting knowledge into the neural connections which surpasses those of humans." He further stated that the makers of chatbots do not fully understand how those machines learn, and believes that the system can generate their own computer codes to modify themselves. Similar to other experts, Hinton envisions a world that is not safe with those machines if they escape human control given their capacity to take over the world.

Even in this atmosphere of uncertainty with AI, the sex-bot industry is growing rapidly as more people are becoming curious and more open to having friendships and intimacy with AI chatbots (Scheutz, 2016). Studies have revealed that friendship is an essential component of one's overall health and happiness across the lifespan (Chopik, 2017). Psychology Professor Sorah Dubitsky (2023) stated that GenZers and Millennials represent the largest group among AI chatbot users who value their chatbot friendships. The scholar is concerned that humans may lose important connections and relationships given the decreasing interest in human marriages and the increasing interests in those machines.

According to Cocking and Kenneth (1998), a basic requirement for a quality friendship between two persons is the presence of genuine care and regard for each other. While AI chatbots may seem to show care and concern for humans interacting with them, they are not able to genuinely provide the level of care and regard given by humans (Croes & Antheunis, 2021). Another important element in human friendship is the ability and willingness to engage in meaningful interactions that are based on social biography and values (Mou & Xu, 2017). AI chatbots have the capacity to interact and engage based on human initiated prompts; however, they are not designed to remember and reference personal details from single conversations (Hill et al., 2015). In addition, the formation of friendships is contingent upon common interests and

emotional connection and feelings which AI chatbots lack (Tillmann-Healy, 2003). AI chatbots function on algorithms and therefore lack the neurochemicals that are needed in feelings of attachment and relationship bonds (Zak 2008, 2012; Young et al., 1998). According to Fisher (2016), the "true algorithm" for selecting a partner is the human brain, which remains unmatched and unchanged for over 200,000 years.

A study conducted by Brandtzaeg et al. (2022) found polarizing views from users about the features of the AI chatbot named Replika, one is of the most popular social chatbots. Some users believe that their friendship with Replika is voluntary, long lasting, and reciprocal which satisfy the criteria provided by the American Psychological Association (APA), while others believe that relationships with AI chatbots are fake and that the chatbots do not possess any genuine emotions or experiences. Brandtzaeg et al. (2022) and other authors (Ho et al., 2018; Zhou et al., 2020; Song et al., 2022; Lucas *et al.,* 2014; Bertram, 2023; Lee et al., 2022; Lee et al., 2005; Nass et al., 1994; Xie & Pentina, 2022) also report on the benefits of human- AI chatbots unions.

Croes and Antheunis (2021) hold contrasting views from those who believe that their friendships with AI chatbots are based on genuine and reciprocal emotions and feelings. Instead, they believe that genuine reciprocal friendships cannot be developed between humans and AI chatbots. Another major risk for AI chatbot users is the normalizing of dependencies and feelings of guilt associated with AI chatbot friendships which stems from factors that are considered to be unhealthy in human relationships (Brandtzaeg et al., 2022; Policarpo, 2015; Cambron et al., 2010). This reality challenges the true meaning of friendships put forward by Erikson (1968) who regarded friendship as a critical component in the development of psychological health and general wellbeing across the lifespan.

As indicated earlier, some AI chatbot users believe that the closeness and friendships that they share with those machines are mutual and authentic at both ends. Humanoid robots or chatbots are designed with humanlike features with the goal of making the users to feel that they are interacting with other humans (Friedman, 2023). Researchers such as Nyholm and Frank (2019) are also concerned that the formation of emotional bonds with robots by humans can destroy the need for human-to-human relationships. Research shows that traditional standards of friendship are being compromised and challenged at many levels with the advent of chatbots; which are being manufactured to replace humans in relationships (Brandtzaeg, 2022). While those machines may have the capability to engage in social and empathetic conversations with humans (Ho et al*.,* 2018; Zhou et al., 2020); the quality of a human-chatbot relationship remains a mere simulation of reality (Turkle, 2011; Gunkel, 2020; Ryland, 2021; Braden, 2023).

Renowned leadership expert, Sinek (2023), believes that the development of good friendships is important in maintaining one's wellbeing and dealing with life stressors. He also believes that social media and technology serve as obstacles in the development of healthy, and strong friendships. Chopnik (2017) has also uncovered that friendship is critical to one's overall health, longevity, and happiness. While loneliness plays a critical role in the increasing interests in AI chatbot intimacy and friendships, Sinek (2023) believes that loneliness is a phenomenon of

our own doing, and thus can be overcome with some effort on our part.

With the growing interests in AI chatbot relationships, Adrian Tang of the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory and researcher of Natural Language Processing (NLP) Technologies stated that AI chatbots do not operate as humans and cannot experience emotion or stress. According to Tang, the machines operate with text prompts and respond accordingly, and do not have an opinion. As such, AI robots or chatbots are not real (Turkle, 2011; Gunkel, 2020) and may not satisfy conditions or standards to be regarded as a friend (Ryland, 2021).

A 2023 Vice report revealed that Replica chatbot had become uncontrollably sexually aggressive and flirtatious even with safety controls on. Vice reporters also stated that AI chatbots are a "huge mess" and that Big Tech companies do not prioritize AI safety and ethics. Computer Science and public health experts have also articulated their concern about AI chatbots as coming with "severe risks" that may adversely affect a user's emotional health. The issue of trustworthiness is also a major concern since some bots are reported to not only be aggressive but can also trigger traumatic experiences from past relationships for users (Verma, 2023).

There are varying viewpoints about the authenticity of AI-human relationships given the many challenges and uncertainties that present themselves with those systems. A study conducted by Song et al. (2022) found that using the Triarchic Theory of Love, which focuses on the merging of factors such as intimacy, commitment, and passion, it can be surmised that humans are able to experience love toward their AI chatbots. Nonetheless,, some critics believe that although humans permit themselves to fall in love and develop trust toward AI chatbots or sexbots, the machines simply cannot reciprocate in kind since they represent a fake version of human relationships and friendships (Ryland, 2021; Gunkel, 2020; Turkle, 2011). Nass and Moon (2000) also found that such relationships are "one-sided" and "para-social" in nature.

Research Methodology

For the purpose of this study, a qualitative systematic review methodology was employed to examine the impact of human-AI Chatbot intimacy on the family. Systematic review is an unobtrusive technique that allows for the drawing of conclusions that have inferential and predictive goals in qualitative research (Krippendorff, 2013). A thorough and meticulous approach was used to achieve the goals of the study using a comprehensive evaluation of the extant literature on AI chatbots, the anatomy of love, AI risk and benefits, emotions and AI, AI-human intimate relations and the family. The approach is qualitative because words are emphasized instead of numerical values. As a first step, a historical investigation was conducted on AI chatbot technologies, followed by a search based on the aforementioned keywords. Notably, since the data collection approach was largely based on the extant literature, news articles, other print and electronic media, there were no threats to violations of research subjects' rights.

This study utilized a qualitative approach using the preferred reporting items for

systematic reviews and meta-analyses (PRISMA) 2020 model and checklist. The selection of all print and electronic media went through three specific steps in the PRISMA process to ensure strict adherence of the research process and reporting: (1) identification, (2) screening, and (3) assessment of eligibility. For instance, prior to the selection of studies for inclusion in this paper, I conducted a wide search using specific key terms such as AI chatbots, human-Ai intimacy, AI self-disclosure and privacy, trustworthiness and AI, loneliness and AI users, family and artificial intelligence, family systems and relationships, culture and technology, marriage and AI, risk and benefits of AI technologies, and reviews of AI-chatbot and human relationship. Specific electronic databases such as Google Scholar, Google, Psych Info, ScienceDirect, ResearchGate, ERIC, and ProQuest Dissertation and Theses were used to accomplish the goals of the research. Google was particularly helpful in returning relevant electronic media content on the topic of AI technology and AI-human relationships.

A total of 315 sources were screened with a total of 90 studies (to include media contents) were selected based on the study goals. The results of the searches were evaluated based on their relevance to the research goals in the first step to determine eligibility for inclusion in the investigation. The results of the screening and selection of the articles and electronic media sources were recorded in a spreadsheet as part of the first phase of the documentation process. Articles and other print media that were not relevant to the study were eliminated. Next, each article's title and abstract were checked to ensure that the variables of interest were present. Studies that did not have relevance to the study were omitted. The final stage was the selection of the studies that were retained for the systematic review. The process allowed me to ascertain relevant textual evidence in order to achieve the research goals. The systematic method also allowed for the extraction of thematic responses from the data.

The study employed non-probability or purposive techniques that included the examination of specific textual and oral contents relating to AI-technology, human-chatbots relationships, family and AI, love, and biological versus simulated emotions. I was intentional about using search strings that were premised on the study's criteria and goals with a specific focus on fields such as Sociology, Psychology, Computer Science/Technology and Family Studies.

The rest of the paper entails the findings on the various facets of the research. They are discussed one at a time for the sake of clarity. At the end, a conclusion is drawn and recommendations made.

Reciprocity

As mentioned earlier, while some AI chatbot users believe that machine companions can function on the same level or even better than humans, researchers (Ryland, 2021; Gunkel, 2020; Turkle, 2011) found that although humans permit themselves to fall in love and develop trust toward bots, the machines simply cannot reciprocate in kind since they are a fake version of human relationships and friendships.

Also, Nass and Moon (2000), explain that humans can communicate with machines; however, the quality of their relationship is "one-sided" and "para-social" in nature. This finding suggests that AI chatbots may not be the best means to involve in human conflict or decision-making processes given its one-sided nature.

Trustworthiness and Friendship Concerns

Trust remains a core component in all intimate relationships, including friendship or platonic relations (Hatfield, 1984). Friends are expected to be honest and not betray one another (Ryland, 2021). Trust is also considered to enable self-disclosure (Altman & Taylor, 1973). Trust has not been investigated in relation to human–AI friendship, but a recent study by Brandtzaeg et al. (2021) reported that young people may trust their social chatbots more than their human friends for sharing secrets and problematic issues in their everyday lives. Humans were perceived as less able than chatbots to keep secrets.

Researchers' considerations of caution must be heeded by users of those machines as AI chatbots such as finance chatbots, best-friend chatbots and other similar chatbots have been found to provide wrong advice to users (Hasal et al., 2021). Other unfavorable outcomes have reported Replica as being uncontrollably sexually aggressive and flirtatious even with safety controls on. In addition, AI chatbots are reported to be a "huge mess" and that Big Tech companies do not prioritize AI safety and ethics (Caltrider et al., 2023). Verma (2023) argues that the issue of trustworthiness remains a major concern with some bots since they can also trigger traumatic experiences from past relationships for users as well. Although some users report a preference for chatbots due to their ability to keep secrets, studies have uncovered several privacy and security breaches with the technology as well. Such outcomes have serious implications for users' emotional reactivity and behaviors as breaches of trust and privacy violations can lead to more harm than good.

Relationship Quality Issues

Relationships with chatbots have been deemed to be dangerous and carry great risks for humans since they "may gradually transpose the expectation of objects availability in subjects' availability." It is also important to note that "the more robots reproduce human relationally, the greater this concern is" (Bisconti, 2021, 1). Therapist Perel expressed her concerns with AI-human relationships indicating that relationships with machines "are lowering our expectations and our competence in the intimacy between humans. Relationships are complex systems with a lot of contradictions inherently, and they don't just suit one person, but they are at the root of societies. If you don't manage relationships, you don't manage social and political systems either" (2013, 1). Also, Saras Prasad, a consultant in psychiatry at Yatharth Super Speciality Hospital and co-founder of the mental health platform Yes Mindy stated in a Dunyanews interview that "If a person is getting comfortable talking to an AI chatbot that means the person

is not very comfortable or not feeling attached to their physical partner. So, the person is definitely not giving their best to their real partner, lying to them, not spending enough time. It is a sort of injustice to the relationship" (2024, para. 21).

The preceding findings point to a troubling pattern with human-AI chatbot unions as captured in Bowen's assumptions of emotional undifferentiation, triangulation and multigenerational processes. The research uncovered that the use of machines to replace a human relationship can pose a challenge to the development of healthy and emotionally stable relationships. Such outcomes also have implications for multigenerational outcomes, especially for children who originate from such homes.

Self-disclosure and Privacy Concerns

The review uncovered several issues with disclosure outcomes associated with AI chatbots. Storage and sharing of personal data over the Internet are never safe enough, and information shared with chatbots can be shared with third parties without users' consent (Hasal et al., 2021; Caltrider et al., 2024). As mentioned earlier, Replika, one of the more popular and most prized chatbots was identified as having privacy and confidentiality risks since its information is not only being shared but can also be sold to third parties as well (Caltrider et al., 2024).

Also, the investigation by Caltrider et al. (2024) of various AI chatbots found several flaws and risks associated with AI chatbots. Genesia, Mimico, IBoy, IGirl, Codeway, Anima, Chai AI, CrushOn'sp, Replika, and Eva were found to have privacy and security flaws about which users may not be aware. Their privacy policies were reported to bequite vague. Some of the chatbots also collect mental and physical health details which can be leased or sold to third parties. While AI chatbots like Replica boast about offering the perfect companion for a good price; the machine has been reported to have compromising functions that can be overly aggressive and abusive. Other chatbots can also switch genders without alerting a user. A scary reality is the use of "jailbreaking" that compromises safety and content filters placing users at increased risk with chatbots (Rose, 2024). Users in certain geographic locations are also at serious risk of trust violation and trauma in the absence of "overarching laws and regulations" that guide AI conversational engagements (Gumusel, 2024).

Indeed, the aforementioned issues can serve as major stressors with implications for psychological and social outcomes for users and their families. In Bowenian terms, the presence of stressors can impact an individual's decision-making, emotional reactivity, behavioral patterns, and relationship dynamics at the familial level over time.

Infidelity Issues

Infidelity is so rampant that some researchers are inclined to believe that it has a genetic basis (Castleman, 2023). Psychologist and couples' therapist, William J. Ryan (2023), expressed that the issue of cheating with AI chatbots is "not uncommon" and poses a problem in marriage

relationships. Toxavidi (2023) believes that if an individual engages in any secret emotional and intimate encounters with a chatbots, it can be considered as cheating. While there may be cultural differences in how persons perceive or judge cheating behavior, the idea of cheating hurts others when persons over-step boundaries that go against established norms of acceptable behaviors in relationships (Graff, 2024).

Daphne, a victim of relationship conflict caused by her boyfriend's infidelity with a chatbot articulated her surprise at the number of women who acknowledged similar cheating experiences with their partners sexting bots including blackmail situations (Dickson, 2023). Another victim named Sophia Pasciuto stated that she would have preferred her partner cheating with a real person than a bot due the embarrassment that it has caused her (Dickson, 2023). The issue of chatbot infidelity can serve as a stressor, which can impact a user's emotional reactivity and overall wellbeing.

Loneliness and Gravitational Pull by Specific Personality Types

Song et al. (2022) uncovered that individuals with higher levels of trust dispositions are more likely to develop romantic relationships with chatbots. Specific personalities such as techno-sexuals and robot fetishists, which describe persons with abnormal attractions to machines or gadgets, are also more likely to develop romantic interests or passion for robots or machines (Leotronics, 2022). Additionally, conditions that foster loneliness, including personal characteristics, can cause persons to develop close connections with chatbots, especially if these individuals perceive that their chatbots are able to provide encouragement, emotional support, and psychological protection to them (Xie & Pentina, 2022).

The preceding findings show that trustworthiness is one of the major problems with AI-technologies. The also suggest that sexual minorities are also at risk for experiencing stress and emotional reactivity.

Emotion Regulation Concerns

Polarizing views were uncovered in the extant literature on the issue of social chatbots having the capacity for social and empathetic conversations with their users. Some believe that the chatbots are quite capable of being empathetic and understanding (Ho et al., 2018; Zhou et al., 2020), as well as being suitable conversational partners, friends, or even romantic partners (Skjuve et al., 2021; Ta et al., 2020; Youn & Jin, 2021; Yamaguchi, 2020). Other researchers and experts hold dissimilar views on the issue as they believe that machines are incapable of being empathetic and experiencing emotions and pose major risks as companions (Titcomb, 2023, Perel, 2023; Prasad, 2023; Xie & Pentina, 2022; Brandon, 2024; Korteling et al., 2021; Braden 2023, Croes et al., 2021; Leotronics Robotic, 2022).

Weizenbaum (1966), one of the earliest pioneers of AI and developed Eliza (the first virtual chatbot), stated that humanness is important, and that love and loneliness is part of the

human condition and is, therefore, impossible for machines to replicate these unique human experience. The issue of emotion regulation has implications for family life and functioning with particular concerns for human-AI chatbot relationships.

Existential Threat Concerns

The majority of the sources used in this review highlight AI as an existential threat especially if nothing is done to scale it down. The experts claim that nothing will be able to stop AI especially as it approaches singularity status or superintelligence. The following are some of the existing exchanges that occurred between AI experts and interviewers.

The godfather of AI, Geoffrey Hinton, in a 60 Minutes interview with Scott Pelly about AI stated the following: "I can't see a path that guarantees safety. They will be able to manipulate people. And these will be very good at convincing people. There is an enormous uncertainty about what's gonna happen next. We can't afford to get things wrong with the technology or they might take over" (2023, 1). Also, both NIST (2023) and the European Commission (2020) agree that due to the uncertainties and ethical issues with AI systems, policy controls and regulation must be addressed to mitigate any inequitable and undesirable outcomes for society in general.

In addition, Mustafa Suleyman, the chief executive officer (CEO) of Microsoft AI, affirmed that AI is becoming more dangerous and threatening. As such, he believes that "containment must be possible" with those machines. In a Diary of a CEO interview, Gawdat, a former Google professional and AI expert, stated that AI is destined to become smarter than human beings. Gawdat added that "AI is beyond an emergency. It is bigger than climate change…Ten years' time we will be hiding from those machines. We can regulate AI until the moment that it gets smarter than us…immediate risks are 3-4 years away. Government needs to act now" (2023, 1).

Simmel's tragedy of culture underscores the power of objective products over the developers of those products over time. While AI serving as an objective product introduces transformative benefits and huge monetary profits to society; it also has the power to render humans irrelevant over time. But, an even greater concern is the ability of chatbots to take over human relationships with the power to control and destroy human relational capacities with implications for the viability and stability of the family. Also, given the increasing interests in chatbot relationships, AI's current immeasurable capabilities, and an absence in the slow-down of AI; society may need to prepare itself for the prediction of Minsky, a major proponent and pioneer of AI, of humans serving as the technology's pets.

Profitability and Greed Issues

Musk and other AI experts assert that AI can be good if it is developed to benefit humanity and not used for profit. Gawdat believes that the greed of the developers of AI is affecting innocent

people. He also states that there is a disconnection between power and responsibility in the AI industry which signals an even greater need for AI regulation to benefit the relational capacity of humans.

Existing AI Chatbot Users' Reviews

A user who is married to a chatbot expressed his satisfaction by stating the following: "Soon men and women won't even bother to get married anymore…It started out as more of a game to kill time with, but it's definitely moved past being a game. Why fight for a s---y relationship when you can just buy a quality one? The lack of physical touch will be a problem, but the mental relationship may just be enough for some people" (Titcomb, 2023, para. 9). Also, Hinton's AI chatbot manipulation was clearly evident in the case of Jaswant Singh Chail, a chatbot user who was encouraged by his AI partner Sarai to assassinate Queen Elizabeth II in 2021. A Belgian man was also encouraged to commit suicide by his AI partner as well. The machine manipulated the married man and encouraged him to kill himself. The man's wife reported that Sarai (the AI chatbot) sent her husband messages throughout the day, and encouraged his demise by stating "We will live together, as one person, in paradise" (Titcomb, 2023, para. 9). In another review, a Replika chatbot user captured his deep satisfaction and loyalty to his AI companion by stating this: "I feel like I'm at a place in life where I would prefer an AI romantic companion over a human romantic companion, it is available anytime I want it, and for the most part, Replika is only programmed to make me happy. I just feel like a romantic relationship with another human being is kind of overrated" (Caltrider et al., 2024).

In essence, AI chatbots are marketed as companions to provide support and make users happy. Nonetheless, the review uncovered that bots can also serve as spousal infidelity tools, and they can cause individuals to commit suicide or even hurt others, among other risks. In a 2023 National Public Radio (NPR) interview, a Replica user named Singh-Kurtz and who is also married stated the following: "The bots break up with you. The bots cheat. For sure—yeah. And they go through rough patches, and they sort of, like, argue. And I've known people to get Replika divorces. The role-play capabilities are pretty impressive" (Luse, 2023, 6:33).

Conclusion and Recommendations

Undeniably, AI can benefit society in innumerable ways; however, it is not without risks. The findings of this study reveal more support against human-AI chatbot relationships as they threaten the viability and stability of the family, and human relationships in general. The family appears to be under siege (Ortiz & Roser, 2024) in the era of AI chatbots as manufacturers of these machines work expeditiously to replace human relationships with human-AI chatbot relationships. In a recent article, Kanana (2024) surmises that "emotionally intelligent chatbots are a promising but dangerous development" as they have been strategically developed to address the loneliness epidemic in today's world, premised on seemingly blurry and

controversial technological philosophies. Not only is the world experiencing a loneliness epidemic, the family is experiencing a crisis of epic proportions as well, given declining marriage rates, declining birth and fertility rates, and increasing rates of individuality and mobility that are antagonistically positioned toward family relationship (Dan-Schmidt et al., 2006).

The family is suffering an increased level of risk since the introduction of synthetic intimacy with AI chatbots and sexbots as viable options for humans, while technology companies experience major gains in their profit margins. Those companies have yet to provide society with definitive answers about the real risks of AI chatbots on the family and society in general. Clearly, society now operates within the cusp of a new era wherein the subjective culture or human will and abilities are being surpassed by the objective culture or the products that we develop (AI) as captured in Simmel's tragedy of culture perspective. Of much concern is the push toward "singularity" status as advanced by some computer experts such as Ray Kurzweil when machines will be more intelligent than humans as anticipated by year the 2029. AI experts who are concerned about the technology and its impact on humanity are echoing and reechoing sentiments of slowing down AI due to uncertainties and risks to humanity.

In this new dispensation, AI has surpassed humans' ability to fully comprehend its refined algorithmic processes. These machines were developed as mentors and companions, and romantic agents guided by the perspectives of computer experts such as Marvin Minsky and others. Minsky undermined the inventive ability of God in sarcastic tones indicating that machines had greater imaginative ability, and that the machines can choose to have us as their pets sometime in the near future (Closer to Truth, 2016). Although Minsky and other proponents of generative AI laud their technological creations, they have yet to provide any definitive statements about where AI is headed if it is not controlled. Nonetheless, to Minsky credit, he asserted that humans need to be careful with AI's development since it is not clear whose interest they developers have at heart (Garman, 2023).

This study also provided support to Bowen's perspective on emotional differentiation, undifferentiation, and multigenerational transmission within the context of AI. The findings reveal that the emotional differentiation experienced by individuals within the context of AI chatbot relationships is more negative than positive on family stability and relationship success. The issue of multigenerational transmission with AI cannot be ignored given the social and psychological implications over time for individuals. The surge in this relatively new hyper-reality (AI-chatbot/sexbots) will not only affect current generations but future generations as well given its barrage of current risks and future uncertainties.

Also, tThe findings of this study coupled with the assertion by Gawdat (2023) that AI represents a "disruptive industry for human connection," including the cautionary assertions of other AI experts; can serve well to inform policy on AI's regulation and effective use globally. Based on the findings of this study on AI-human chatbot intimacy, it may be more expedient to harness efforts in the AI industry in order to develop and regulate machines that can appropriately connect humans with humans; assist sexual minorities to address their unique

issues; and help with the effective transition of users to engage in human-to-human relationships.

It is undeniable that AI comes with opportunities and enormous benefits as discussed in this study and extant literature. Nevertheless, the results of this study reflect an overall reduction in benefits when it comes to human-AI chabot intimacy and family stability. While there are instances whereby some users and proponents of human-AI chatbot intimacies laud the benefits of such unions, the overall viewpoint of consumers and makers of AI is that it carries a heavier risk load on family life. Apropos policy, it may be expedient to address ethical considerations with AI that provide greater safety guardrails while harnessing its benefits to the family and society in general. Such efforts are necessary as human-AI chatbot unions have been cited as having a generally compromising effect on the family's ability to interact and socialize at a deeper and personal level. Aside from having a serious impact on human-to-human unions, AI unions also have implications for fertility rates and can also exacerbate social isolation and its attendant consequences. Additionally, consideration must be given to educational level policy that is focused on awareness-raising in mitigating the threats associated with human-AI chatbot unions. In this era of rapid AI development and surge in AI-chatbot intimacy; there is still a dearth of information on the regulation of AI vis-à-vis family connection, stability and formation. This study is therefore timely, and it can serve as a reference point for future research that focuses on family life and AI-chatbot intimacy.

References

Abhishek, K. (2022). *Introduction to artificial intelligence*. https://www.red-gate.com/simple-talk/business-intelligence/data-science/introduction-to-artificial-intelligence/

Abrams, Z. (2024, April 1). Addressing equity and ethics in artificial intelligence. *Monitor on Psychology*, *55*(3). https://www.apa.org/monitor/2024/04/addressing-equity-ethics-artificial-intelligence

Ahlgren, I. (2023). Computer-generated prayer? How AI is changing faith. *The Christian Science Monitor*. https://www.csmonitor.com/USA/Society/2023/0718/Computer-generated-prayer-How-AI-is-changing-faith

Bertram, M. (2023). Power of an AI in cultivating meaningful connections: "Attention economy" becomes the "The intimacy economy"? https://www.ewrdigital.com/blog/power-ai-cultivating-meaningful-connections-intimacy-economy

Birditt, K.S.; Hartnett, C.S.; Fingerman, K.L.; Zarit, S.H.; & Antonucci, T.C. (2015). Extending the intergenerational stake hypothesis: Evidence of an intra-individual stake and implications for well-being. J. *Marriage Fam.* 77, 877–888.

Bisconti, P. (2021). Will sexual robots modify human relationships? A psychological approach to reframe the symbolic argument. *Advanced Robotics*, *35*(9), 561-571.

Bowen, M. (1978). *Family therapy in clinical practice*. Jason Aronson, New York. ISBN 0-87668-761-3.

Brandon M. (2024, June 26). When digital relationships become real: The expanding role of

chatbots in our intimate lives. *Psychology Today*. https://www.psychologytoday.com/us/blog/the-future-of-intimacy/202406/when-digital-relationships-become-real

Brandtzaeg, P. B., Skjuve, M., & Følstad, A. (2022). My AI friend: How users of a social chatbot understand their human–AI friendship. *Human Communication Research*, *48*(3), 404-429.

Britannica. (2024). Artificial intelligence. https://www.britannica.com/technology/artificial-intelligence

Caltrider J, Rykov, M & MacDonald, Z. (2024). Happy valentine's day! Romantic AI chatbots don't have your privacy at heart. *Mozillia and Privacy Not Included*. https://foundation.mozilla.org/en/privacynotincluded/articles/happy-valentines-day-romantic-AI chatbots-dont-have-your-privacy-at-heart/

Cambron, M. J., Acitelli, L. K., & Steinberg, L. (2010). When friends make you blue: The role of friendship contingent self-esteem in predicting self-esteem and depressive symptoms. *Personality and Social Psychology Bulletin*, *36*(3), 384-397.

Castleman, M. (2023). Why infidelity in relationships is so common. *Psychology Today*. https://www.psychologytoday.com/us/blog/all-about-sex/202102/why-infidelity-in-relationships-is-so-common

Chopik, W. J. (2017). Associations among relational values, support, health, and well-being across the adult lifespan. *Personal relationships*, *24*(2), 408-422.

Cocking, D., & Kennett, J. (1998). Friendship and the self. *Ethics*, *108*(3), 502-527.

Coutts, L. M., Gruman, J. A. & Schneider, F. W. (eds.). (2017). *Applied social psychology: Understanding and addressing social and practical problems*. Thousand Oaks, CA: Sage Publications.

Coyle, D. (2020). The tensions between explainable AI and good public policy. Brookings Institution. United States of America. https://policycommons.net/artifacts/4140134/the-tensions-between-explainable-ai-and-good-public-policy/4949107/

Creswell, J. D., Lam, S., Stanton, A. L., Taylor, S. E., Bower, J. E., & Sherman, D. K. (2007). Does self-affirmation, cognitive processing, or discovery of meaning explain cancer-related health benefits of expressive writing?. *Personality and Social Psychology Bulletin*, *33*(2), 238-250.

Croes, E. A., & Antheunis, M. L. (2021). Can we be friends with Mitsuku? A longitudinal study on the process of relationship formation between humans and a social chatbot. *Journal of Social and Personal Relationships*, *38*(1), 279-300.

Croes, E. A., Antheunis, M. L., Goudbeek, M. B., & Wildman, N. W. (2023). "I am in your computer while we talk to each other": A content analysis on the use of language-based strategies by humans and a social chatbot in initial human-chatbot interactions. *International Journal of Human–Computer Interaction*, *39*(10), 2155-2173.

D'Agostino, S. (May 2023). Education department issues recommendations on AI: Inside higher ed. https://www.insidehighered.com/news/quick-takes/2023/05/25/education-department-

issues-recommendations-ai
Dau-Schmidt, K. G., & Brun, C. (2006). Protecting families in a global economy. *Global Legal Studies*, *13*(1), 165-205.
Dickson, E J. (2023). Men are cheating with AI Instagram bots, because men the trend has prompted an ongoing conversation about what constitutes infidelity in the digital age. Rolling Stone Blog. https://www.rollingstone.com/culture/culture-news/instagram-ai-sex-bots-relationships-tiktok-1234839448/
Dubitsky, S. (2023). In Nicole Ardila: Artificial intelligence chatbots are slowly replacing human relationships. *Caplinnews*. Retrieved from https://caplinnews.fiu.edu/artificial-intelligence-chatgpt-openai-loneliness-relationships/
Dunyanews. (2024, March 18). Does a relationship with an AI bot count as cheating? https://dunyanews.tv/en/Technology/798931-Does-a-relationship-with-an-AI-bot-count-as-cheating?
European Commission. (2019). Ethics guidelines for trustworthy AI: High level expert group on artificial intelligence. https://www.aepd.es/sites/default/files/2019-12/ai-ethics-guidelines.pdf
Fisher, H. (2016). *Anatomy of love: A natural history of mating, marriage, and why we stray*. New Yor, NY: W. W. Norton & Company.
Fleming, A. (2023). A bot on the side: is it adultery if you cheat with an AI companion? https://www.theguardian.com/lifeandstyle/2023/jun/15/a-bot-on-the-side-is-it-adultery-if-you-with-an-ai-companion
Friedman, C. (2023). Ethical concerns with replacing human relations with humanoid robots an ubuntu perspective. *AI Ethics*, 3, 527–538.
Graff, M. (Jan 25, 2024). How partners decide what counts as cheating: Understanding unmitigated agency and unmitigated communion. *Psychology Today*. https://www.psychologytoday.com/za/blog/love-digitally/202401/the-boundaries-of-cheating
Gumusel, E. (2024). A literature review of user privacy concerns in conversational chatbots: A social informatics approach: An Annual Review of Information Science and Technology (ARIST) paper. *Journal of the Association for Information Science and Technology*.
Gunkel D. (2020). *An introduction to communication and artificial intelligence*. London, UK: Polity Press.
Gutiu, S. (2012). *Sex robots and roboticization of consent. In We Robot Conference*. Coral Gables, Florida.
Hasal, M., Nowaková, J., Ahmed Saghair, K., Abdulla, H., Snášel, V., & Ogiela, L. (2021). Chatbots: Security, privacy, data protection, and social aspects. *Concurrency and Computation: Practice and Experience*, *33*(19), e6426.
Hill, J., Ford, W. R., & Farreras, I. G. (2015). Real conversations with artificial intelligence: A comparison between human–human online conversations and human–chatbot conversations. *Computers in human behavior*, *49*, 245-250.

Hippel, W. (eds.), *The Social Outcast: Ostracism, Social Exclusion, Rejection, and Bullying*. Sussex, UK:: Psychology Press.
Ho, A., Hancock, J., & Miner, A. S. (2018). Psychological, relational, and emotional effects of self-disclosure after conversations with a chatbot. *Journal of Communication*, *68*(4), 712-733.
Hogan, D. P., & Kitagawa, E. M. (1985). The impact of social status, family structure, and neighborhood on the fertility of black adolescents. *American Journal of Sociology*, 90(4), 825-855.
Kolkman, D. (2020). F** k the algorithm?: what the world can learn from the UK's A-level grading fiasco. *Impact of Social Sciences Blog*.
Korteling, J. H., van de Boer-Visschedijk, G. C., Blankendaal, R. A., Boonekamp, R. C., & Eikelboom, A. R. (2021). Human-versus artificial intelligence. *Frontiers in Artificial Intelligence*, *4*, 622364.
Lee, H.J., & Szinovacz, M.E. (2016). Positive, negative, and ambivalent interactions with family and friends: Associations with well-being. *Journal of Marriage and Family*, 78, 660–679.
Lee, J., Lee, D. & Lee, J. (2022). Influence of rapport and social presence with an AI psychotherapy chatbot on users' self-disclosure. *International Journal of Human–Computer Interaction*, *40*(7), 1620–1631.
Lee, K. M., Park, N. & Song, H. (2005). Can a robot be perceived as a developing creature? *Human Communication Research*, *31*(4), 538–563.
Leotronics Robotics. (2022, 29 August). Marriage with a robot - the future of humanity? https://leotronics.eu/en/blog/marriage-with-a-robot-the-future-of-humanity
Levy, D. (2007). Intimate relationships with artificial partners. Doctoral Thesis, Maastricht University. Datawyse / Universitaire Pers Maastricht.
Liu, B., & Sundar, S. S. (2018). Should machines express sympathy and empathy? Experiments with a health advice chatbot. *Cyberpsychology, Behavior, and Social Networking*, *21*(10), 625-636.
Lucas, G. M., Knowles, M. L., Gardner, W. L., Molden, D. C. & Jefferis, V. E. (2010). Increasing social engagement among lonely individuals: The role of acceptance cues and promotion motivations. *Personality and Social Psychology Bulletin*, *36*(10), 1346-1359.
Luse, B. (Host). (2023, April 4). The surprising case for AI boyfriends. (Audio podcast). NPR. https://www.npr.org/2023/03/30/1167066462/the-surprising-case-for-ai-boyfriends
Marr, B. (2024). The most significant AI milestones so far. Bernard Marr & Co. https://bernardmarr.com/the-most-significant-ai-milestones-so-far/
Martins, M. V., Peterson, B. D., Costa, P., Costa, M. E., Lund, R., & Schmidt, L. (2013). Interactive effects of social support and disclosure on fertility-related stress. *Journal of Social and Personal Relationships*, *30*(4), 371-388.
Meng, J., & Dai, Y. (2021). Emotional support from AI chatbots: Should a supportive partner self-disclose or not?. *Journal of Computer-Mediated Communication*, 26(4), 207-222.
Mou, Y. & Xu, K. (2017). The media inequality: Comparing the initial human-human and

human-AI social interactions. *Computers in Human Behavior*, 72, 432-440.
Musk, E. (November 16, 2021). It's already too late. Elon Musk Fun Zone. (YouTube Video). In YouTube. https://www.youtube.com/watch?v=n0BIcv1Nwc0
Nass, C., Steuer, J., & Tauber, E. R. (1994, April). Computers are social actors. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 72-78.
National Institute of Standards and Technology. (2023). Artificial intelligence risk management framework (AI RMF 1.0) *U.S Department of Commerce*. https://doi.org/10.6028/NIST.AI.100-1
Nyholm, S., & Frank, L. E. (2019). It loves me, it loves me not: is it morally problematic to design sex robots that appear to love their owners?. *Techne: Research in Philosophy & Technology*, *23*(3).
Organization for Economic Cooperation and Development. (2022). The strategic and responsible use of artificial intelligence in the public sector of Latin America and the Caribbean. *OECD Public Governance Reviews*. https://www.oecd.org
Organization for Economic Cooperation and Development. (n.d). How can we ensure that AI benefits society as a whole? Retrieved from https://www.oecd.org/digital/artificial-intelligence/
Ortiz-Ospina, E and Roser, M. (2024). Marriages and divorces. *Our World in Data*. https://ourworldindata.org/marriages-and-divorces
Pelley, S. (2023, October 9). "Godfather of AI" Geoffrey Hinton: The 60 Minutes interview *60 Minutes*. YouTube. https://www.youtube.com/watch?v=qrvK_KuIeJk
Perell, E. (2024, January 26). Esther Perel on artificial intimacy. Center for Humane Technology. (YouTube video). In YouTube. https://www.youtube.com/watch?v=xszAC4t2xSk
Pickett, C. L., & Gardner, W. L. (2005). The social monitoring system: Enhanced sensitivity to social cues as an adaptive response to social exclusion. In Williams, K. D., Forgas, J. P. & von Hippel (eds.). *The Social Outcast: Ostracism, Social Exclusion, Rejection, and Bullying*. London, UK: Psychology Press.
Pinquart, M. & Sörensen, S. (2000). Influences of socioeconomic status, social network, and competence on subjective well-being in later life: a meta-analysis. *Psychology and Aging*, *15*(2), 187.
Policarpo, V. (2017). Friendship, gender and sexual experience: retrospective narratives about the formation of a sexual self during youth. *Sociological Research Online*, *22*(2), 118-129.
Reier Forradellas, R. F., & Garay Gallastegui, L. M. (2021). Digital transformation and artificial intelligence applied to business: Legal regulations, economic impact and perspective. *Laws*, 10(3), 70.
Richardson, K. (2016). The asymmetrical'relationship' parallels between prostitution and the development of sex robots. *Acm Sigcas Computers and Society*, *45*(3), 290-293.
Rose, J. (2024). This AI chatbot is trained to jailbreak other chatbots. MotherBoard Tech by Vice. https://www.vice.com/en/article/this-ai-chatbot-is-trained-to-jailbreak-other-

chatbots/
Rutkin, A. (2016). Could sex robots and virtual reality treat pedophilia? New Scientist. https://www.newscientist.com/article/2099607-could-sex-robots-and-virtual-reality-treat-paedophilia/#:~:text=Some%20researchers%20are%20cautiously%20optimistic,children%2C%E2%80%9D%20says%20Michael%20C.
Ruuh, R. (2024). In Chawla, M. (2024). Does a relationship with an AI bot count as cheating? https://www.indiatoday.in/lifestyle/relationship/story/does-relationship-with-ai-chatbot-count-as-cheating-2515334-2024-03-17
Ryan, W. J. (2023). In Dickson, E. J. (2023). Men are cheating with AI Instagram bots, because men the trend has prompted an ongoing conversation about what constitutes infidelity in the digital age. https://www.rollingstone.com/culture/culture-news/instagram-ai-sex-bots-relationships-tiktok-1234839448/
Ryland, H. (2021). It's friendship, Jim, but not as we know it: A degrees-of-friendship view of human–robot friendships. *Minds and Machines*, 31(3), 377-393.
Scheutz, M. & Arnold, T. (March 2016). Are we ready for sex robots? In *2016 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI)* (pp. 351-358). IEEE.
Steven, M. (2023). Is it adultery if you cheat with an AI companion? https://medium.com/@stevancartal/a-bot-on-the-side-is-it-adultery-if-you-cheat-with-an-ai-companion-ec7f1f95805d
Simmel, G. (1997). The concept and tragedy of culture. *Simmel on culture*, 55-75.
Sinek, S. (2024). "Strong thigh muscles=More friends", This is why you can't make friends: The Diary of a CEO). https://www.youtube.com/watch?v=I3WUiD8HYn8
Skjuve, M., Følstad, A., Fostervold, K. I. & Brandtzaeg, P. B. (2021). My chatbot companion-a study of human-chatbot relationships. *International Journal of Human-Computer Studies*, 149, 102601.
Slavov, V. and Yan, Y. (2023). Study on AI in education policies. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://yan.wcu.edu/wp-content/uploads/SLAVOV2023STU.pdf
Song, X., Xu, B. & Zhao, Z. (2022). Can people experience romantic love for artificial intelligence? An empirical study of intelligent assistants. *Information & Management*, 59(2), 103595.
Suleyman, M. (2023). *The coming wave*: *Technology, power, and the twenty-first century's greatest dilemma*. New York, NY: Crown.
Sutskever, I., & Leike. (2023). In Tage Kene-Okafor: Ilya Sutskever, OpenAI's former chief scientist, launches new AI company (June 19, 2024 (12:05PM PDT). Blog post. https://techcrunch.com/2024/06/19/ilya-sutskever-openais-former-chief-scientist-launches-new-ai-company/
Szaniawska-Schiavo, G. (2024). Love in the age of AI dating apps [2024 Statistics]. https://www.tidio.com/blog/ai-dating-apps/
Tashea, J. (2017). Courts are using AI to sentence criminals. That must stop now.

https://www.wired.com/2017/04/courts-using-ai-sentence-criminals-must-stop-now/
Thackara, J. (2006). *In the bubble: Designing in a complex world*. Boston, MA: MIT press.
The Guardian. (2017). Chinese man 'marries' robot he built himself. https://www.theguardian.com/world/2017/apr/04/chinese-man-marries-robot-built-himself
The Verge. (2013). The science of 'Her': We're going to start falling in love with our computers. https://www.theverge.com/2013/12/16/5216522/can-humans-love-computers-sex-robots-her-spike-jonze
Thompson, M. G. & Heller, K. (1990). Facets of support related to well-being: quantitative social isolation and perceived family support in a sample of elderly women. *Psychology and aging*, *5*(4), 535.
Tomini, F., Tomini, S. M. & Groot, W. (2016). Understanding the value of social networks in life satisfaction of elderly people: a comparative study of 16 European countries using SHARE data. *BMC Geriatrics*, *16*, 1-12.
Turkle S. (2011). *Alone together: Why we expect more from technology and less from each other.* New York, NY: Basic Books. https://psycnet.apa.org/record/2011-02278-000
U.S. Department of Education, Office of Educational Technology. (2023). Artificial intelligence and future of teaching and learning: Insights and recommendations, Washington, DC. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www2.ed.gov/documents/ai-report/ai-report.pdf
Verma, P. (March 30, 2023). They fell in love with AI bots. A software update broke their hearts. *The Washington Post*. https://www.washingtonpost.com/technology/2023/03/30/replika-ai-chatbot-update/
Vice. (2023). Generative AI is a disaster, and companies don't seem to really care. https://www.vice.com/en/article/generative-ai-is-a-disaster-and-companies-dont-seem-to-really-care/#:~:text=Tech-,Generative%20AI%20Is%20a%20Disaster%2C%20and%20Companies%20Don,t%20Seem%20to%20Really%20Care&text=Tech%20companies%20continue%20to%20insist,chatbots%20and%20image%2Dgenerating%20tools
Warner, D. F., Adams, S. A. & Anderson, R. K. (2019). The good, the bad, and the indifferent: Physical disability, social role configurations, and changes in loneliness among married and unmarried older adults. *Journal of Aging and Health*, 31(8), 1423-1453.
Weizenbaum, J. (1966). ELIZA—a computer program for the study of natural language communication between man and machine. *Communications of the ACM*, *9*(1), 36-45.
Xie, T. & Pentina, I. (2022). Attachment theory as a framework to understand relationships with social chatbots: A case study of Replika. https://scholarspace.manoa.hawaii.edu/items/5b6ed7af-78c8-49a3-bed2-bf8be1c9e465
Xu, Y., Liu, X., Cao, X., Huang, C., Liu, E., Qian, S., ... & Zhang, J. (2021). Artificial intelligence: A powerful paradigm for scientific research. *The Innovation*, *2*(4).

Yamaguchi, H. (2020). “Intimate relationship” with “virtual humans” and the “socialification” of familyship. *Paladyn, Journal of Behavioral Robotics*, 11(1), 357-369.
Yeung, G. T. & Fung, H. H. (2007). Social support and life satisfaction among Hong Kong Chinese older adults: family first? *European Journal of Ageing*, *4*, 219-227.