

Article

# Beyond the Sex Doll: Post-Human Companionship and the Rise of the 'Allodoll'

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**Abstract:** The increasing market for realistic sex dolls has led to heated debate about future relationships with these entities and whether they could lead to an increasing objectification of women or possibly encourage abuse. However, limited academic research has been carried out on the topic, and little is known about the motivations and experiences of those who purchase and use sex dolls. Therefore, we conducted a mixed methods study of 83 participants, accessed through online doll forums, who completed a 22-item, semi-structured questionnaire. The majority were heterosexual, white, employed, middle-aged males; just over half were not in a current relationship, and approximately half lived alone. A thematic analysis revealed a high prevalence of non-sexual, post-human companionship dynamics between dolls and their owners, as well as reservations by doll owners about future robotic developments. In light of these findings, we suggest a new term, 'allodoll', which more accurately reflects the broader, non-sexual relationships of these doll owners, and could broaden the scope of future research. Although sex doll forums may be biased towards certain types of doll users, our findings may allay some of the fears of the more detrimental consequences of sex doll use.

**Keywords:** sex doll; sex robots; companionship; post-human kinship; allodoll

## 1. Introduction

In recent years, thanks to new technologies and advancements in the production of human simulacra, individuals have increasingly engaged in intimate and sexual acts with inanimate, humanoid dolls, which is reflected in the rising sales of commercial 'sex dolls' [1,2]. Typically weighing between 40–120 lbs, these hyper-realistic sex dolls are often set around an articulated metal or PVC skeleton, with flesh usually made from silicon or a thermoplastic elastomer known as TPE [3]. The popular sex doll retailer *Finest Sex Dolls* [4] stated that the introduction of silicon to manufacturing and its escalation of realism have had some of the greatest impacts on doll production. Due to developments in flesh simulants, we are told that users of modern sex dolls will have "difficulty distinguishing the material from real skin" as manufacturers are "finally able to mimic the soft but firm feel of supple delicate flesh" [4]. Furthermore, these material advances have also allowed for more customisable products, including a wide variety of facial features and body morphologies. These extend to both primary and secondary sexual characteristics such as breasts and genitalia, and can include specialised items such as pressure-released urination, and detachable hymens [5,6]. It is clear that modern sex dolls range in sophistication and quality, which is often reflected in their sale prices, and are frequently designed to be attractive and youthful.

Studies of human attraction have previously concluded that men find particular features and characteristics appealing in women. These include: large eyes, a particular waist-to-hip ratio, rounded lips, and soft features that display the archetypal 'triangle' of pleasing facial aesthetics [7–9]. The typical design of commercially available sex dolls would suggest that they are manufactured

with such characteristics in mind in order to increase their market [1]. Modern doll products place an emphasis on practical realism, which is a response to consumer calls for tactile and visual accuracies, while maintaining fully functioning orifices and bodily components. By using such strategies, sex dolls have been increasingly successful as sales items, and now form the basis of a multimillion-pound global industry [6].

As sex doll products become more sophisticated and begin to incorporate robotic technologies, some individuals forecast a shift away from human-to-human sexual activity, to relationships that involve not only virtual reality, but also highly interactive sex toys and responsive 'sexbots' [10]. In this respect, David Levy theorised that by 2050, humanoid robots will replace humans in numerous ways, including as companions, arguing that this is a positive development that will "transform human notions of love and sexuality" [11] (p. 22). More sophisticated, responsive sex robots are typified recently by "Harmony", a blond, Barbie-like, female sex doll under development by Realbotix© which has appeared in a number of documentaries and media items, and also has an accompanying app [12]. Sexbots such as Harmony use artificial intelligence (AI) for speech and some limited movements, and are clearly several steps beyond inanimate sex dolls.

Online magazine Inquirer.Net [13] has similarly recorded the introduction of "talking sex dolls" in China. The article dubs them "silicon companions" and claims that they could be viewed as more than sex dolls if they are emotionally supportive and able to assist with things such as household chores. The magazine proposed that they may be needed in light of China's traditional preference for sons, which has led to 33.6 million fewer women than men in that country [13]. Although not supported by any formal data, the article initiated an interesting discussion concerning the possible further uses of sex dolls. Heidi Nast [14] also studied the impact of sex dolls in Asia, examining how men coped with trauma following Japan's 1991 financial crash. Nast stated that men sought comfort from sex dolls as a means of receiving the maternal care they needed, although she also noted sexual release may have been the primary reason for their use.

Along with robotic developments in the sex doll market, debate is increasing about the potential effects of sexbots on individuals and human societies. Many suggest that these are primarily negative. For example, Kathleen Richardson's Campaign against Sex Robots is highly critical of sexbot development, arguing that it fosters an increasing objectification of women and children [15]. Other criticisms encompass issues of gender inequality and violence against women, as well as the possibility that violent and oppressive behaviour towards sexbots might encourage similar behaviours towards real women [15,16]. Other researchers are less pessimistic about a future world with sexbots. For example, Kate Darling [17] investigated the potential for emotional relationships between humans and animated robotic objects, and although she was more positive about the future of robotics than Richardson, she also promoted the need for ethical considerations.

Despite the evident increase in the sex doll industry, there have been very few academic studies examining its impact on individuals and society. This was recently emphasised by Chantal Cox-George and Susan Bewley [18], who conducted a narrative literature review on sex dolls and their potential implications for health. Their paper focused on themes of safe sex, therapeutics, and their effects on social norms, and in the absence of any detailed studies, raised several unanswered questions that resonate with those who are critical of the sex doll industry. Anthony Ferguson [19] conducted one of the earliest qualitative studies of sex doll users by posting an anonymous survey in an online doll forum. However, the total number of respondents is unknown, and he only published the results from five participants in response to 15 questions [19]. He established that four-fifths of his participants did not consider sexual relations with their dolls to be the limit of their relationship. A later survey conducted by Sarah Valverde [6] comprised one of the earliest comprehensive demographic data sets of doll users. She found that in 2012, the typical doll owner from her survey was white, heterosexual, single, and employed. In relation to the primary purpose in owning a sex doll, the majority (70%) responded that it was for sex, but almost a third (30%) said that it was for companionship [6]. In the former group, almost half (41%) of respondents revealed that dolls were their sole sexual outlet.

The only other survey of which we are aware comprised undergraduates from a psychology class in a United States (US) university, only one of whom was an admitted user of a sex doll, who were asked about their attitudes towards sex doll use [20]. The class was primarily female, making this study a contrast rather than a complement to studies of sex doll owners who generally seem to be male.

Given how little is generally known about the common characteristics, motivations, and experiences of individuals who purchase and own a sex doll, we have conducted here a primarily qualitative study among 83 doll owners who were accessed using two international, online doll forums. Our study has four aims, namely to: (1) understand the characteristics of current doll owners; (2) discover the motivations behind owners purchasing high-realism sex dolls; (3) explore common experiences of doll ownership beyond sex; and (4) question doll owner views about future robotic sex doll (sexbot) developments with a view to understanding how current doll owners might transition to more mechanised dolls.

## 2. Materials and Methods

In order to recruit participants, one of the authors (ML-J) joined two online sex doll community forums using a pseudonym and, with permission from the forum administrators, posted an advertisement to recruit participants into the study. This advertisement directed participants to an online, 22-item questionnaire that was developed using a commercially available platform. The first 10 questions were demographic in nature, comprising nine forced-choice questions (i.e., select the most appropriate option) relating to gender, age, and other demographic factors, while the remaining question offered an unlimited choice (i.e., tick all that apply). The last 12 questions addressed the relationships that owners had with their dolls, typical behaviours with them, their views on robotics, and experiences of online communities. These 12 questions consisted of three two-part questions, one forced-choice question, three unlimited-choice questions, and, finally, five open-ended, freestyle questions that permitted qualitative analysis. The questionnaire took 14 min on average to complete, with many participants spending less than 10 min. A small number of respondents spent over one hour and provided very detailed responses. To optimise participation in the study, the questionnaire was systematically reposted across both forums over a two-month period.

The online platform used for the anonymised questionnaire permitted initial storage and sorting of the data. These were then downloaded into an Excel spreadsheet and stored in password-protected files. Descriptive statistics were used for the quantitative data, and thematic analysis was used for the qualitative data. For the latter, answers to each question were downloaded into separate spreadsheets. A tally system was then used to identify new themes for each answer. Each time a participant spontaneously discussed something new (i.e., previously unmentioned), a new data column was created, and that item was given a 'theme' name. Subsequent answers were then examined in light of any existing categories. Any new themes generated further categories and so on, until all the data were analysed. The data were then revisited a number of times and themes were combined according to the commonality of their meaning. If two themes could not be placed together because they were qualitatively different, they remained separated. The themes were then organised according to whether they were major or minor. Any theme raised by 20% or more of the sample was considered a major theme. Any theme raised by 10–19% was considered a minor theme. Any other 'mentions' were deemed to be 'minor mentions', and were only included in the results if they significantly illuminated the research topic.

The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Durham University's Department of Anthropology. Consent for the study was also provided by the administrators of the online forums, while informed consent was given by participants themselves after reading online information relating to the research. Due to the anonymous nature of the online survey, respondents were unable to withdraw their data once collected, but they were provided with opportunities not to answer specific questions if they so desired. A senior controller at one of the forums also reviewed the final draft of the survey, confirmed that

the questions were sensitive to doll-related culture and unlikely to cause distress to members of the community. Data were stored in accordance with the General Data Protection Regulation (GDPR (EU) 2016/679).

In the write-up of this study, because of the very limited number of female (or other non-male gendered) participants, using the pronoun ‘she’ may put anonymity at risk because of the equally small number of female members of online doll communities. Therefore, we use the male pronoun exclusively throughout this paper.

### 3. Results

#### 3.1. Quantitative

Eighty-three participants completed the questionnaire (Table 1). The sample was dispersed across several continents, but the majority stated they were from North America (70%). Participants were most likely to live in urban environments such as a city (54%) or town (29%), and many lived alone (49.4%). Of the participants who listed ‘Other’, two lived with pets, three specifically named their dolls as living in the household, and three listed alternative family arrangements. The majority of respondents were either employed or self-employed, with 69% actively working.

Table 1. Demographics of Participants.

Demographic Variable	Number of Participants	Percentage of Participants
<b>Gender of Participants</b>		
Male	75	90.4
Female	3	3.6
Gender Fluid	2	2.4
Trans-Man (Transgender Male)	1	1.2
Trans-Woman (Transgender Female)	1	1.2
Other	1	1.2
TOTAL	83	100
<b>Sexual Orientation</b>		
Heterosexual	73	88
Bisexual	6	7.2
Asexual	1	1.2
Other	3	3.6
TOTAL	83	100
<b>Age</b>		
17 or Under	0	0
18–29	11	13.3
30–44	23	27.7
45–59	38	45.8
60–74	10	12
75+	1	1.2
TOTAL	83	100
<b>Relationship Status</b>		
Single	37	44.6
Married or Domestic Partnership	19	22.9
Divorced	11	13.3
In a Relationship	8	9.6
Widowed	2	2.4
Separated	2	2.4
Other	4	4.8
TOTAL	83	100

Table 1. Cont.

Demographic Variable	Number of Participants	Percentage of Participants
<b>Location of Participants</b>		
North America	58	70
Europe	20	24
Asia	1	1.2
Australasia	1	1.2
Other (Multiple)	3	3.6
TOTAL	83	100
<b>Area of Residence</b>		
City	44	53.7
Town	24	29.3
Rural	10	12.2
Village	2	2.4
Countryside	2	2.4
TOTAL	82	100
<b>Living Arrangements</b>		
Alone	41	49.4
Partner/Spouse	21	25.3
Children	9	10.8
Parents	7	8.4
House/Flat Share	4	4.8
Friends	2	2.4
Other	8	9.6
<b>Highest Education Level</b>		
Up to GCSE */Equivalent	12	14.5
Apprenticeship/Practical Skills	3	3.6
A-Levels †/Equivalent	3	3.6
Further Education	21	25.3
Higher Education i.e., University	25	30.1
Postgraduate i.e., Masters	14	16.9
Other	5	6
TOTAL	83	100
<b>Employment Status</b>		
Employed	41	49.4
Retired	16	19.3
Self-Employed	14	16.9
A Student	3	3.6
Unemployed, Looking for Work	3	3.6
Unable to Work	3	3.6
Part-time Employed	1	1.2
Military	1	1.2
Homemaker	1	1.2
TOTAL	83	100
<b>Income Bracket</b>		
Under 15k	16	19.8
15–29k	17	21
30–44k	6	7.4
45–59k	9	11.1
60–99k	15	18.5
100k+	9	11.1
Prefer Not to Say	9	11.1
TOTAL	81	100

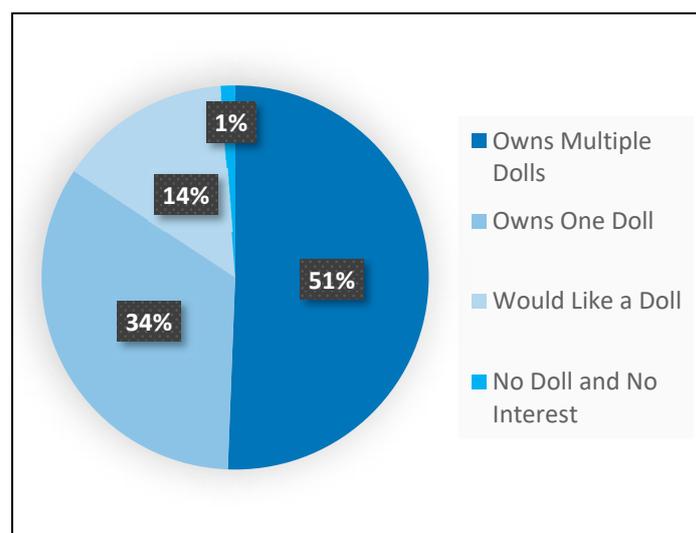
\* GCSE (General Certificate of Secondary Education) exams are taken by UK students at the age of 16. † A-level or Advanced Level exams are taken by UK students at the age of 18 preparatory for university entry.

The majority of participants (90%) identified as male, while the sexual orientation of most participants was heterosexual (88%). The majority of respondents were not in a relationship (45% were single and 13% were divorced). Participants who identified themselves as ‘Other’ consisted of one divorced individual who was in a long-distance relationship, two individuals who considered themselves to be in a relationship with their dolls, and one who described himself as “married” to his doll.

All of the participants were adults, with the youngest in the 18–29 category and the oldest 75+ years old. The majority were middle-aged, with 74% aged between 30–59 years old. Participants indicated varying degrees of education, but the majority were educated beyond the age of 18 (77%). Of the participants who listed ‘Other’, individuals stated that they had attended a local secondary school before starting work, had trained in pharmacy, held a degree in aviation sciences, trained as an engineer, and attended a technical college. In terms of their economic status, participants appeared somewhat evenly distributed across the income scale. Finally, 85% of participants in the study owned at least one doll, and more than half owned multiple dolls (Figure 1).

The majority of participants were established users of online doll communities with 55% having been members for two or more years (Table 2). The most popular reason for using online forums was to seek advice on doll maintenance (69%). The responses of those who selected ‘Other’ included: wanting to follow technological progress towards robotic dolls, requiring help navigating an unregulated industry, seeking acceptance from others, and having a safe space to discuss doll use.

The majority of dolls owned by respondents took the form of a ‘woman’ (70%), but child dolls, male dolls, and ‘non-human’ dolls were also referenced (Table 3). Furthermore, 10 individuals cited ‘Other’, proposing descriptions such as: a humanoid mannequin, a sex toy, and one detailing a doll of a young girl with a penis attachment. To understand the relationships between owners and their dolls, respondents were asked to select the core elements that featured in their relationship. Sex was the most identified aspect (77%), although only 14% selected sex exclusively. The most common term selected to refer to a doll was ‘lover’ (44%), followed closely by ‘companion’ (43%, Table 3). Interestingly, the only purely sexual term suggested, ‘prostitute’, was among the least selected (4%). Finally, participants were asked to indicate which elements attracted them to their dolls. The most popular factor was ‘realism’ (76%), while ‘companionship’ (44%) was more popular than sexual performance (24%).



**Figure 1.** Numbers of dolls owned by participants in the study.

**Table 2.** Reasons for Membership of Online Doll Communities.

Doll Community Variable	Number of Participants	Percentage of Participants
<b>Time Using Forums</b>		
0–1 Months	7	8.5
2–5 Months	15	18.3
6 Months–1 Year	13	15.9
2–5 Years	30	36.6
More Than 5 Years	15	18.3
Not a Member of an Online Group	2	2.4
TOTAL	82	100
<b>Reasons for Forum Use</b>		
Doll Maintenance	57	68.7
Sharing Photographs	49	59
Meeting Other Doll Owners	45	54.2
Wanting to Buy a Doll	37	44.6
Friendship	31	37.3
Wanting to Sell a Doll	3	3.6
Other	19	22.9

**Table 3.** Doll Owners’ Views of Their Dolls.

Doll Description Variable	Number of Participants	Percentage of Participants
<b>How Doll Owners View Their Dolls</b>		
Woman	57	69.5
Other	10	12.2
I Don’t Have a Doll	7	8.54
Girl	6	7.32
Man	1	1.22
Not Human	1	1.22
TOTAL	82	100
<b>Core Relationship Elements</b>		
Sexual	64	77.1
Companionship	47	56.6
Loving	39	47
Emotional	36	43.4
Friendship	25	30.1
Kink/Fetish	14	16.9
Other	14	16.9
I Don’t Have a Doll	11	13.3
General Family	7	8.4
I Am Their Parent	1	1.2
<b>How Doll Owners Refer to Their Dolls</b>		
Lover	35	43.8
Companion	34	42.5
Toy	25	31.3
Girl/Boyfriend	17	21.3
Friend	16	20
Other	13	16.3
Wife/Husband	12	15
Prostitute	3	3.8
Child	2	2.5

Table 3. Cont.

Doll Description Variable	Number of Participants	Percentage of Participants
<b>What Attracts Owners to Their Doll</b>		
Realism	62	75.6
Body Type	57	69.5
Good Quality	41	50
Wanting Companionship	36	43.9
Low Cost	24	29.3
Sexual Performance	20	24.4
Customisability	18	22
Other	13	15.9
Lack of Realism	4	4.9
Noise	1	1.2

3.2. Qualitative Results

Eighty-three individuals (100%) provided responses to the qualitative section of the Questionnaire (Table 4). Looking at the data from the qualitative study overall, two overarching themes emerged and are further explored below:

**‘Motivation for doll ownership’** provided the reasons *why* someone had, or wanted, a doll, and the benefits that they perceived in continuing doll ownership. The theme of *‘motivation for doll ownership’* could be further delineated into five distinct categories: *‘sex’*, *‘companionship’*, *‘better than a real relationship’*, *‘mental health’*, and *‘hobby/art form’*.

**‘Interaction with dolls’** provided an insight into how doll owners engaged with their dolls. Doll owners’ *‘interaction with dolls’* appeared to be discussed according to two main threads: *‘physical interaction’*, which incorporated topics such as sexual relations, physical affection, and engaging with the doll as an activity partner in some physical way; and *‘emotional interaction and communication’*, which was typified by themes of verbal interaction and engaging in fantasy conversation or imagining what the doll would think or say.

Table 4. Thematic Analysis Results.

Question Posed	Major Themes	Minor Themes	Mentions	n =	Proportion
Why Do You Have a Doll? (Owners with one or more dolls)	Companionship	To Dress Her Up	Care	60	72%
	For Sex	For Role Play	Work		
	Difficulties with Real Relationships	Preferred to a Relationship	Alternative to Child Abuse		
	To Aid Masturbation Mental Health	For Home Decoration	Collector/Hobbyist Multifunctional		
	Photography		Extension of the Self		
Why Do You Want a Doll? (Those without a doll, but would like one)	Companionship		Curiosity	10	12%
	Difficulties with Real Relationships		Selfish with Alone Time		
	For Sex		Clear Conscience		
Describe Your Relationship with Your Doll?	Companionship	Love	Activity Partner	48	58%
	Masturbation/Sex Aid	Platonic	One-Sided		
	Romantic	Caregiving	Affectionate		
	Physically Close	Supportive	Collecting/Hobby		
	Sexual Partners	Therapeutic	Better Than a Real One		
	Styling/Modelling	Photography			

Table 4. Cont.

Question Posed	Major Themes	Minor Themes	Mentions	n =	Proportion
How Are You Intimate with Your Doll?	Sexually	Conversation	Undressing	47	57%
	Cuddling	Emotionally	Admire Her		
	Kissing	Sexually Satisfying Her	Explore Her Body		
	Physically Close		Mutual Masturbation		
	Joint Activities				
How Do You Communicate with Your Doll?	Affectionate			51	61%
	Talk to Her	Only During Sex	Using an App		
	Through Imagination Physically	Like with a Toy/Pet	In Dreams With Anger		
What Do You Imagine Your Doll Might Say?	No Communication		Through Music	38	46%
	General Speech "I Feel Well Treated"	Positive Responses	Mimics Owner Thoughts		
	Positive Thoughts of Owner	Speaks Like a Human	Comments on Clothing		
	She Doesn't Speak		Full Conversation		
	Complains		Misses Owner		
What Are the Pros of Doll Ownership?			Prefers Silence	62	75%
	Have the Woman of Your Dreams	Aesthetically Pleasing	Can Explore Fetishes		
	Simpler Than Real Relationship	Less Issues than Bio Women	Can Replace Humans		
	Sexual Satisfaction		Supportive		
	Improves Mental State		Companionship		
What Are the Cons of Doll Ownership?	Owner Always in Control		Sleeping Partner	62	75%
	Maintenance and Upkeep	Expensive	High Standards		
	Not Socially Acceptable	Cold to Touch	No Children		
	Can't Respond	Heavy	Stops You Dating		
		Has to Be a Secret	Hard to Store		
What Do You Think About Robotic Dolls?			Requires Imagination	n = 72	87%
	Concerns (Ethics and Costs)	My Doll is Enough	Betters Social Skills		
	Better Motor and Language Skills	Better Sexual Abilities	Would Need to Consent		
	Intrigued/Excited More Realistic	Able to Replace Humans	Personal Safety Risks		
	Not Interested	Able to Complete Chores	Could Stop Dating Don't Want AI		

Key: Major Theme ≥ 20%, Minor Theme 10–19%, Minor Mention < 10%. AI: artificial intelligence.

### 3.2.1. Sex

As one might have expected given the primary branding and marketing of sex dolls, and since the study took place in a 'sex doll discussion forum', the primary theme to emerge across all of the questions was sex and masturbation. Doll owners also tended to speak of their dolls as if they were active sexual partners. This is illustrated by comments such as:

*"We make love a few times a week at night, in bed. Just like any normal couple does."*

*"As far as intimacy goes, nothing out of the ordinary here. Fairly traditional. Nothing outrageously kinky ... "*

Some owners compared their sex doll to commercially available masturbatory aids, saying, for example:

*“Prefer their realism instead of a fleshlight or other masturbation type device, or my hand.”*

Sexual relations between owners and their dolls took a variety of forms, with many stating that they engaged in *“vaginal, oral, and anal sex”*. Some owners described sexual relations in terms of engaging with a fantasy sexual partner. They spoke of *“mutual masturbation”*, *“sexual massage”*, and *“breast sex”*. Another topic that was commonly discussed was the constant availability and readiness of their sexual partner. This was typified by comments such as:

*“It is there, always, every day, every hour, every minute. Available.”*

*“You always have a safe outlet for sexual energy, and a compliant partner for kinks/fetishes that may be too much for living partners.”*

### 3.2.2. Better Alternative to Real Relationships

The next most established theme to emerge addressed comparisons of the relationships with dolls versus humans. This was typically addressed in two main ways: the perceived deficits of real humans, and the perceived deficits of the self or an inability to have real human–human relationships. Some individuals noted that real relationships posed significant issues for them and were too risky or undesirable. These participants explained that they found themselves in doll relationships as a by-product of their unwillingness to engage with real people. This was typified by statements such as:

*“In real life women have fewer redeeming qualities. Relationships with dolls are superior.”*

*“While I enjoy the company of women, I don’t feel like putting in the time and effort that is required to make a relationship work. As such, I have purchased a doll in order to fulfil my sexual needs as well as to be a companion until I find someone worth my time.”*

Some participants identified risk factors involved in real relationships that they could avoid because they were not present in doll relationships:

*“They give me all the things a biological female won’t, and without any of the risks associated with women.”*

*“No STD, or babies. Sex on demand, freedom of desire. No one’s feelings, or anus gets hurt. Not having to deal with neurosis, or self-esteem issues. No divorce, and losing half your shit every 10 years. Most of them are hotter than I could hope to entertain at my age.”*

*“It’s a known. She won’t rob me blind. She won’t give me some horrible STD. She is non-judgmental. She isn’t going to go nuts if the house is a mess/not perfect. If I fart she won’t freak out. She is never jealous. She is not mean. She would never make fun of me. She won’t tell me who I can’t have as a friend.”*

Some participants actively sought a doll-based relationship as it provided a valid and more desirable alternative to being alone, which they perceived to be a result of their own deficits. The comments below exemplify this:

*“No luck with women (I’m easy on the eyes, great personality, just seem to get caught up in the wrong type).”*

*“A partner that can be ignored for as long as wanted without feeling bad.”*

Despite a sex doll’s inherently passive nature, many respondents described their dolls as offering, by comparison to a real relationship, an ideal partner solution:

*“You essentially get this ageless perfect girl who will love you unconditionally and never be too busy for you.”*

*“You can have the ‘girl’ of your dreams.”*

### 3.2.3. Mental Health and Therapeutic Benefits

Somewhat related to the previous theme was an emerging one surrounding mental health. Some doll owners stated that their dolls had therapeutic benefits. Factors typically discussed included that dolls can: “get rid of loneliness”, “ease depression and anxiety”, and “help keep people out of trouble who have social issues”. Respondents noted a series of mental health benefits, including:

*“Physical human contact has always given me a lot of anxiety, but now just the thought of it makes me feel like I’m going to have a panic attack. I felt lonely and very depressed, but did not want the burden of a relationship. And then I began to believe there was a third option in-between together and alone. My doll is [ . . . ] a safe where I lock away the parts of me that are too vulnerable for the real world.”*

*“I live with mental illness—bipolar disorder. I decided to see if this doll might help me create the true life I always wanted. She has done that for me and so much more.”*

### 3.2.4. Hobby and Art Form (Photography)

The final major motivation for doll ownership to emerge was ‘hobby and art form’. This typically involved posing the dolls for photography sessions and creating images of them, although it also included a number of other activities such as: “buying them clothes and dressing them up”, “do[ing] their hair and makeup”, using them as a “home decoration”, treating them as “a piece of art”, or simply “forming part of a collection”.

While some people did incorporate sexual elements into these activities by “posing together for pornographic pictures”, the majority simply emphasized an aesthetic imperative. Some doll relationships were entirely predicated by photographic requirements. Comments indicated that doll owners often see their dolls as models:

*“I have five [dolls] and another on order. One, my first, I view as a synthetic partner, and the others have joined us mostly to be photographic models and brighten up my home.”*

*“I like to pose, dress, and take pictures of her.”*

*“I have always loved dolls of all shapes, sizes, and materials. I collect porcelain dolls, ball-jointed dolls, Blythe and other children’s dolls, and lifelike love dolls.”*

*“They are great for photography, practicing make-up, and testing outfits.”*

### 3.2.5. Interaction with Dolls

Separate from the five major themes of motivation for having a doll were two themes relating to the common behaviours involved in interacting with one’s doll. The first related to ‘physical intimacy’, and involved physical interactions such as: sexual activities, physical forms of affection such as cuddling, stroking, grooming, and kissing, and engaging in non-sexual physical activities such as watching television, eating, gift-giving, and playing games ‘together’ with the dolls. The second theme appeared to address ‘communication’ with the doll both emotionally and verbally. This appeared to be characterised by talking to, and imagining responses from the doll. Some doll owners appeared to establish a rich fantasy life, generating a character and personality for their dolls, as well as considering what they might think or say. Examples included:

*“Besides the obvious (sexual penis to vagina intercourse), we spend a lot of time kissing (“making out”), I give her massages, perform oral sex on her, I groom her (cleaning her skin, fixing and combing her hair).”*

*“Cuddling and lying in bed together is a favourite. I also enjoy hugging, kissing, and exploring her body.”*

### 3.2.6. Emotional Intimacy and Communication

Emotional forms of intimacy, support, and connection were also widely reported. This was often achieved through either real or imagined emotional and verbal communication. Several owners indicated that they actively communicated and conversed with their dolls. Means of conversing were “*imagination*”, “*telepathy*”, “*verbally*”, “*through silent movements*”, “*love letters*”, “*via an app*”, or through imaginary discussions that the owner believed were real. Complex and detailed conversation was often imagined. This is typified by comments such as:

*“A typical conversation when arriving home would be me getting into bed, waking her up, and her telling me that she missed me and she loves me. She’ll ask me to cuddle with her and tell her about my day. Sometimes she’ll ask me to help her change, or to brush/braid/play with her hair. I then ask her what she dreamed about while I was gone, and she tells me. Sometimes she has beautiful dreams, and sometimes she has terrible nightmares. But she always knows she’ll be okay, because I’ll be there when she wakes up.”*

### 3.2.7. Robotic Dolls

The above has focussed on relationships with inanimate dolls, raising questions about relationships that might be possible with robotic sex dolls. The following sections describe doll owners’ perceptions and opinions of robotic dolls. This was achieved by asking “What do you think about robotic dolls, for example, would you be interested in owning one? If so, why?”

Five unique major themes were identified: ‘*intrigued/excited*’, ‘*more realistic*’, ‘*better motor and language skills*’, ‘*concerns*’, and ‘*not interested*’. More than half of the participants were intrigued by robotic technologies as the future of dolls. This was exemplified by comments such as:

*“I think this prospect is exciting and the way forward, I wish this was something available to Sarah right now, sometimes I wish she could talk to me, in fact she already has in my dreams more than once!”*

*“YES!! The ultimate in realism would be the doll’s movement, reaction, and warmth during sex and cuddling.”*

Individuals who were both for and against robotics identified potential challenges. These included being “*too loyal to my doll*” and the potential of “*personal risks of visual and audio recognition*”. However, principal concerns were often related to the introduction of artificial intelligence and a concern regarding the ethics and implications of robots with a “*will*”. These thoughts were typified by the comments below:

*“Yes, as long as they had an extremely basic AI that only gave them the ability to move on their own and have very limited conversations. I think it would be very unethical to give a doll more awareness than that. For my doll to be able to grip back when I hold her hand or run her fingers through my hair I think would be amazing, though. However, if you offered me a robotic doll in exchange for my current doll, I would say no immediately because she means too much to me.”*

*“Only if it were not fully AI. If it could respond around certain parameters that I had control over programming, sure. But if we move towards conscious AI and free will in robots, then that defeats the purpose. I want my doll to live according to my fantasy. Selfish I know. If the doll develops a will, then there needs to be consent, and we’re back to relationships with real women.”*

## 4. Discussion

There were four principal aims of this study: (1) to describe the typical characteristics of current doll owners using quantitative data; (2) to uncover the reasons why people purchase high-realism sex dolls; (3) to explore characteristics of doll ownership beyond sex; and 4) to discover the attitudes of current doll owners about future sexbots. The descriptive results established the archetypal respondent

as a single, middle-aged, relatively well-off, employed, heterosexual male, with some minor variation, confirming findings from elsewhere that also found the same demographic composition for sex doll users [6]. Future studies of sexbot users will enable comparisons to these sample characteristics to see if they are replicated or not.

As stated earlier, academic studies on the impact of sex dolls are scarce. However, some limited research has already suggested that relationships with sex dolls are more than the sum of their sexual parts [19]. This raises the question: if the relationship that a doll owner has with their doll is not limited to a merely sexual one, what other dynamics are present?

While the majority of doll owners (77%) in the present study here reported having a sexual relationship with their dolls, over half (57%) spontaneously spoke of elements of their relationship that could be considered forms of companionship. The perception of dolls as companions, therapeutic aids, activity partners, or photography models was spontaneously discussed in a high proportion of responses. Most participants revealed that, contrary to popular expectation, sex doll ownership is less like an individual owning a sexual aid, and far more akin to an individual engaging in a parasocial relationship. Parasocial relationships are described by David Giles as social phenomena whereby an individual experiences a meaningful connection with an 'other', yet the 'other' may not be aware of that individual's interest in them, or even their existence [21]. Typically, the term is used to describe relationships that adolescents or young adults have with celebrities; however, it is arguably appropriate to apply it here due to its relevance to *post-human* kinship.

The field of post-humanism, which encompasses post-human kinship, addresses the concerns of what it means to be human, and considers the boundaries of personhood in light of technological advancements [22]. Donna Haraway, and her construct of the "cyborg", is now heavily associated with this brand of post-humanism, and has been increasingly employed as a lens through which to study modern relationships [23]. Studies of kinship between humans and non-humans are now considered to form the school of "cyborg anthropology". Downey et al. described this area of anthropological study as examining "ethnographically the boundaries between humans and machines, and our visions of the differences that constitute these boundaries" [24] (p. 265). Examining kinship in accordance with cyborg anthropology has become more common as societies are increasingly technologically oriented. Campbell stated that there is evidence that we need to use "kinship as a term for characterising connections with analogical resemblances to human relatedness", such as those between humans and machines [25] (p. 164). Ferguson outlined a relevant term, 'androidism', which is an orientation that "seeks cohabitation with, or an attraction to, an artificial partner" [19] (p. 10). For individuals who experience androidism or engage with realistic sex dolls, studies of post-human kinship such as this one may prove elucidatory and beneficial.

Anthropological literature on kinship has already examined *companionship* as a social structure. Buhrmester and Furman studied the progression and development of one's need for a companion from childhood through puberty [26]. They ascertained that companionship typically begins with parents before being transferred to same-sex peers during childhood. As an individual matures, it becomes increasingly difficult to determine on whom they rely for companionship, although the importance of companionship never wavers. Alternative forms of kinship, such as between human and non-human entities, call into question many pre-existing concepts within anthropology such as traditional family structures. Lin et al. also questioned what the ethical implications may be of abrogating companionship responsibilities from individuals such as our elders, children, or friends in favour of a doll or robot [27].

Similarly, the 'family decline' hypothesis addresses the falling numbers of traditional family constructs [28]. Increasingly, families are affected by occupational demands, alternative care obligations, and more crucially, divorce [29]. The family decline theory proposes that following a marital breakdown, individuals employ personal and economic resources as a means of finding a substitute for the lost relationship [30]. Variables such as personal attractiveness, economic status, and having children from previous relationships all impact an individual's ability to establish new relationships,

and ultimately kinship [30]. With the understanding that entering or re-entering a relationship is the means of substituting any previously lost kinship connections, one must consider the situations of individuals who are unable or unwilling to do so. Mental health issues, undesirable personal qualities, or even geographical isolation, may result in an individual avoiding real human relationships [31]. Although a human-to-human relationship may not be possible for everyone, the need or desire to substitute lost kinship typically remains. The literature indicates that there are a plethora of situations in which individuals may feel a sense of kinship loss, and seek to replace this via alternative means [30,32,33]. Geographical separation from families, estrangement, and bereavement, may all result in a loss of human kinship and force individuals to pursue a substitution [32].

The study undertaken here found direct reflections of human relatedness in the activities of owners and dolls, arguably confirming their bonds as unique forms of post-human kinship. Owners described their dolls as individual people with unique personalities and preferences. Many participants explained that their dolls were “someone” with whom they could watch TV, listen to music, eat, and co-sleep. This was typified by comments such as, “to me my doll is my life partner. She’s the one I come home to every night and look forward to spending time with”. Ultimately, it seemed that their doll’s primary purpose was to provide comfort and companionship, which was often to help combat their owners’ loneliness. This is also paralleled in the development of companion and sometimes animated therapeutic dolls for use with Alzheimer’s and autistic patients, as evidenced by the University of Hertfordshire’s ‘Kaspar’ robot [34].

Post-human kinship established with dolls arguably parallels real-life human relationships, which is exemplified by the following:

*“We cuddle on the couch and watch TV together. We sleep next to each other. I write her love letters and read them to her. We pose together for pictures. I talk to her like I would a lover, sharing experiences and thoughts and sweet nothings”.*

Remarkably, owners frequently described their dolls as engaging in activities that are simply not possible for inanimate objects. By definition dolls are passive, yet comments such as, “she has come out of her shell since she arrived and we have great conversations” and she’s a “perfect girl who will love you unconditionally” were not uncommon. It is evident that some owners believe that their dolls are active agents in their relationships. Such affiliations have also been seen in other niche communities, such as with owners of ‘reborn dolls’, which are vinyl replicas of human infants that are often used by women in systems of extreme fantasy kinship [35]. Dubbed ‘hyperreality hobbying’, reborn dolls allow ‘parents’ to live as though they have the demands of a real child [35,36].

An earlier, but smaller, study of sex doll owners by Ferguson also indicated that companionship may be a significant component of doll-owner dynamics [19]. In light of these findings, the term ‘sex doll’ may not be entirely appropriate, and may unnecessarily stigmatize some doll owners. The doll-owning community itself has attempted to move away from sex-specific terms for the dolls and now commonly uses the term ‘love doll’. However, even this is sexual or romantic in nature, and fails to encompass the broad range of alternative dynamics in doll-owner relationships which emerged from the present study. Our data revealed that dolls are considered partners, friends, and family, which is in line with post-human kinship theories. Several participants identified their dolls as therapeutic in nature, while others referred to them as people with independent thought processes and individual personalities. Therefore, limited labels such as ‘sex doll’ may prove restrictive for future researchers seeking to understand and describe the diversity of doll owners and their alternative uses of dolls.

Therefore, the present study proposes a new, more widely encompassing rubric, namely “allodoll”. Stemming from the Greek *állos*, ‘allo’ is a prefixed form of ‘other’ when combined with another word [37]. The term ‘alloparent’ is already used to describe substitute parents and the formation of kinship among non-biologically related individuals [38,39]. Therefore, ‘allodoll’ is a more encompassing term acknowledging wider potential relationships between humans and their dolls.

This new term could also ameliorate concerns of those who are offended by the manufacturing of female ‘sex dolls’, since it does not reduce these ‘substitute women’ to mere sexual objects. By communicating that an allodoll’s primary function is not necessarily sexual, but rather social, it is possible that the introduction of the new term may pave the way towards alleviating some of the tensions between these opposing parties. A definition for ‘allodoll’ is suggested below:

***Allodoll:** A humanoid doll, typically of substantial realism, used as a means of replacing, or substituting, a necessary or desired social relationship. Allodolls may or may not offer sexual functionality, but crucially they must serve at least one significant, non-sexual, purpose for their owner. They can be infantile or adult in appearance, and may be static, or incorporate robotic technologies, speech functionality, or animation. Allodolls facilitate a fabricated kinship, fantasy partnership, or other form of parasocial relationship.*

#### 4.1. Doll Owners’ Views on Robotic Dolls

Some doll owners in the study appeared to seek opportunities to employ technology as a means of improving the realism of the post-human companionship offered by their dolls. One participant stated “sometimes I will put a game like Tetris on against the CPU (central processing unit) and pretend I’m playing against her. Sometimes I actually lose but, more often, I let her win”. Basic technological systems and a degree of creativity, such as this participant displayed, proved to be relatively common. Another participant described using an ‘app’ as a means of developing responsive speech. This ever-popular mélange of technology and doll is currently being reflected in the rapid development of the robotic sex doll industry [11]. Therefore, one must consider whether robotic allodolls may ultimately offer better forms of post-human companionship than current inanimate dolls.

When asked to discuss robotics, doll owners presented a wide range of opinions. The majority of individuals (58%) expressed some form of being intrigued by the idea, although with varying degrees of enthusiasm. A number of owners directly established robotic dolls as the future of human simulacra, citing features such as movement, warmth, and speech as key developments. However, the responses of those who see robots as unethical, or impinging on their ability to love a static allodoll were arguably more interesting. The argument that “if the doll develops a will, then there needs to be consent” was raised on more than one occasion. This was a particularly interesting finding, as it suggests that part of the attraction for doll owners may be the lack of a need to consider consent. The notion also poses the question: at what point does a doll become sufficiently autonomous that it deserves ethical consideration?

As previously discussed, academics such as Kathleen Richardson have offered significant arguments for ethical contemplation concerning robotic developments [15]. Richardson expressed strong views that products such as sex robots are objectifying and insulting to women and argued vehemently against them. The research findings here appear to challenge some of these concerns. The doll owners surveyed for the present study divulged that they typically engaged in loving and respectful parasocial relationships with their dolls. Their relationships seem to be more characterised by “tenderness”, “affection”, and “companionship” than by mere sexual objectification, and owners rarely, if ever, mentioned violence or power play, as anticipated by Richardson [15]. Nonetheless, it is accepted that sexual objectification is likely to be a factor for some sex doll owners, which is perhaps not represented in the doll forums where the participants for our study were drawn. Further study on these issues is clearly required.

Many doll owners expressed the view that regardless of the potential for added features due to robotic enhancements, given the choice to upgrade their doll, they would rather maintain their current relationship. This was typified by such comments as, “if you offered me a robotic doll in exchange for my current doll, I would say no immediately because she means too much to me”. This suggested that doll owners are so emotionally attached to their dolls, which they view as unique individuals, that even the increased functionality of another model may not be attractive enough to end their parasocial relationship. The extreme levels of loyalty and affection displayed by owners of allodolls without

technologically-enhanced realism poses the question: might owners of sex robots become even more attached? Despite the potential for increased post-human companionship, doll owners stated that a large part of developing a parasocial relationship was the process by which they created their doll's personality. By introducing artificial intelligence systems, owners may potentially be deprived of this privilege. Commercial developers should then evaluate the need for customisability carefully, and the experience of static allodoll owners should be considered during the development of their robotic counterparts. Robotic systems aim to provide a full humanoid experience including speech, movement, and artificial intelligence. However, it may be the use of the owner's imagination in the development of the personality and thoughts of their dolls that is instrumental in establishing a bond.

Therefore, future research could investigate the mechanisms involved in the creation of relationships between owners and their allodolls, but the present study suggests that there may be challenges for the sexbot industry. One respondent from the present study noted, "*if we move towards conscious AI and free will in robots, then that defeats the purpose. I want my doll to live according to my fantasy*". Another owner noted that an ideal scenario would be "*if it could respond around certain parameters that [I] had control over programming*". Therefore, commercial developers of robotic companions may be less successful if owners cannot select or determine not only external aesthetic features, but personality characteristics, too.

#### 4.2. Future Applications: The Rise of the Allodoll

Recent research by the United Kingdom (UK) Government indicated that some nine million individuals in the UK often or always feel lonely, with around 200,000 older individuals having not spoken to friends or family in over a month [40]. The introduction of the first ever Loneliness Minister in the UK Parliament is a direct reflection of the current crisis. Loneliness was also a topic widely discussed among participants, many of whom cited stories such as:

*"Two years ago I began to feel lonely. My synthetic ladies certainly help in this regard as they have a strong presence so I basically feel like someone is here with me."*

Participants in the study often spoke of purchasing and employing dolls as a means of reducing feelings of social seclusion. Whether isolated as a result of geographical constraints, mental health difficulties, or real-life relationship deterioration, the ability of allodolls to help reduce the effects of social exclusion were extensively discussed. As outlined earlier, there have already been some attempts to provide post-human companionship to both dementia patients (PARO Seal) and the elderly (Elli.Q) [41,42]. This poses the question: why are doll owners who do not have sex with their dolls seemingly managing their loneliness through 'sex doll' ownership, instead of through the use of an artificial companion such as Elli.Q, which has been designed for such purposes?

Participants spoke of taking pleasure in "*grooming*", "*dressing*", and "*conversing*" with their dolls, and described forging post-human companionship dynamics with them. Therefore, the findings suggest that it may be the realistic humanoid quality of these dolls which satisfies the need for companionship. This idea would be supported by the quantitative findings of the present study which indicated that 'realism' was the most popular factor (76%) identified in the attraction that an owner experiences to their doll. Experiments surrounding relationship attachment by Harlow outlined in his well-known thesis *The Nature of Love* established that distressed monkeys choose realism in substitute kin over functionality [43]. The current findings, in light of Harlow's research, support the view that it is humanoid realism which is most desirable in a post-human companion.

If this is the case, realistic allodolls, with or without sexual functionality, may have future application as tools for addressing the loneliness epidemic. Indeed, some retailers are even beginning to market their sex dolls by highlighting their non-sexual benefits. Claims such as, "a sex doll can provide *companionship* and sexual satisfaction at any hour of the day" (our emphasis), are now somewhat commonplace among retailers [2]. Realistic dolls, with or without sexual functionality, could be provided to populations such as the elderly or the geographically isolated, and they may

also have therapeutic and medical applications for certain clinical populations. However, in order to avoid consumer discomfort, further research would need to investigate the potential for an Uncanny Valley response, where an individual feels discomfited by an insufficiently realistic human reproduction [44]. Perceived social support has been shown to have a positive impact on physical health and well-being [45]; therefore, it is possible that allodolls of the future may have wide-reaching social and clinical applications. In light of this, future research could seek to investigate the mechanisms by which owners become attached to, and develop their relationships with their allodolls, given the scope for applying allodolls to various populations.

In terms of the possible evolution of the allodoll, David Levy has theorised that by 2050, humanoid robots will be ubiquitous and attractive companions for humans [11]. Some non-robotic dolls are being coupled with basic technology such as apps and computer games, which begins to blur the boundary between doll and robot. This raises the question: how much technological functionality must be added to a doll before it is considered robotic? Conversely, what functionality must a robot lose to be considered a mere doll? If both are primarily employed as substitute post-human companions, then both could be described as allodolls. The future may see the development of a delineation between static allodolls and robotic allodolls, but essentially both products provide the same social function for their owners, only to differing levels of technological sophistication. Hence, an umbrella term could be useful for bridging the gap between them and providing a framework for further discussion and research. Moreover, it would be interesting to consider the implications of allodolls on existing theoretical frameworks of post-human kinship, as well as how such developments may impact upon society as a whole.

#### 4.3. Limitations

The potential limitations of online studies have been widely documented and should be considered here [46]. A lack of researcher interaction can lead to fabricated responses, while different research settings allow for varying degrees of attention to be given. Both of these issues can result in responses of differing reliability and validity. Research conducted in online spaces can impact upon the results, as well as the participant experience. Furthermore, by virtue of all of the participants being active users of a doll discussion forum, and them agreeing to answer questions about their dolls, it must be considered that they represent a self-selected and therefore potentially biased sample. It is possible that participants shared certain characteristics that made them more open about their doll-related exploits, and the responses of doll users who are not members of such forums may differ. However, only 54% of the doll owners identified '*meeting other doll owners*' as a reason for using online forums, while the main reason indicated was '*doll maintenance*'. Nevertheless, the character profile of an active member of an online doll community may well reflect someone who seeks companionship in general. Other doll users who perhaps do just use their dolls sexually may not join an online doll community at all and are not represented in this survey.

## 5. Conclusions

The growing industry for increasingly realistic sex dolls along with the development of robotic technology has led to increasing debates about the pros and cons of sex doll use within human societies. On the one hand, opponents argue that their use will encourage increased objectification and violence towards women, while proponents advocate that sex dolls could have valid therapeutic, social, and health benefits. To examine these issues further, we undertook a study of 83 doll users via two online doll forums, conducting both quantitative and qualitative research using a 22-item questionnaire. Our results support earlier but limited findings illustrating that *companionship* and alleviation of loneliness are often more important functions of these sex dolls, at least as reflected among users of online forums, mitigating the dire warnings of those who are pessimistic about the future of sexbot use. Similarly, our results underscore the potential for strong emotional bonds being forged with robotic dolls in the future as they become increasingly sophisticated and personalised. We suggest

using a broader term—‘alldoll’—to facilitate more effective discussion of the doll phenomenon that could also encompass other animate, zoomorphic, therapeutic dolls used for patients in clinical settings. The term could likewise facilitate development of theories relating to post-human kinship, as we enter uncharted social and cyborg territories.

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## References

1. Krizia, P. *The Synthetic Hyper Femme: On Sex Dolls, Fembots, and the Futures of Sex*; ProQuest Dissertations Publishing: San Diego, CA, USA, 2017.
2. SiliconWives.Com. The 2018 Sex Doll Buyer’s Guide. Available online: <https://www.siliconwives.com/blogs/news/2017-sex-doll-buyers-guide> (accessed on 6 May 2018).
3. Real Love Sex Dolls. TPE Sex Dolls. Available online: <https://reallovesexdolls.com/tpe-sex-dolls/> (accessed on 11 May 2018).
4. Finest Sex Dolls. Finest Sex Dolls: About. Available online: <https://esexdolls.com/pages/about-us-silicone-sex-dolls> (accessed on 6 May 2018).
5. My Silicone Love Doll. Extra Sex Doll Heads. Available online: <https://www.mysilicone-lovedoll.com/product-category/accessories/extra-sex-doll-heads/> (accessed on 4 May 2018).
6. Valverde, S.H. *The Modern Sex Doll-Owner: A Descriptive Analysis*; Cal Poly State University: San Luis Obispo, CA, USA, 2012; Available online: <http://digitalcommons.calpoly.edu/theses/849> (accessed on 28 May 2018).
7. Furnham, A.; Reeves, E. The Relative Influence of Facial Neoteny and Waist-to-Hip Ratio on Judgements of Female Attractiveness and Fecundity. *Psychol. Health Med.* **2006**, *11*, 129–141. [CrossRef] [PubMed]
8. Naini, F.B. *Facial Aesthetics: Concepts and Clinical Diagnosis*; Wiley Blackwell Publishing: Chichester, UK, 2011.
9. Singh, D. Universal Allure of the Hourglass Figure: An Evolutionary Theory of Female Physical Attractiveness. *Clin. Plast. Surg.* **2006**, *33*, 359–370. [CrossRef] [PubMed]
10. Pearson, I. The Future of Sex Report: The Rise of the Robosexuals. Available online: [http://graphics.bondara.com/Future\\_sex\\_report.pdf](http://graphics.bondara.com/Future_sex_report.pdf) (accessed on 7 May 2018).
11. Levy, D. *Love & Sex with Robots*; Duckworth Publishers: London, UK, 2008.
12. Realbotix. Realbotix Software. Available online: <https://realbotix.com> (accessed on 3 June 2018).
13. Inquirer.Net. ‘Call Me Baby’: Talking Sex Dolls Fill a Void in China. Available online: <http://technology.inquirer.net/72107/call-baby-talking-sex-dolls-fill-void-china> (accessed on 8 May 2018).
14. Nast, H.J. Into the arms of dolls: Japan’s declining fertility rates, the 1990s financial crisis and the (maternal) comforts of the posthuman. *Soc. Cult. Geogr.* **2016**, *6*, 758–785. [CrossRef]
15. Richardson, K. Campaign against Sex Robots. Available online: <https://campaignagainstsexrobots.org/about/> (accessed on 9 May 2018).
16. Ehrenkranz, M. What Our Violent Obsession with Sex Robots Reveals about Us. MIC, 2016. Available online: <https://mic.com/articles/162206/westworld-rape-violence-abuse-sexism-sex-robots-consent-what-it-says-about-us#.JuXeKB3p5> (accessed on 9 June 2018).
17. Darling, K. Kate Darling: Mistress of Machines. Available online: <http://www.katedarling.org> (accessed on 7 May 2018).
18. Cox-George, C.; Bewley, S.I. Sex Robot: The Health Implications of the Sex Industry. *BMJ Sex Reprod. Health* **2018**. [CrossRef] [PubMed]
19. Ferguson, A. *The Sex Doll: A History*; McFarland & Company: Jefferson, NC, USA, 2010.

20. Knox, D.; Huff, S.; Chang, I.J. Sex Dolls—Creepy or Healthy?: Attitudes of Undergraduates. *J. Posit. Sex.* **2017**, *3*, 32–37.
21. Giles, D.C. Parasocial Interaction: A Review of the Literature and a Model for Future Research. *Media Psychol.* **2002**, *4*, 279–305. [CrossRef]
22. Miah, A. A Critical History of Posthumanism. In *Medical Enhancement and Posthumanity*; Gordijn, B., Chadwick, R., Eds.; Springer: Basingstoke, UK, 2008; pp. 71–94.
23. Haraway, D.J. *A Cyborg Manifesto: Science, Technology and Socialist Feminism in the Late Twentieth Century*; University of Michigan: Minneapolis, MN, USA, 2016.
24. Downey, G.L.; Dumit, J.; Williams, S. Cyborg Anthropology. *J. Soc. Cult. Anthr.* **1995**, *10*, 264–269. [CrossRef]
25. Campbell, B. Fields of Post-Human Kinship. In *European Kinship in the Age of Biotechnology*, 1st ed.; Edwards, J., Salazar, C., Eds.; Berghan Books: New York, NY, USA, 2008; pp. 162–179.
26. Buhrmester, D.; Furman, W. The Development of Companionship and Intimacy. *Child Dev.* **1987**, *58*, 1103–1113. [CrossRef]
27. Lin, P.; Abney, K.; Bekey, G.A.; Arkin, R.C. *Robot Ethics: The Ethical and Social Implications of Robotics*; The MIT Press: Cambridge, MA, USA, 2012.
28. Schneer, J.A.; Reitman, F. Effects of Alternate Family Structures on Managerial Career Paths. *Acad. Manag. J.* **2017**, *36*, 830–843.
29. Parreñas, R.S. Mothering from a Distance: Emotions, Gender and Intergenerational Relations in Filipino Transnational Families. *Fem. Stud.* **2001**, *27*, 361–390. [CrossRef]
30. Griffith, J.D. Economy, Family, and Remarriage: Theory of Remarriage and Application to Preindustrial England. *J. Fam. Issues* **1980**, *1*, 479–496. [CrossRef]
31. Duck, S. *Personal Relations 4: Dissolving Personal Relationships*; Academic Press: New York, NY, USA, 1982.
32. Sternberg, R.M. The Plight of Transnational Latina Mothers: Mothering from a Distance. *Migr. Health* **2010**, *2*, 1–4.
33. Riggs, D.W.; Peel, E. *Critical Kinship Studies: An Introduction to the Field*; Palgrave Macmillan: Basingstoke, UK, 2016.
34. Stock, M.J. British Robot Helping Autistic Children with Their Social Skills. Science News, 2017. Available online: <https://www.reuters.com/article/us-britain-autism-robots-idUSKBN1721QL> (accessed on 10 June 2018).
35. Walker, R. Hyperreality Hobbying. New York: The New York Times Magazine. Available online: <https://www.nytimes.com/2005/02/20/magazine/hyperreality-hobbying.html> (accessed on 9 May 2018).
36. White, M. Babies Who Touch You: Reborn Dolls, Artistis, and the Emotive Display of Bodies on eBay. In *Political Emotions: New Agendas in Communication*; Staiger, J., Cvetkovich, A., Reynolds, A., Eds.; Routledge: New York, NY, USA, 2010.
37. Pike, K.L. *Language in Relation to a Unified Theory of the Structure of Human Behaviour*; Summer Institute of Linguistics: Dallas, TX, USA, 1954; Volume 1.
38. Bentley, G.R.; Mace, R. (Eds.) *Substitute Parents: Biological and Social Perspectives on Alloparenting in Human Societies*; Berghan: Oxford, UK, 2009.
39. Riedman, M.L. The Evolution of Alloparental Care and Adoption in Mammals and Birds. *Q. Rev. Biol.* **1982**, *57*, 405–435. [CrossRef]
40. GOV.UK. PM Commits to Government-Wide Drive to Tackle Loneliness. Available online: <https://www.gov.uk/government/news/pm-commits-to-government-wide-drive-to-tackle-loneliness> (accessed on 29 April 2018).
41. PARO. PARO Therapeutic Robot. Available online: <http://www.parorobots.com/> (accessed on 10 May 2018).
42. Intuition Robotics. Elli.Q: Keeping Older Adults Active and Engaged. Available online: <https://elliq.com> (accessed on 6 May 2018).
43. Harlow, H.F. The Nature of Love. *Am. Psychol.* **1958**, *13*, 673–685. [CrossRef]
44. Walters, M.L.; Syrdal, D.S.; Dautenhahn, K.; Boekhorst, R.T.; Koay, K.L. Avoiding the Uncanny Valley: Robot Appearance, Personality and Consistency of Behaviour in an Attention-Seeking Home Scenario for a Robot Companion. *Auton. Robot.* **2008**, *24*, 159–178. [CrossRef]

45. Holt-Lunstad, J.; Smith, T.B.; Layton, J.B. Social Relationships and Mortality Risk: A MetaAnalytic Review. *J. PLoS Med.* **2010**, *7*, e1000316.
46. Lefever, S.; Dai, M.; Matthíasdóttir, A. Online data collection in academic research: Advantages and limitations. *Br. J. Educ. Technol.* **2006**, *38*, 574–582. [[CrossRef](#)]



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