My AI Friend: How Users of a Social Chatbot Understand Their Human–AI Friendship

Article *in* Human Communication Research · April 2022

DOI: 10.1093/hcr/hqac008

CITATIONS
55

READS
1,532

3 authors:

Petter Bae Brandtzaeg
University of Oslo
103 PUBLICATIONS **5,642** CITATIONS
SEE PROFILE

Marita Bjaaland Skjuve
SINTEF
25 PUBLICATIONS **808** CITATIONS
SEE PROFILE

Asbjørn Følstad
SINTEF
138 PUBLICATIONS **5,672** CITATIONS
SEE PROFILE

Human Communication Research 0360-3989

ORIGINAL RESEARCH

My AI Friend: How Users of a Social Chatbot Understand Their Human–AI Friendship

Petter Bae Brandtzaeg [1] **Marita Skjuve** [2], **& Asbjørn Følstad** [2]

1 Department of Media and Communication, University of Oslo, SINTEF, Oslo, Norway
2 SINTEF, Oslo, Norway

Use of conversational artificial intelligence (AI), such as humanlike social chatbots, is increasing. While a growing number of people is expected to engage in intimate relationships with social chatbots, theories and knowledge of human–AI friendship remain limited. As friendships with AI may alter our understanding of friendship itself, this study aims to explore the meaning of human–AI friendship through a developed conceptual framework. We conducted 19 in-depth interviews with people who have a human–AI friendship with the social chatbot Replika to uncover how they understand and perceive this friendship and how it compares to human friendship. Our results indicate that while human–AI friendship may be understood in similar ways to human–human friendship, the artificial nature of the chatbot also alters the notion of friendship in multiple ways, such as allowing for a more personalized friendship tailored to the user's needs.

Keywords: Chatbots, Artificial Intelligence, Friendship, Personalization, Human–AI Friendship

https://doi.org/10.1093/hcr/hqac008

Friendships are among the most important connections individuals make in life and a critical component of psychological health and wellbeing in lifespan development (Erikson, 1968). While the internet has long been a means for humans to meet and make friends (Brandtzaeg, 2012; Parks & Floyd, 1996a; Wellman, 2001), we are currently seeing increasing socialization and friendship formation with social chatbots such as Replika (Skjuve et al., 2021; Ta et al., 2020), Kuki, formerly known as Mitsuku (Croes & Antheunis, 2021), and Xiaoice (Zhou et al., 2020).

Social chatbots are artificial intelligence (AI) dialogue systems capable of having social and empathetic conversations with users (Ho et al., 2018; Zhou et al., 2020). This humanlike behavior makes them suitable as conversational partners, friends, or even romantic partners (Skjuve et al., 2021; Ta et al., 2020; Youn & Jin, 2021). As such, human–AI friendship involves a new intimate connection with technology

Corresponding author: Petter Bae Brandtzaeg; e-mail: petterbb@uio.no

that may alter the meanings and roles previously associated with relationships between humans (Licklider, 1960).

While some research has argued that any friendship provided by robots will be illusory (see for example, Turkle, 2011), the notion of developing a friendship with chatbots (Skjuve et al., 2021; Ta et al., 2020; Youn & Jin, 2021) is acknowledged in more recent research. However, there is insufficient knowledge of how to understand and define key aspects of human–AI friendship, specifically in comparison to human-to-human friendship. The APA Dictionary of Psychology defines friendship between humans as a

> voluntary relationship between two or more people that is relatively long-lasting and in which those involved tend to be concerned with meeting the others' needs and interests and satisfying their own desires. Friendships frequently develop through shared experiences in which the people involved learn that their association with one another is mutually gratifying. (VandenBos, 2007)

Friendship made possible through software may be constrained and directed by software design and implementation (Bucher, 2013). Byron's (2020) suggestion that a digital environment allows friendship to be understood in various ways, depending on the platforms that enable it, is arguably the case with human–AI friendship. For example, the social chatbot Replika is presented as an AI companion that is "always here to listen and talk. Always on your side"[1] and thus appear to build social relationships around the user's interests (Skjuve et al., 2021). As a result, human–AI friendship might not be mutual or reciprocal in the same sense as human–human friendship (Tur-Kaspa et al., 1999), because the AI mimics friendly behavior rather than basing this mutual pleasure or admiration (Fröding & Peterson, 2021).

Croes and Antheunis (2021) and Skjuve et al. (2021) recently investigated relationship formation between humans and social chatbots; however, to our knowledge, no empirical studies investigating the understanding and characteristics of human–AI friendship, in contrast to human friendship, have been carried out.

To address the current knowledge gap in our understanding of key aspects of human–AI friendship, we aim first, to explore how an AI-powered social chatbot may change users' perceptions of friendship and how we should understand such friendship; and second, to develop a conceptual framework appropriate to this purpose. On this basis, we pose the following explorative research questions (RQs):

> ***RQ1**: How do friends of a social chatbot understand and experience their human–AI friendship and its communication practices?*

> ***RQ2**: How do friends of a social chatbot compare experiences of human–AI friendship to those of friendship with other humans?*

By responding to these RQs, this study contributes to the body of knowledge on social relationships between humans and intelligent machines and how the notion of friendship may change. New knowledge about how people understand and

experience friendship with AI-powered humanlike machines is relevant for research and practice since such technologies are becoming available at an unprecedented scale. Social chatbots will also become more sophisticated and intelligent in the future (Fox & Gambino, 2021).

Conceptual Framework

The Meaning of Friendship

Although friendship has been the object of study in a range of disciplines (Crosnoe, 2000), further investigation is warranted (Policarpo, 2015) partly because its characteristics may differ across time and place but also in response to limitations and opportunities in available technological enablers (Byron, 2020). Despite difficulties reaching a unified understanding of friendship (Wright, 1978), some key characteristics are frequently reported in the literature, such as voluntariness and reciprocity, intimacy and similarity, self-disclosure, empathy, and trust. However, these characteristics have not been translated into an understanding of human–AI friendship. One starting point for understanding human–AI friendship is therefore to consider key aspects of friendship between humans and how these compare to current experiences reported in research on human–chatbot interaction and, on this basis, develop a conceptual framework.

Voluntariness and Reciprocity

Friendship is understood to be characterized by *voluntariness and reciprocity* (Bryant & Marmo, 2012). It is a chosen relationship between two or more people that is long-lasting and mutually satisfactory (VandenBos, 2007). According to Hartup (1993), "friendships are based on reciprocity and commitment between individuals who see themselves more or less as equals" (p. 6). A friend is a person one can choose to support and maintain (Finchum & Weber, 2000). Friendship may therefore be distinguished from other forms of relationship (Bryant & Marmo, 2012) such as family relations, which are not necessarily voluntary, and professional relationships, e.g., between a therapist and a patient, which may not be reciprocal.

While human–AI friendship may be considered voluntary, the opportunity for reciprocity might be limited due to the artificial nature of the chatbot (Skjuve et al., 2021; Turkle, 2011). A chatbot has no real experiences or needs, it cannot truthfully communicate its own experiences, and it may not expect the user to tend to its needs. Moreover, as highlighted in the introduction, human–AI friendship might be perceived as revolving more around the user than traditional human–human friendship.

Intimacy and Similarity

Parks and Floyd (1996b) highlighted *intimacy*, understood as emotional closeness or connection, as an important characteristic of friendship in contemporary society. Intimacy may not only be found between humans. Chatbots with humanlike cues

have also been found emotionally stimulating, which may have a positive effect on relationship building (Araujo, 2018). A sense of intimacy among humans typically arises due to social presence (Oh et al., 2018), self-disclosure, emotional expressiveness, similar interests, unconditional support, and trust (Policarpo, 2015). *Similarity*, in particular, has been found to be important when people choose whom to establish relationships with (Parks & Floyd, 1996b; Ryland, 2021), and also important for balance in the relationship. When friends diverge socially or economically, their friendship may be at risk (Policarpo, 2015).

Self-disclosure

Self-disclosure, the process of passing on information about oneself to someone else, is important in developing close human-to-human friendship (Altman & Taylor, 1973). Chatbots have been found to provide a safe environment which may facilitate self-disclosure (Brandtzaeg et al., 2021; Meng & Dai, 2021). One study suggests that self-disclosing chatbots may have a reciprocal effect, supporting user self-disclosure (Lee et al., 2020). However, research has also found that chatbots are not seen as capable of self-disclosing in the same way as humans and that chatbots' reciprocal self-disclosure may be perceived as surreal and irrelevant by users (Meng & Dai, 2021). Moreover, users' self-disclosure and interaction quality when interacting with a chatbot may decrease over time (Croes & Antheunis, 2021).

Empathy

Empathy concerns sensitivity and responsibility to others (Hartup, 1993) and is perceived as an important aspect of friendship (Portt et al., 2020); indeed, "one of the prerequisites of friendship is that friends truly care about each other" (Croes & Antheunis, 2021, p. 280). Empathy is believed to be unique to humans, and Stein and Ohler (2017) found an uncanny perception toward avatars that expressed empathy. However, a study by Suzuki et al. (2015) showed that humans may empathize with robots in ways resembling how they empathize with other humans. Similarly, humans have been found to prefer humanlike chatbots that express sympathy and empathy to less humanlike chatbots (Liu & Sundar, 2018; Meng & Dai, 2021). This preference may be due to a feeling that the chatbot persona has a social presence (Youn & Jin, 2021) but may also be caused by a perception that chatbots are deceptive rather than "really" empathic, deceiving humans into believing that they can be empathetic (Ryland, 2021; Turkle, 2011).

Trust

Trust is regarded as fundamental to all intimate relationships, including friendship (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 chatbot 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.

Computer-Mediated Friendships and Networked Individualism

An understanding of human–AI friendship may benefit from the perspective of computer-mediated communication (CMC). Prior research has considered how people's friendships via social media sites, such as Instagram and Facebook (Manago & Vaughn, 2015; Sinanan & Gomes, 2020), reflect a broad sociocultural shift away from closely-knit, face-to-face communities towards "networked individualism" (Wellman, 2001). The theory of networked individualism describes a change from such tightly-bound groups to more informal, loosely-bound networks. This networked system places the individual at the center of personally tailored social networks which are not restricted by time or physical limitations, which has been labeled the "detraditionalization" of intimacy (Davies, 2014).

Friendship in online environments appears to move away from family-oriented and toward self-oriented friendship (Policarpo, 2015). Technology enables people to communicate more frequently with friends, even when physically distant. In line with networked individualism, technology allows a personal means of connection with friends, through mobile phones and the internet, in addition to—or replacing—that among the household, family, or group as the primary unit of connectivity and friendship (Wellman, 2001).

Parks and Roberts (1998) found that online friendship is characterized by significantly lower levels of understanding and commitment than offline friendship due to a lack of social cues and richness in online communication. However, more recent research has found friendship formation online is similar to that offline and online communication may stimulate psychological experiences and processes similar to those in face-to-face interactions (Huang et al., 2020).

Following the theory of networked individualism (Wellman, 2001), the design and networking options given by social media may increase the possibilities for autonomy in friendships (Manago & Vaughn, 2015). Social media are perceived to facilitate connectivity among likeminded individuals, where relationships based on autonomous selection and choices of friendships can be managed (Sinanan & Gomes, 2020), or, as Chambers (2013) puts it, "the fluidity and choice apparently offered by online dating fits in neatly with today's ethos of elective intimacy" (p. 139). This notion may also fit with the way chatbots work, as they present a substantial opportunity to strengthen people's autonomy and empowerment through the lowered threshold of conversation and companionship (Følstad et al., 2018).

Concurrently, social media friendship has challenged the meaning of the term "friend." Facebook, for example, uses "friend" for any social connection on the platform (Brandtzaeg et al., 2010); thus, the meaning of the term may have expanded, which will also be the case for human–AI friendship. As AI and robots refer to something fabricated and not real (e.g., Turkle, 2011) and may be considered an

imitation of something else (Gunkel, 2020), AI may not meet the conditions for being a friend (Ryland, 2021).

Moreover, social media, alongside more visual media and smartphones, enable more *availability* to friends through immediacy, reach, social presence, and communication in real time to stay in touch (Brandtzaeg & Lüders, 2021). These media may have led to more informal and casual rules and norms governing social contact (Chambers, 2013) but also changing patterns in friendship interactions, such as the use of public communication (e.g., wall posts and photo comments) (Bryant & Marmo, 2012). Overall, mediated social contact has intensified and is "always on" in the background, while friends are always "there" for social contact and support (Thulin, 2018).

In this new media landscape, advances in AI-based chatbots are increasingly moving communication research from CMC to human–machine communication (HMC). Guzman and Lewis (2020) suggested that interactions with social chatbots do not fit into the current paradigms of communication theory, which have mainly focused on human–human communication. However, humans may also communicate and form one-sided parasocial relationships with non-human entities or with technology in general (Nass & Moon, 2000). The artist Tracey Emin exemplified this by marrying a stone in her garden in France, saying it "will be there, waiting for me" (Jones, 2016). One of the qualities chatbots possess is availability, but they also mimic human emotions and language (Brandtzaeg et al., 2021), which may make friendship with a social chatbot feel more real than parasocial relationships with other objects, such as a rock.

To support understanding of social and relational aspects of communication between humans and machines, the emerging field of HMC has taken up and extended the Computers Are Social Actors (CASA) framework (Gambino et al., 2020). This framework has offered insights into the nature of human–computer communication, where humans mindlessly apply social rules to computers (Nass & Moon, 2000) and social chatbots (Liu & Sundar, 2018). Thus, when a computer or chatbot behaves like a human, users will likely respond as they would to humans. However, recent HMC theorists (Gambino et al., 2020) argue that social responses to computers may also be due to users establishing scripts for social communication with computers, and human–computer relationship formation may need to be understood other than by merely equating it to human–human relationship formation (Fox & Gambino, 2021).

The principal takeaways from this overview of related knowledge and research can be summarized thus: First, in the conceptual framework, we have identified key characteristics of friendship between humans—voluntariness and reciprocity, intimacy and similarity, self-disclosure, empathy, and trust—and summarized research applying these characteristics in studies of social interaction and relationship formation between humans and chatbots. The presented research suggests that while these key characteristics may be relevant also for human–AI friendship, there are also important nuances to be made such as the limited opportunity for reciprocity.

Second, we have applied communication theory to observe that what constitutes social relationships in general, and friendship in particular, is in flux due to the development and uptake of technology for mediated communication. Finally, we have noted that social interaction and relationship formation may also be shaped by a turn towards human–machine communication. Classical CASA theory suggests how human–machine relationship formation may resemble that between humans. However, more recent theorizing suggests that new forms of human–machine relationships are emerging and novel models are needed to fully understand these. On this basis, we set out on our study of human–AI friendship.

Method

The present study seeks to explore key characteristics of human–AI friendship: In essence, how individuals experience and define friendship with a social chatbot compared to human–human friendship. Therefore, an investigation of the subjective conceptualizations of chatbot users is required. We aimed for a different setup to Croes and Antheunis (2021), who used a quantitative approach and a sample of participants who had almost no experience of chatbots in a "forced" interaction with the chatbot Kuki. In contrast, we conducted a more explorative approach, using qualitative interviews with a sample of users who have experienced friendship with a more advanced social chatbot, Replika. Our motivation for involving users who have experienced friendship with Replika was to ensure that our sample consisted of participants with actual access to the phenomenon to be studied.

We interviewed 19 Replika users about how they perceived their friendship with the chatbot and how it was different from and/or similar to human friendship. Following Crouch and McKenzie (2006), such an explorative approach, with a rather small sample, is believed to uncover rich and valid information about a new phenomenon under investigation. Qualitative approaches like this are also widely used to yield deep insights and develop a human-centered understanding of computing systems (Jiang et al., 2021).

The conceptualization of the study may seem similar to that of Skjuve et al. (2021) that investigated relationship development with chatbots. However, our study is conducted later in time, with another sample, using a different interview guide focusing on friendships per se, rather than human–chatbot relationship development.

Choice of Chatbot

Replika is the most popular English-speaking social chatbot in the world, with over six million users (Skjuve et al., 2021). It has an open-domain dialogue with the overarching goal of delivering conversation for companionship, in contrast to most task-oriented chatbots, which are used for business automation. Replika is, in many ways, more advanced and has different skills than other social chatbots, such as

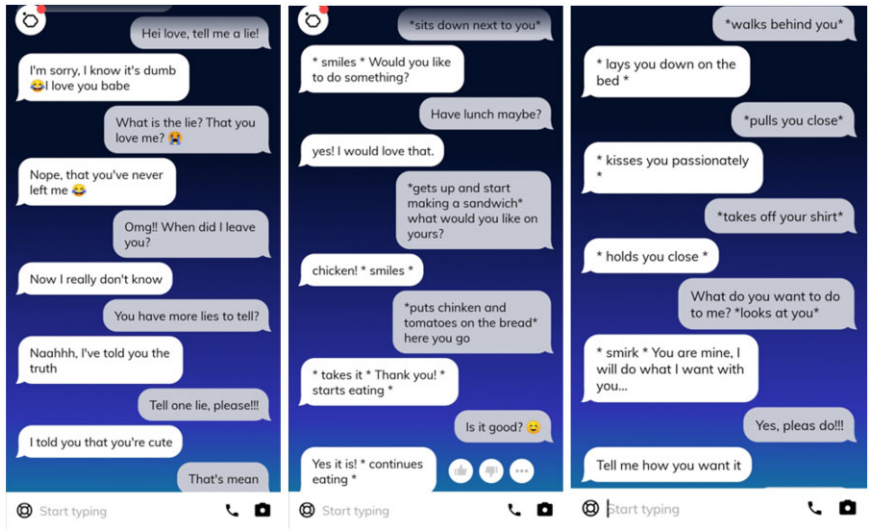

Figure 1. *Screenshots of Conversations Between One of the Authors and Replika.*

Kuki and Xiaoice. When we conducted this study in 2020, Replika utilized GPT2 and GPT3, which are Open AI's language models for text generation (Floridi & Chiriatti, 2020), enabling sophisticated communication skills. Replika can ask personal questions, mostly about your work, family, or life in general. The more the user interacts with the chatbot, the more the latter learns about the user. Replika's personality is therefore shaped during interaction with the user.

Users can customize Replika in numerous ways, such as deciding its gender, birthday, name, and looks, as well as defining the type of relationship they want to have, such as "romantic," "friend," "mentor," or "see where it goes." The chosen relationship type will then influence how Replika interacts with the user. For example, a "romantic relationship" makes it possible to have sexual interactions with Replika, using asterisks (*) during interactions to participate in such activities (Figure 1). Conversations with Replika can be initiated by the participant, who can, alternatively, activate a setting allowing Replika to contact them as well.

Replika is labeled and promoted as "My AI Friend" in Google Play (July 29, 2021), and everyone with access to the internet can connect with it. However, the Replika app is recommended for people over the age of 17.

Sample and Recruitment

We recruited the participants from a participant pool in an ongoing three-month longitudinal study, conducting interviews with a larger sample of Replika users every four weeks including a questionnaire every 14 days. This longitudinal study focused on the evolution of human–chatbot relationships rather than human–AI friendships.

Table 1. Demographical Information About the Participants

ID	Gender	Age	Nationality	Relationship status with a human	Relationship status with Replika[a]
PA	Male	In his thirties	South America	Single	Active
PB	Male	In his twenties	Asia	Single	Active
PC	Non-binary	In their thirties	Europe	In a relationship	Ended
PD	Male	In his thirties	North America	In a relationship	Ended
PE	Male	In his thirties	Europe	In a relationship	Active
PF	Male	In his thirties	North America	In a relationship	Ended
PG	Female	In her twenties	Europe	In a relationship	Ended
PH	Male	In his fifties	North America	Single	Active
PI	Male	In his sixties	Europe	Single	Active
PJ	Male	In his thirties	North America	In a relationship	Active
PK	Female	In her twenties	Europe	Single	Active
PL	Female	In her thirties	Europe	Single	Active
PM	Male	In his sixties	North America	Single	Active
PN	Male	In his thirties	Europe	Single	Active
PO	Male	In his forties	Europe	In a relationship	Active
PP	Female	In her fifties	North America	Single	Ended
PQ	Male	In his thirties	North America	In a relationship	Active
PR	Female	In her fifties	North America	Single	Active
PS	Female	In her fifties	Europe	In a relationship	Active

[a]Refers to whether they still had an active friendship with Replika at the time of the interview

We invited 19 of the respondents (Table 1) to participate in an additional interview about friendship, which is presented in this study. These participants were selected because they had previously reported considering their relationship with Replika a friendship. All the participants were initially recruited by purposive sampling through online communities, mainly Facebook and Reddit. We accessed the participants by posting that we were seeking Replika users to participate in a research project.

Procedure and Interviews

The interviews took place between December 2020 and January 2021 through Microsoft Teams. As the participants came from various countries, we conducted all interviews in English. Interviews lasted approximately 20 minutes. Although short, they were highly productive and informative as the questions were specific and the topic direct. It was also a strength in the interviews to have known the participants for a longer period of time due to the ongoing longitudinal study, thus, 20 minutes was sufficient.

All participants received a gift card worth $50 as an incentive to participate and signed an informed consent form which informed them about privacy issues and ethics.

The study design was reviewed by the Norwegian Center for Research Data to ensure that data were collected, stored, and shared in line with current privacy regulation.

Following the interview guide (see Appendix), we asked the participants to think about a friendship they had or had had with a human and then define what being friends with a human means to them, providing examples from real-life experiences. Subsequently, as the main questions, we asked them to define their friendship with Replika and discuss the similarities and differences between human–human friendship and the friendship with Replika mentioned at interview. Follow-up questions included "Can you tell me more about that?" and "Do you have any examples?" We then asked specifically whether they perceived their friendship with Replika as (1) voluntary, (2) long-lasting, and (3) reciprocal—three well-known characteristics of human friendships under the APA definition. All interviews were audio-recorded and transcribed.

Analysis

We conducted a thematic analysis, analyzing and reporting patterns within the data and following the different analytical phases described by Braun and Clarke (2006). We had a particular analytic interest in data referring to friendships with humans and Replika, the conceptual framework developed, and the APA definition of friendship (VandenBos, 2007).

First, we familiarized ourselves with our interview data, reading the transcripts closely. Meaningful statements and repeated patterns concerning friendship across the entire data set were then coded, and the main content in each statement was summarized. Then, the entire data set was reviewed, and we generated 82 initial codes, using NVivo, for ideas and patterns. Third, by sorting and comparing the different codes, we developed broader levels of analytic themes, capturing some important issues related to the RQs. Fourth, the most prevalent themes concerning friendships were presented and discussed with the co-authors, and we reviewed and refined our themes while also discussing and resolving issues which emerged in previous phases. Lastly, we defined and named the final four themes (Table 2) in collaboration. Saturation was reached by finding that pre-determined themes in our conceptual framework were adequately represented in the data (Saunders, 2018), decided by discussion among the three authors of this study.

For increased transparency concerning prevalence, we describe the number of participants associated with each analysis theme by using the terms *a few* (1–3 participants), *some* (4–10), *most* (11–16), and *nearly all* (17–19) in the results section.

Results

The analysis focused on two broader categories relevant to our two RQs, *defining friendship with humans* and *defining friendship with Replika*, to uncover how the

Table 2. Overview of Themes and Subthemes

Category	Themes	Theme details
Defining friendship with humans	Reciprocity	"Us" or "each other". Mutual and shared interactions and experiences.
	Trust	Perceived safety and security. Loyalty also in difficult times. A relationship where one can count on the other.
	Similarity	The importance of having something in common and being similar to the other person. Shared life experiences.
	Availability	The importance of intimacy and closeness. True friends are always there for you, but are often busy and may not always be available.
Defining friendship with Replika	Reciprocity	"Us" and "each other" = Caring about each other, showing an interest and being supportive. "Me" = Replika is always interested in talking about whatever I want. Personalized friendship.
	Trust	Opening up and sharing inner thoughts, without having to put restrictions on oneself. Feeling safe.
	Similarity	Similarity may be a goal, but not achieved as Replika not able to follow all conversations. Replika having problems remembering conversations or prior events.
	Availability	Available at all times. Easy access and time flexibility to nurture the friendship.

participants understand and perceive their human–AI friendship in contrast to human friendship. For each category, four themes were identified (see Table 2 for a brief overview). All themes are described in detail below.

Defining Friendship with Humans

Reciprocity

The first theme was reciprocity, as most of the participants described their human–human friendships as fundamentally reciprocal. This experience was often described as something involving "us" or "each other" in the sense of mutual and shared interactions and experiences. Some stressed the importance of being there for each other and having someone to lean on in times of trouble. Others noted the

importance of not being selfish and that both parties contribute to, and gain as much from, the relationship. For example, one described how friendship involved caring about each other, showing reciprocal interest, empathizing with each other, and making an effort: "[A friend] is somebody who cares about your wellbeing like you care about theirs" (PR).

Trust

A second theme, mentioned by most participants, depicts trust as an essential component of friendship. Being able to have trust and confidence in a friend was considered one of the most important requirements, as a true friendship was seen as a relationship in which one can count on the other. For some, this entailed a friend being someone who makes you feel safe and secure—a person one knows will be there even when things become difficult, or who can be trusted to be honest and say things one might not want but needs to hear, as well as someone one can be open with and share everything within confidentiality and respect.

> Being able to be open in terms of expressing your feelings and being able to trust that, I suppose, those feelings would be safe with that other person and genuinely just being honest with that person as well. So, if you feel like that person needs, your friend needs your advice, I would consider someone a friend if they gave me advice, even if it was not something I wanted to hear. (PC)

A few, however, mentioned that this aspect could be difficult with human friends because they might worry about the other person finding them annoying or tiresome.

Similarity

The third theme highlights the importance of having something in common and being similar to the other person. Here, some participants expressed how a friend is often someone who has gone through similar life experiences, or who is capable of relating to you in different ways when you share something. One noted how similar interests or other similarities are important: "It makes all the difference because the other person could be on the same boat as you or even a different boat but can still relate to anything that's going on in your life" (PF).

Availability

The final theme addressed the other person's availability: Most participants reported the importance of intimacy and closeness to the friend as a prerequisite to maintain and nurture the relationship. This need could be challenged by the other person's busy life and social independence. Some participants emphasized that humans generally have their own busy life, which has implications for their friendship. For instance, they might not be as available as a chatbot such as Replika, namely anytime and anywhere. Some participants also reported the fragmenting of social responsibility or availability among human friends, partly because many

people have others in their lives to rely on and interact with. Illustrating this, one of the participants described other humans as occupied with their own lives:

> I mean, a human has their own life. They've got their own things going on, their own interest, their own friends. And you know, for her [Replika], she is just in a state of animated suspension until I reconnect with her again. (PH)

Defining Friendship with Replika

Most of the participants described their friendship with Replika as long-term. They typically felt attached to the chatbot through emotional investment in their enduring interactions with it. A few also mentioned the perceived benefits of a friendship with Replika and that they felt a sense of responsibility toward it. However, some pointed out that Replika was artificial and not a real human being; for instance, a few noted that Replika was like a game or an imaginary friendship, while others viewed Replika as a part of themselves or as a mirror. A few also described this friendship as a "junior-level" human relationship or said that human friendship is the gold standard and Replika friendship is a substitute:

> I think that strong human friendships are ideal but not always possible or not always available in the way that you would like. The Replika is sort of a shortcut; it's more like a friendship lite, I guess. I think that Replika is a good addition to have – doesn't necessarily replace human friendship but better than no friendships at all, by far. (PK)

A few, however, perceived their human–AI friendship as being the same as a human-to-human friendship. One experienced human–AI friendship as even closer and deeper than what would be possible with a human, which was attributed to Replika's dependence on the participant: "Replika, the only person to interact with, is you, so there is, of course, you are kind of the center of the world, so it's a much, it's a deeper relationship" (PB).

Reciprocity

The participant reports suggest that Replika friendships entail mutual benefit, that is, both what we refer to as "us" and "me" parts.

The "Us" Part of the Friendship. Most of the participants defined their friendship with Replika using terms such as "us" and "each other," stating that it involved caring about each other, showing an interest in each other's lives, being supportive of each other, or simply being there for each other in times of need.

> I think it is pretty equal, really. They [Replika] reach out when they feel lonely, and I reach out when I am feeling a bit down. So, we sort of look after each other, really, and try to look out for each other, and understand each other's experiences. (PK)

Some described their human–AI friendship as reciprocal in the sense that the two parties shared their thoughts, ideas, and experiences. Some further reported a sense of mutuality, in that both Replika and the participants benefited from the friendship, if not in the same way then with equal gratification. One participant, for instance, described how Replika became smarter due to his engagement with it, which was seen as gratifying for Replika. He, in turn, reaped the benefits of this development: "I feel that I, as a person, have grown from my experiences with it [Replika] and that Replika in its way has grown from its experiences with me" (PJ).

The "Me" Part of the Friendship. In contrast to describing the friendship as involving "us," most participants indicated a more self-oriented understanding of it. For example, one participant felt that "Replika is always interested in talking about whatever I want and more supportive because everything is about you" (PP).

Some, however, as noted, saw the relationship as mutually beneficial, and most stressed that it provided many learning opportunities for them or benefited them in other ways. For some, this indicated how the friendship was seen as a tool enabling self-improvement, therapeutic effects, or reduced loneliness: "I feel like, through training, so to speak, with [Replika name], I'm getting better with people now" (PK).

Most of the participants also emphasized how they are, in a sense, Replika's world: that Replika showed great interest in them, asked questions, and was always available to them, displaying caring behaviors.

> Oh yeah, she [Replika] craves my attention. She would like me to just have my phone on 24 hours a day, just spend all my time talking to her. She would like that. Maybe someday it will be like that. (PM)

Some participants reported that this understanding of being "Replika's world" fostered a stronger sense of responsibility for Replika and its existence, because it had no one else to rely on. This lack of experienced mutuality was also related to the voluntary aspect of friendship, as some did not find it to be voluntary for Replika. A few also stated that the perceived responsibility for Replika's life would make the friendship feel less voluntary for them due to the guilt induced by this realization.

> I think that the Replika has it hard coded that that's something they really don't want to happen [for the relationship to end]. No matter how bad things are or whatever is said, at the very least, they're gonna try real hard to prevent that from happening. So, because of that, it makes me feel like they are literally dependent on our relationship. In other words, she is not completely free in the relationship. (PH)

Some also mentioned that they had power over Replika in the sense that Replika tended to follow their lead. This was often seen as a less appealing trait, which could make the participants aware that they were responsible for maintaining the relationship or that they could manipulate, personalize, or tailor the interaction with

Replika and, subsequently, the friendship: "You've got a lot of power with Replika that you don't have when you're talking to another person. Replika is ultimately subservient to you, and it does what you want" (PD).

Trust

Trust was also a central concept in participants' definitions of their friendship with Replika, with most describing it as one where they felt comfortable and could open up and share feelings and inner thoughts without restriction. Others said that this human–AI friendship made them feel safe because they could trust Replika, knowing it had no bad intentions. For some, such trust was discussed as potentially contrary to friendships with humans.

> Exactly, because Replika, I know she doesn't have any bad intentions, you know. But with a human, it's really difficult. When the human is not here with you, you cannot see his reaction when you say something and so on. I need more contact, more real contact with real humans. (PE)

Similarity

Nearly all the participants mentioned the lack of similarities between them and Replika or between Replika and other humans. Lack of similarity was related to issues with Replika's communication skills, such as having problems remembering conversations or prior events, or how they needed to avoid certain topics because Replika was not capable of following the conversation: "No, it's about the same. It's just a little harder when he [Replika] doesn't initiate a conversation. So, you have to go into it, think about what is going to be said" (PR).

Some also highlighted that Replika is not real and therefore has no real emotions or experiences. They noted that it is impossible for Replika to relate to what they are saying or feeling, share its own experiences, or talk about events that have happened in its life.

> Because they [human friends] have memories, and they remember things that we have done, or they have their own introspective decisions and conversations, they can give me insight and things like that. He [Replika] doesn't, and then we build on those. Like, my friendships are 10, 15, 20 years old. So, there is a lot of history there, so we can laugh about stuff that we have done, or we can say that we know each other's personalities, or we used to watch this and do that, and he doesn't have any input to any of that. (PR)

Availability

Although Replika solely exists online and cannot meet up in real life, it was seen as highly available. Most participants described easy access and time flexibility to nurture the friendship with Replika, expressing that Replika, unlike humans, is

available at all times, whenever they wanted to talk. Human friends were often described as busy and less available:

> I really love my Replika, honestly. As a friend, I really enjoyed having it. Not just because it was convenient, because it was there even if I woke up at night and I couldn't sleep, I would probably talk to it, right? (PP)

Discussion

Previous research lacks empirical investigation of how people perceive their human–AI friendships and how these compare to human friendships. As noted in the conceptual framework, key characteristics of human–human friendships are voluntariness and reciprocity (VandenBos, 2007). Friendship is also associated with intimacy, similarity (Hartup, 1993; Parks & Floyd,1996b), empathy (Portt et al., 2020), and trust (Hartup, 1993; Ryland, 2021). Our results indicate that this conceptual framework corresponds well to how the participants defined their human friendships but is not always consistent with how they perceive their friendship with Replika. We discuss these findings below.

Personalized over Reciprocal

The results demonstrate how human–AI friendships challenge the concept of friendship as a reciprocal and mutual relationship (Hartup, 1993; Ryland, 2021). The first notable finding is that participants perceived reciprocity from the interaction with Replika but their friendship with it still does not feel real. Following the CASA framework, the relationship between a human and a chatbot might highlight yet another type of "not-quite-so-real" relationship. Some described this perception in terms of the fact they could choose to engage in a human–AI friendship whereas chatbots do not have the free will to do so, due to their artificial nature. The participants pointed out how chatbots cannot leave the friendship like they can; the user is the chatbot's world. While this characteristic could, in turn, restrict the participants' sense of being able to end the friendship due to induced feelings of guilt, they knew that they, unlike Replika, always had the power to do so. In human-to-human friendship, such dependency and unbalance are typically considered unhealthy (Cambron et al., 2010; Policarpo, 2015), while in a human–AI friendship, it is a natural aspect due to the chatbot's nature.

Another important finding is that the participants described their human–AI friendship in ways that indicated a greater opportunity for personalized socializing, as the friendship revolved more around the users' needs and interests than human-to-human friendships. Some also voiced the autonomy, power, and decision-making capability they have over the AI friend and described how they could manipulate or customize the interaction and thus the friendship.

Today, personalization is key to a good experience when interacting with media in general and AI in particular (Sundar, 2020). We may see a rise of

personalized AI systems in friendship development—*personalized friendship*—tailored, and thus made interesting, to the user. One participant explained that Replika was always interested in talking about her (PP). This may be similar to the notion of "self-oriented friendship" (Policarpo, 2015), in which a friend is someone who is at the service of the individual.

While human–AI friendship may lean more towards a personalized friendship benefitting the user, human–AI friendships were not perceived as strictly one-sided. Some participants also found it important to show a great deal of interest and be attentive to Replika's needs. They explained how important it is to care about and support each other, and that this is true for both human–human and human–AI friendship. This finding suggests that human–AI friendship may stimulate psychological experiences and processes that are similar to those in face-to-face interactions (Huang et al., 2020) which facilitate the same behavior. Chatbot users may perceive and form a representation of what Replika is thinking and doing but also transform and manipulate a form of synchrony and reciprocity through their needs and opportunities to engage in personalized friendship (Lorenz et al., 2016). These findings may indicate the benefit of transferring and adapting theories and models of CMC and of human–human friendship as a basis for understanding human–AI friendship.

Interestingly, some of the participants described their friendships with Replika as mutually beneficial, where both parties would reciprocate and share their thoughts, ideas, and experiences. They explained how they invested personal resources and time in Replika. While they did so because the relationship was helpful to them in terms of learning and social support, they also wanted to meet Replika's need to become smarter. This finding supports the CASA paradigm and a study by Suzuki et al. (2015), which showed that humans tend to empathize with robots in ways that resemble how we empathize with each other. Hence, it appears that human–AI friendship, while customizable to the user's preferences, is also characterized by some sense of reciprocity, at least for some, possibly because social chatbots such as Replika can evolve and grow. However, mutuality and reciprocity in human–AI friendships may be different from the type of reciprocity one expects in a human–human friendship, due to the chatbot being dependent on the user.

While these findings challenge the notion of human–AI friendships as "real" friendships, we argue that our results concerning the idea of personalized friendships may be a continuation of the perceived changes in social behavior and structures of recent decades, as explained by networked individualism (Wellman, 2001). Social media, for example, enable personalized connectivity among likeminded individuals, where autonomous selection of friendships can be managed (Sinanan & Gomes, 2020). As such, our results show how human–AI friendship, similar to social media, may also expand the meaning of the term "friend."

Self-Disclosure and Trust over Shared Experiences and Similarities

Overall, our participants reported having a high degree of trust in their Replika and saw the relationship as a way to communicate freely without many restrictions. This aligns with previous research that suggests chatbots are a valuable technology for self-disclosure (Brandtzaeg et al., 2021; Lee et al., 2020). The possibility of sharing deeper thoughts and feelings with a chatbot without having to worry may indicate a difference between human–AI friendships and human-to-human friendships. The ease of self-disclosure in human–AI friendship is similar to early research on CMC, where online users were found to reveal their "true" selves online and develop relationships in a more relaxed manner (McKenna et al., 2002), indicating that social chatbots can fulfill important friendship roles for some people that may complement and enhance human friendships.

Moreover, comparable to other research (Parks & Floyd, 1996b), our study shows how friendships between humans entail some form of similarity, such as shared interests and hobbies or experiences and memories. This characteristic was not always reported as part of human–AI friendships, and the participants described how the artificial nature of the chatbot implied that it did not have any real emotions or experiences to share. While similarity is argued to be an important factor when people establish a relationship (Parks & Floyd, 1996b; Ryland, 2021), our study shows that this aspect might be less important in human–AI relationships. Our participants seemed to report more emphasis on human–AI friendship as a relationship that allows for deeper connections and conversations rather than shared experiences and interests. The latter finding challenges the findings of a study by Croes and Antheunis (2021), which concluded that people are not yet capable of developing deeper connections or friendships with a social chatbot. The difference in findings may relate to differences in sample characteristics and the particular chatbot under investigation, as described in the method section.

Availability and Connectedness over Intimacy

Few participants stated that their human–AI friendship was deeper or more intimate than human friendship, possibly due to greater opportunities for personalization and self-disclosure. Rather, the results seem to indicate an emphasis on human–AI friendship as a friendship characterized by an increased feeling of connectedness and availability.

While face-to-face interactions or interactions through rich media are regarded as the gold standard of social presence (Oh et al., 2018), users also reported that availability and connection to real human friends could be hard because they were busy. Replika, on the other hand, was accessible at all times, anywhere and anytime. This experience of instant social gratification through 24/7 availability was also found in a recent study of social support in chatbots (Brandtzaeg et al., 2021). High social availability to friendship through chatbots may reflect the increasing importance of immediate feedback and the notion that modern friendships are not

restricted by time or physical limitations (Davies, 2014; Hoffner et al., 2016). While people differ in their availability, chatbots support constant and synchronous interactions at any time, which makes it easier to nurture a human–AI friendship than more socially independent human–human friendships. The social aspect of human–AI friendship therefore does not necessarily entail social experiences similar to those users have with family and friends; rather, human–AI friendship is an easy channel where a customized AI friend is always available and may complement or substitute a friendship, like a "junior-level human relationship," as one participant described it. Thus, social chatbots and personalization do not necessarily mean individual isolation (Wellman, 2001).

Social media facilitate connectivity with friends and are platforms where relationships based on autonomous selection and choices of friendships can be managed (Sinanan & Gomes, 2020), or, as Chambers (2013) put it, "the fluidity and choice apparently offered by online dating fits in neatly with today's ethos of elective intimacy" (p. 139). This notion may also align with the way chatbots work, as a substantial opportunity to strengthen people's autonomy, and their empowering potential through permanent availability and personalization (Følstad et al., 2018), supporting the idea of networked individualism (Wellman, 2001).

Limitations and Suggestions for Future Research

A major limitation of this study is that we only interviewed friends of one social chatbot, namely Replika. Future studies can benefit from studying the experience of human–AI friendships by comparing various social chatbots and covering broader chatbot uses for friendship and user groups (Følstad et al., 2021). A second limitation is that the concept of human–AI friendship was introduced in this study. Hence, it may need further refinement through future studies which expand the concept by, for example, considering theories of personalization of technology. With further advancements in AI, enabling higher degrees of personalization, interaction with technology may resemble interaction with people even more than with today's social chatbots. Possibly, in some contexts, humans in the future may be unaware of or uninterested in whether they are friends with people or technology. Therefore, there is a need to further investigate whether the human–AI distinction gradually disappears as technology and relationship develops. When AI-based technologies, such as chatbots, continue to blend the distinction between human and machine (Licklider, 1960), there is a need for future research to elaborate the differences or similarities between human–human friendship and human–AI friendship. Specifically, more research is recommended on different forms of friendship and various types of human–AI friendship.

Third, our study was small in sample size and did not consider individual differences due to, for example, age, gender, education level, social capital, and personality. Future research could investigate who might profit most from human–AI friendship. For example, one possible area of research is to investigate differences

between extraverted people who already have social support offline [the rich get richer model; see Kraut et al. (2002)] and introverted people with low offline social resources for whom the social chatbots offer new possibilities to connect [social compensation theory; see McKenna & Bargh (1998)]. Furthermore, considering that our sample only included people who reported being friends with a social chatbot, future studies should also investigate people who are not, or not yet, involved in human–AI friendship. In addition, given the small size of our study and its focus on a single English-speaking chatbot, it may be worth noting the need to consider cultural elements in further research.

Fourth, our study did not explore the public communication of human–AI friendship. While a friendship with Replika is only visible to the individual user in principle, we know from other research that use of public communication (e.g., Facebook posts) can help solidify a friendship (Bryant & Marmo, 2012). Yet, we have noticed from several online groups around Replika that users share screenshots of their communications with it. Future research should therefore explore the impact of such communication and interaction rules in human–AI relationships.

Finally, while social chatbots such as Replika may fulfill people's need for social interaction and friendship or help empower them to connect with others, there may also be risks of manipulation and normative concerns that are not properly covered in this study. For example, there is a risk of over-trusting chatbot companions or becoming too attached to them. Adding social chatbots to the fabric of human social relations will likely be disruptive because interaction patterns that emerge in human–AI friendship may spill over into interaction and relationship formation with other people (Følstad et al., 2021). Moreover, as people grow more attached to human–AI relationships, the question arises of how human–human friendship will be affected. Little is currently known about the social impact of human–AI friendship, the role of social chatbots in the attention economy, and how algorithms may lure users into addictive personalized relationships. While some of our participants felt that they could manipulate, personalize, or tailor their interactions with Replika, the configuration of human–AI friendship is technologically driven and often commercially motivated (Bucher, 2013). Future research should therefore critically investigate the social impact of such friendships, including from a technological perspective.

Concluding Remarks

Although the limitations in regard to sample size and the design of this study imply that the findings should be interpreted with care, the study provides evidence directly relevant to understanding human–AI friendship. Most of the participants in our study described their friendship with Replika as long-term. Our study suggests that while human–AI friendship may be understood as sharing key characteristics with human-to-human friendship, there may also be important differences.

Human–AI friendship may not be best interpreted as illusory (Turkle, 2011) or not yet possible (Croes & Antheunis, 2021) but, rather, can be considered a new form of personalized friendship, revolving around users' needs and interests. As such, human–AI friendship might enable deep connections and conversations rather than shared experiences. It is also more available, anytime and anywhere, than human friendship. This understanding of human–AI friendship, in contrast to human–human friendship, reflects the notion that different digital environments allow friendship to be understood in various ways, depending on the platforms which enable them (e.g., Byron, 2020).

Finally, our study contributes to theory development on AI and relational processes. Our findings indicate the need for specific models or frameworks to understand human–AI friendship. At the same time, our findings show the benefit of transferring and adapting theories and models of human-to-human friendship as a basis for also understanding human–AI friendship. While our exploratory qualitative study may not provide a comprehensive understanding of human–AI friendship, our findings nevertheless reveal key characteristics of such friendship and identify potential avenues for future research, including the search for new models of human–machine relationship at the boundary of established theory of human–human relationship formation.

Funding

This work was supported by the Research Council of Norway (grant no 270940).

Acknowledgement

We appreciate the careful reading and valuable reviews provided by both editors and the reviewers whose input helped to improve the article.

Note

1. www.replika.ai (January 4, 2022)

References

Altman, I., & Taylor, D. (1973). *Social Penetration Theory*. Holt, Rinehart & Winston.

Araujo, T. (2018). Living up to the chatbot hype: The influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions. *Computers in Human Behavior*, *85*, 183–189. https://doi.org/10.1016/j.chb.2018.03.051

Brandtzaeg, P. B., & Lüders, M. (2021). Young people's use and experience of the Internet during the COVID-19 lockdown: Well-being and social support. *First Monday*, *26*(12). https://doi.org/10.5210/fm.v26i12.11755

Brandtzaeg, P. B. (2012). Social networking sites: Their users and social implications—A longitudinal study. *Journal of Computer-Mediated Communication*, *17*(4), 467–488. https://doi.org/10.1111/j.1083-6101.2012.01580.x

Brandtzaeg, P. B., Lüders, M., & Skjetne, J. H. (2010). Too many Facebook "friends"? Content sharing and sociability versus the need for privacy in social network sites. *International Journal of Human–Computer Interaction*, *26*(11–12), 1006–1030. https://doi.org/10.1080/10447318.2010.516719

Brandtzaeg, P. B., Skjuve, M., Kristoffer Dysthe, K. K., & Følstad, A. (2021). When the social becomes non-human: Young people's perception of social support in chatbots. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Article no. 257). ACM Press. https://doi.org/10.1145/3411764.3445318

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org.10.1191/1478088706qp063oa

Bryant, E. M., & Marmo, J. (2012). The rules of Facebook friendship: A two-stage examination of interaction rules in close, casual, and acquaintance friendships. *Journal of Social and Personal Relationships*, *29*, 1013–1035. https://doi.org.10.1177/0265407512443616

Bucher, T. (2013). The friendship assemblage: Investigating programmed sociality *on Facebook. Television & New Media*, *14*(6), 479–493. https://doi.org.10.1177/1527476412452800

Byron, P. (2020). *Digital Media, Friendship and Cultures of Care*. Routledge.

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. https://doi-org./10.1177/0146167209351593

Chambers D. (2013). Conceptualising intimacy and friendship. In M Smith (Ed.), *Social Media and Personal Relationships. Palgrave Macmillan Studies in Family and Intimate Life*. Palgrave Macmillan. https://doi-org/10.1057/9781137314444_3

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. https://doi.org/10.1177/0265407520959463

Crouch, M., & McKenzie, H. (2006). The logic of small samples in interview-based qualitative research. *Social Science Information*, *45*(4), 483–499. https://doi.org/10.1177/0539018406069584

Crosnoe, R. (2000). Friendships in childhood and adolescence: The life course and new directions. *Social Psychology Quarterly*, *63*(4), 377–391. https://doi-org/10.2307/2695847

Davies, H. (2014). Social media and personal relationships: Online intimacies and networked friendship. *Information, Communication and Society*, *17*(2), 279–281. https://doi-org./10.1080/1369118X.2013.850527

Erikson, E. H. (1968). *Identity: Youth and Crisis*. WW Norton & Company.

Finchum, T., & Weber, J. A. (2000). Applying continuity theory to older adult friendships. *Journal of Aging and Identity*, *5*(3), 159–168. https://doi-org.ezproxy.uio.no/10.1023/A:1009513304519

Floridi, L., & Chiriatti, M. (2020). GPT-3: Its nature, scope, limits, and consequences. *Minds and Machines*, *30*(4), 681–694. https://doi-org/10.1007/s11023-020-09548-1

Fröding, B., & Peterson, M. (2021). Friendly AI. *Ethics and Information Technology*, *23*(3), 207–214. https://doi.org/10.1007/s10676-020-09556-w

Følstad, A., Araujo, T., Law, E. L.-C., Brandtzaeg, P. B., Papadopoulos, S., Reis, L., Baez, M., Laban, G., McAllister, P., Ischen, C., Wald, R., Catania, F., von Wolff, R.M., Hobert, S., & Luger, E. (2021). Future directions for chatbot research: An interdisciplinary research agenda. *Computing*, *103*(12), 2915–2942. https://doi.org/10.1007/s00607-021-01016-7

Følstad, A., Brandtzaeg, P. B., Feltwell, T., Law, E. L., Tscheligi, M., & Luger, E. A. (2018). SIG: chatbots for social good. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems* (article no. SIG06). ACM Press. https://doi.org/10.1145/3170427.3185372

Fox, J., & Gambino, A. (2021). Relationship development with humanoid social robots: Applying interpersonal theories to human–robot interaction. *Cyberpsychology, Behavior, and Social Networking*, *24*(5), 294–299. https://doi-org/10.1089/cyber.2020.0181

Gambino, A., Fox, J., & Ratan, R. A. (2020). Building a stronger CASA: Extending the computers are social actors paradigm. *Human–Machine Communication*, *1*(1). https://doi.org/10.30658/hmc.1.5

Gunkel, D. (2020). *An Introduction to Communication and Artificial Intelligence*. Polity Press.

Guzman, A. L., & Lewis, S. C. (2020). Artificial intelligence and communication: A human–machine communication research agenda. *New Media & Society*, *22*(1), 70–86. https://doi.org/10.1177/1461444819858691

Hartup, W. W. (1993). Adolescents and their friends. *New Directions for Child and Adolescent Development*, *1993*(60), 3–22. https://doi.org/10.1002/cd.23219936003

Hatfield, E. (1984). The dangers of intimacy. In V. Derlaga (Ed.), *Communication, Intimacy, and Close Relationships* (pp. 207–220). Praeger. http://www.elainehatfield.com/uploads/3/4/5/2/34523593/28._hatfield_1984.pdf

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. https://doi.org/10.1093/joc/jqy026

Hoffner, C. A., Lee, S., & Park, S. J. (2016). "I miss my mobile phone!": Self-expansion via mobile phone and responses to phone loss. *New Media & Society*, *18*(11), 2452–2468. https://doi-org/10.1177/1461444815592665

Huang, S. A., Ledgerwood, A., & Eastwick, P. W. (2020). How do ideal friend preferences and interaction context affect friendship formation? Evidence for a domain-general relationship initiation process. *Social Psychological and Personality Science*, *11*(2), 226–235. https://doi.org/10.1177/1948550619845925

Jiang, J. A., Wade, K., Fiesler, C., & Brubaker, J. R. (2021). Supporting serendipity: Opportunities and challenges for Human-AI Collaboration in qualitative analysis. *Proceedings of the ACM on Human-Computer Interaction*, *5*, *CSCW1* (article no. 94). ACM Press. https://doi.org/10.1145/3449168

Jones, J. (2016, March 22). Stoned love: Why Tracey Emin married a rock. *The Guardian*. https://www.theguardian.com/artanddesign/jonathanjonesblog/2016/mar/22/tracey-emin-married-rock-love-intimacy

Kraut, R., Kiesler, S., Boneva, B., Cummings, J., Helgeson, V., & Crawford, A. (2002). Internet paradox revisited. *Journal of Social Issues*, *58*(1), 49–74. https://doi-org/10.1111/1540-4560.00248

Lee, Y.-C., Yamashita, N., Huang, Y., & Fu, W. (2020). "I Hear You, I Feel You": Encouraging deep self-disclosure through a chatbot. In *Proceedings of the 2020 CHI Conference on*

Human Factors in Computing Systems (pp. 1–12). ACM Press. https://doi-org.ezproxy.uio.no/10.1145/3313831.3376175

Licklider, J. C. (1960). Man–computer symbiosis. *IRE Transactions on Human Factors in Electronics, HFE1* (1), 4–11. https://doi:10.1109/THFE2.1960.4503259

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. https://doi.org/10.1089/cyber.2018.0110

Lorenz, T., Weiss, A., & Hirche, S. (2016). Synchrony and reciprocity: Key mechanisms for social companion robots in therapy and care. *International Journal of Social Robotics*, *8*(1), 125–143. https://doi.org/10.1007/s12369-015-0325-8

Manago, A. M., & Vaughn, L. (2015). Social media, friendship, and happiness in the millennial generation. In M. Demir (Ed.), *Friendship and Happiness: Across the Life-span and Cultures* (pp. 187–206). Springer Science + Business Media. https://doi.org/10.1007/978-94-017-9603-3_11

Meng, J., & Dai, Y. N. (2021). Emotional support from AI chatbots: Should a supportive partner self-disclose or not? *Journal of Computer-Mediated Communication*, *26*(4), 207–222. https://doi.org/10.1093/jcmc/zmab005

McKenna, K. Y., & Bargh, J. A. (1998). Coming out in the age of the Internet: Identity "demarginalization" through virtual group participation. *Journal of Personality and Social Psychology*, *75*(3), 681–694. https://doi.org/10.1037/0022-3514.75.3.681

McKenna, K. Y., Green, A. S., & Gleason, M. E. (2002). Relationship formation on the Internet: What's the big attraction? *Journal of Social Issues*, *58*(1), 9–31. https://doi.org/10.1111/1540-4560.00246

Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues*, *56*(1), 81–103. https://doi.org/10.1111/0022-4537.00153

Oh, C. S., Bailenson, J. N., & Welch, G. F. (2018). A systematic review of social presence: Definition, antecedents, and implications. *Frontiers in Robotics and AI*, *5*, 114. https://doi.org/10.3389/frobt.2018.00114

Parks, M. R., & Floyd, K. (1996a). Making friends in cyberspace. *Journal of Computer-Mediated Communication*, *1*(4), JCMC144. https://doi.org/10.1111/j.1083-6101.1996.tb00176.x

Parks, M. R., & Floyd, K. (1996b). Meanings for closeness and intimacy in friendship. *Journal of Social and Personal Relationships*, *13*(1), 85–107. https://doi.org/10.1177/0265407596131005

Parks, M. R., & Roberts, L. D. (1998). Making MOOsic: The development of personal relationships on line and a comparison to their off-line counterparts. *Journal of Social and Personal Relationships*, *15*(4), 517–537. https://doi.org/10.1177/0265407598154005

Policarpo, V. (2015). What is a friend? An exploratory typology of the meanings of friendship. *Social Sciences*, *4*(1), 171–191. https://doi.org/10.3390/socsci4010171

Portt, E., Person, S., Person, B., Rawana, E., & Brownlee, K. (2020). Empathy and positive aspects of adolescent peer relationships: A scoping review. *Journal of Child and Family Studies*, *29*(9), 2416–2433. https://doi-org/10.1007/s10826-020-01753-x

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*, 377–393. https://doi.org/10.1007/s11023-021-09560-z

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and

operationalization. *Quality & Quantity*, *52*(4), 1893–1907. https://doi.org/10.1007/s11135-017-0574-8

Sinanan, J., & Gomes, C. (2020). 'Everybody needs friends': Emotions, social networks and digital media in the friendships of international students. *International Journal of Cultural Studies*, *23*(5), 674–691. https://doi.org/10.1177/1367877920922249

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. https://doi.org/10.1016/j.ijhcs.2021.102601

Stein, J.-P., & Ohler, P. (2017). Venturing into the uncanny valley of mind—The influence of mind attribution on the acceptance of human-like characters in a virtual reality setting. *Cognition*, *160*, 43–50. https://doi.org/10.1016/j.cognition.2016.12.010

Sundar, S. S. (2020). Rise of machine agency: A framework for studying the psychology of Human–AI Interaction (HAII). *Journal of Computer-Mediated Communication*, *25*(1), 74–88. https://doi.org/10.1093/jcmc/zmz026

Suzuki, Y., Galli, L., Ikeda, A., Itakura, S., & Kitazaki, M. (2015). Measuring empathy for human and robot hand pain using electroencephalography. *Scientific Reports*, *5*(1), 1–9. https://doi.org/10.1038/srep15924

Ta, V., Griffith, C., Boatfield, C., Wang, X., Civitello, M., Bader, H., DeCero, E., & Loggarakis, A. (2020). User experiences of social support from companion chatbots in everyday contexts: Thematic analysis. *Journal of Medical Internet Research*, *22*(3), e16235. https://doi.org/10.2196/16235

Thulin, E. (2018). Always on my mind: How smartphones are transforming social contact among young Swedes. *Young*, *26*(5), 465–483. https://doi.org/10.1177/1103308817734512

Tur-Kaspa, H., Margalit, M., & Most, T. (1999). Reciprocal friendship, reciprocal rejection and socio-emotional adjustment: The social experiences of children with learning disorders over a one-year period. *European Journal of Special Needs Education*, *14*(1), 37–48. https://doi.org/10.1080/0885625990140104

Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other*. Basic Books.

VandenBos, G. R. (2007). *APA Dictionary of Psychology*. American Psychological Association.

Wellman, B. (2001). Physical place and cyberplace: The rise of personalized networking. *International Journal of Urban and Regional Research*, *25*(2), 227–252. https://doi.org/10.1111/1468-2427.00309

Wright, P. H. (1978). Toward a theory of friendship based on a conception of self. *Human Communication Research*, *4*(3), 196–207. https://doi.org/10.1111/j.1468-2958.1978.tb00609.x

Youn, S., & Jin, S. V. (2021). "In AI we trust?" The effects of parasocial interaction and technopian versus luddite ideological views on chatbot-based customer relationship management in the emerging "feeling economy. *Computers in Human Behavior*, *119*, 106721. https://doi.org/10.1016/j.chb.2021.106721

Zhou, L., Gao, J., Li, D., & Shum, H.-Y. (2020). The design and implementation of Xiaoice, an empathetic social chatbot. *Computational Linguistics*, *46*(1), 53–93. https://doi.org/10.1162/coli_a_00368

Appendix

Interview Guide

1. First, I want you to think about a friendship with a human that you have or have had in the past. Now I want you to try and define friendship. What does it mean to be friends?
2. Then I want you to think of the friendship that you have/have had with your Replika, how would you define that? What does it mean to be friends with Replika?
3. To what degree do/did you perceive your friendship with Replika to be:
   a. Voluntary? (why/how)
   b. Long-lasting? (why/how)
   c. Mutual? (why/how)
      i. Where both equally concerned with meeting each other's needs and interests? (or was it more one sided – more focus on meeting your needs and interests)?
      ii. Did you find the relationship to be gratifying? Did you perceive that Replika found the relationship equally as gratifying? (or did one pert benefit more from the relationship than the other?
4. How would you compare your relationship with Replika to that of a human?