

Anticipating Family Automation: Public Imaginaries of Robotic Surrogacy and Co-Parenting

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ABSTRACT

Humanoid robotics is moving from industrial and service settings into intimate domains of family life, making robotic surrogacy and robotic co-parenting plausible but morally contested futures. This paper examines how prospective users perceive the potential role of humanoid robots in reproduction and parenting, focusing on perceived barriers, anticipated consequences and ethical dilemmas. The study is based on a multi-method qualitative design, including 40 AI-assisted interviews and four face-to-face focus groups. Data were examined using thematic analysis grounded in ethics of care and attachment theory. Findings reveal a conditional openness to robots as functional assistants, such as offloading repetitive childcare tasks, contrasted with profound moral resistance to relational substitution. We identify a critical red line where automation transitions from supportive assistance to a human identity threat zone where the potential dehumanisation of foundational parent-child bonds leads to technology resistance. We propose that resistance is concentrated where robotic mediation is perceived to substitute for, rather than augment, primary human attachment relationships. We contribute an attachment-grounded framework by showing that adoption of intimate robotics depends not only on technical feasibility or perceived usefulness, but on whether future users locate robots within a utility zone or a relational substitution zone.

Keywords: Robotic surrogacy, Robotic parenting, Attachment theory, Human-Robot interaction, Robot ethics, Surrogacy ethics

1. INTRODUCTION

The growing demand for humanoid robot technology across industrial, service and domestic settings has driven a step-change in their development and projected diffusion (Tong et al., 2024; Fosso Wamba et al., 2023; Shamsuddoha et al., 2025), with the global humanoid robot market forecast to grow at a 17.5% compound annual rate towards USD 4 billion by 2030 (The Research Insights, 2025). Humanoid social robots are increasingly piloted in eldercare and nursing-home contexts, where they support residents and complement human carers (Odekerken-Schröder et al., 2020), and in everyday family life, where AI-enabled domestic assistants are moving beyond voice-based interaction devices into agentic, parenting-adjacent products that schedule routines, monitor children and engage in extended conversational care (Yamaguchi, 2020; Levinson et al., 2022; Ho et al., 2024).

Recent developments on humanoid robotics have brought the idea of robotic surrogacy (robots designed to gestate human offspring) into public discussion. The topic gained renewed visibility when Chinese researchers announced a humanoid robot prototype designed to simulate pregnancy and support infertile families (Baig, 2025). The so-called surrogate robot is framed as offering safer reproductive pathways for individuals with medical risks, LGBTQ+ couples, and single parents, while also reducing complications such as preeclampsia and preterm birth (Singh et al., 2022). While promising to eliminate many risks associated with traditional pregnancy and surrogacy, these promises remain entangled with ethical, legal, and social concerns about the meaning of motherhood, and the role of human emotion in parenting and family formation (Rashid et al., 2024).

We adopt an ethics of care lens because debates about robotic surrogacy hinge less on the technical feasibility of automated gestation than on contested judgements about whose bodies, labour and emotional commitments may legitimately be substituted by a machine (DeFalco & Dolezal, 2023; Veysey, 2024). Robotic surrogacy also introduces concerns about access and equity, if accessible only to the elite, exacerbating existing health and

socioeconomic disparities (Singh et al., 2022). Robotic surrogacy therefore belongs to a broader family of morally contentious biotechnologies in which scientific innovation, public morality and market legitimization intersect (Cole & Banerjee, 2013).

Existing research also identifies important ethical and legal concerns surrounding adoption of social robots. Privacy and security are frequently cited, because many domestic robots are equipped with data-intensive sensing systems like cameras and microphones (Ho et al., 2024). More broadly, loss of privacy and perceived threats to human identity have emerged as key barriers to the adoption of social robots. In the case of robotic parenting and surrogacy, these concerns may intensify in domestic contexts, where intimate data are exposed and technologies may be perceived as displacing roles traditionally understood as uniquely human (Sindhwani et al., 2024). An experiential ethics perspective further suggests that everyday encounters with AI and robots surface ethical tensions that formal policy debates often understate, such as discomfort with opacity, the introduction of invisible labour, shifting responsibility and blame, and the willingness to exchange privacy for convenience or benefit (Fischer & Frennert, 2025).

These issues are particularly salient in family settings, where parenting technologies may normalise new forms of dependency and responsibility transfer over time. Humans' capacity to form affective bonds with artificial agents renders the idea of robotic parenting plausible. Anticipated social robotic futures include them becoming companions, carers and family-like figures (Nourbakhsh, 2013). Children or care recipients may respond to robots as parental or nurturing figures, especially when robots display social cues like empathy, warmth, and responsiveness (DiGioia, 2021). Conversely, scholars have raised concerns that children may overuse robots or come to prefer them over peer interaction and outdoor play (Bryson & Bogani, 2021). We use attachment theory as a useful lens to analyse the robotic parenting implications as the theory specifies the caregiving conditions that can produce secure versus insecure relationship outcomes. Its emphasis on the criteria for evaluating whether a robot is imagined as a legitimate secondary support or as an illegitimate substitute for a primary

attachment figure in potential users' imaginaries (Bowlby, 1969; Ainsworth et al., 1978; Raikes et al., 2019).

This study aims to contribute to the challenges of forecasting how robots will be used in more intimate settings of human relations by examining how people perceive the role of robots in reproduction and parenting. We address the following questions: (1) How do contextual, ethical, and relational factors shape the line between functional assistance and relational substitution in robotic surrogacy and co-parenting, driving conditional adoption or moral resistance? and (2) How do prospective users distinguish robotic mediation in caregiving and gestation that augments human attachment from mediation that is perceived as substituting it?

This study makes four contributions. First, we extend research on technology adoption in ethically contested domains by showing that resistance to humanoid robots in family life is not generic technophobia, but a context-sensitive defence of attachment bonds, responding to growing calls toward interdisciplinary research to inform technological change (Li et al, 2026). Second, we extend attachment theory by specifying when a robotic agent is imagined as a legitimate secondary caregiver and when it is rejected as an illegitimate substitute primary attachment figure, thereby delineating the boundary conditions of an extended attachment account (Raikes et al., 2019). Third, we develop the concept of the human identity threat zone, a framework that maps the spectrum from functional assistance to relational substitution and identifies the moderators that shift this boundary, providing a forecasting tool for technology developers, policymakers and bioethicists working at the intersection of humanoid robotics and intimate family life. Finally, we provide a research agenda of unresolved issues that require further investigation as the field of humanoid robots continues expanding towards more intimate human settings.

2. LITERATURE REVIEW

2.1. Robot Surrogacy and the Ethics of Care

Surrogacy, particularly gestational surrogacy, raises ethical concerns around dehumanisation, exploitation, and the commodification of human reproduction. Commercial surrogacy involves hiring a woman to carry a pregnancy for another individual or couple, a practice known as Womb as a Service (WaaS) (Tsang, 2025). Critics argue that commercial surrogacy often exploits socioeconomically vulnerable women by transforming reproductive labour into a service for wealthier, often foreign, commissioning parents (Rashid et al., 2024). However, from an ethics of care perspective, these debates cannot be reduced to questions of consent, contract, or commodification alone. Care ethicists argue that surrogacy is a profoundly relational practice in which gestational labour is inseparable from affective ties, embodied vulnerability, and the moral attentiveness that one body extends to another (Krause, 2017). Banerjee and Sharma (2023) show that policy debates which sever the affect–care–labour link in gestational surrogacy distort the moral reality of the practice, treating surrogates either as selfless gift-givers or as exploited workers, while overlooking the relational care work that constitutes the pregnancy itself. Empirical reviews similarly show that surrogacy arrangements are characterised by ongoing negotiations of intimacy, trust, and responsiveness between surrogates, intended parents, and the future child, and that these relational dynamics, rather than the transactional frame alone, can shape whether the arrangement is experienced as ethically tenable (Gunnarsson Payne et al., 2020).

The ethics of care provides a normative framework that locates moral value in the responsiveness, attentiveness, and competence of care relations rather than in abstract universal principles (Tronto, 1993; Held, 2006). Tronto (2013) identifies several phases (caring about, caring for, care-giving, care-receiving and, more recently, caring with) that frame care as a temporally extended practice in which moral adequacy is judged by the quality of the relationship that unfolds between the one who cares and the one cared for. Applied to

reproduction, this lens reframes surrogacy not as a discrete service transaction but as a sustained practice of bodily and emotional accompaniment, emphasising the surrogate's situated knowledge, the commissioning parents' obligations of attentiveness, and the relational welfare of the future child. The ethics of care therefore complements macro-ethical critiques of commodification by providing the conceptual vocabulary needed to evaluate the micro-level relational nuances through which surrogacy is morally lived (Krause, 2017; Banerjee & Sharma, 2023).

Regulatory asymmetries across countries continue to push demand across borders, creating uncertainty around parenthood, citizenship, and the rights of children born through such arrangements (Horsey, 2024; Marinelli, 2024; Valc, 2025). Recent ethical guidance also emphasises that surrogacy debates cannot be reduced to a simple permissive versus prohibitive divide, but must account for the welfare, consent, and sometimes conflicting interests of surrogates, intended parents, and children (Shenfield et al., 2025; Zadykowicz et al., 2025). These tensions become even more complex when reproduction is imagined through technology rather than exclusively human bodies. DeFalco and Dolezal (2023) examine technological gestation and robot childcare by questioning how effectively technology can replace the "maternal" touch, suggesting that the projected and imagined technologies assume a biocentric model of the human that overlooks relationality.

In the context of robot surrogacy ethical tensions arise over questions of motherhood and identity, as distinctions between genetic, gestational, and social parenting complicate normative concepts of family and maternal responsibility (Rashid et al., 2024). Surrogate robots amplify consumer and cultural anxieties about collapsing boundaries between the "natural" and the artificial. If machines can simulate pregnancy or provide reproductive assistance, the ethical landscape of family-making will be fundamentally changed (Seetharaman, 2025). AWT also introduces ethical dilemmas about access and equity. If

artificial wombs become a costly solution accessible only to the elite, they risk exacerbating existing health and socioeconomic disparities (Singh et al., 2022).

Concerns about “designer babies,” eugenics, and the technologization of reproduction, have long circulated through science fiction and critical scholarship. Robotic surrogates are frequently depicted in media as morally fraught, disposable labour linked to capitalist exploitation and the displacement of human caregiving (Eberl, 2010; Vint, 2020). In “*I Am Mother*”, the maternal machine becomes an all-encompassing AI that disregards human suffering as collateral damage in its mission to facilitate human species survival (De Falco, 2025). *Blade Runner 2049* symbolizes robotic surrogacy as both hope for artificial life and existential threat to human supremacy, reflecting deep-seated fears about technological autonomy (Knight & McKnight, 2008). Similarly, *Alien: Covenant* casts the artificial surrogate mother as monstrous, intertwining queer-coded villainy and reproductive transgression to critique perceived violations of the “natural” order (Creed, 1993; Piluso, 2023). Fuelled by these narratives, assisted reproductive technologies including artificial wombs and cyborg maternal figures are embedded in patriarchal, heteronormative, and technophobic discourses (Veysey, 2024). In this sense, representations of artificial reproduction do not only reflect social anxieties but also shape how emerging technologies are interpreted in relation to bodies, social change, family life, and ethics.

However, a critical gap remains in the extant literature: while scholars have extensively debated the macro-ethical dimensions of reproductive labour and market legitimization, there is a lack of enquiry into the micro-level relational dynamics. Current discourse remains largely biocentric, focusing on the artificiality of the womb while overlooking the relationality involved in a robot-surrogate. Crucially, although the ethics of care has been productively mobilised to evaluate carebots in elderly and disability contexts (Chan, 2020; Yuan, Coghlan, & Lederman, 2023), it has not yet been extended to the case of robotic surrogacy and co-parenting. This omission matters for three reasons. First, care ethics offers the most developed normative vocabulary for capturing the attentiveness, responsiveness, and embodied responsibility that

distinguish reproductive caregiving from other forms of service delivery and is therefore uniquely suited to interrogating whether a non-human agent can plausibly occupy that role. Second, without such a lens, public and policy debate risks defaulting either to a techno-optimistic functionalism (i.e., the robot 'works', therefore it is acceptable) or to essentialist rejection (only human bodies can care), neither of which clarifies the conditions under which delegation might be morally tenable. Third, applying care ethics to robot surrogacy makes visible the asymmetries of vulnerability, dependence, and power that any caregiving arrangement carries. These asymmetries can otherwise be obscured when the analysis stops at the womb itself. Addressing this gap is therefore crucial for any credible evaluation of robotic surrogacy that can inform design and policy. The next section introduces Attachment Theory as a complementary theoretical lens to evaluate how technological mediation can reconfigure the foundational, intimate relationships of the family unit.

2.2. Robotic co-parenting and attachment

Attachment theory offers a useful lens for examining robotic co-parenting because it specifies the relational conditions through which infants and children develop security, trust and expectations of care. The attachment bond formed between an infant and their primary caregiver is widely understood to lay the foundation for later personality development, mental health, and patterns of intimacy and commitment in adulthood (e.g. Bowlby, 1969; Ainsworth & Bowlby, 1991; Schore & Schore, 2008). During early childhood, attachment is primarily unidirectional, as caregivers offer nurturing and protection without anticipating reciprocity. In contrast, adult attachment relationships are typically characterised by mutuality, where both individuals provide and receive emotional support (Ainsworth, 1978; Hazan & Shaver, 1994). For the purposes of this study, the most relevant insight is that secure attachment depends less on biological status alone than on caregiving that is experienced as sensitive, available, consistent and predictable (Bowlby, 1969; Ainsworth et al., 1978).

This distinction matters because the assumed natural link between giving birth and immediate attachment has been questioned in recent research. Suarez et al. (2022) discuss mothers of premature infants were initially not feeling like parents and their parental identity strengthened as they became more involved in caregiving. In a similar context, Valiaho et al.'s (2023) study demonstrates the importance of parent-infant closeness and parental participation in infant care as essential elements enhancing parent-infant bonding. Research on foster care also shows that children can form secure attachments with carers beyond the biological parent, including in later childhood and adolescence (Fernandez, 2009; Joseph et al., 2014; Sprecher, 2023). Raikes et al. (2019) challenged the primary assumption of attachment theory that nonparental caregiving would disrupt the primary mother-child attachment bond, based on the assumption that maternal attachment formed the basis for all subsequent attachments. Instead, they frame an extended attachment theory that explains how children can form secondary attachments with nonparental caregivers, if the caregiving is sensitive, contingent, consistent, and predictable (Raikes et al., 2019).

Attachment figures of humans may change over time, with various figures being able to fulfil people's attachment needs (Hazan & Shaver, 1994). This evolution also implies that robots could be attachment figures over the course of human development, just like siblings taking over this role when necessary. This extended view creates an important opening for analysing robotic caregiving as attachment is not limited to living beings (Wan & Chen, 2021). As robotic agents become more socially interactive and emotionally intelligent, humans are increasingly forming attachments to them (Odekerken-Schröder et al., 2020). The attachment to robotic agents is shaped by not only social attributes (e.g., interactivity, natural speech, aesthetics) and technical attributes (e.g., accuracy, connectivity, personalisation) of the agent but also the social and technological anxiety humans experience (Kang et al., 2024), especially when bonding with care-capable agents in domestic life. For example, Deng et al. (2024) show that social anxiety can shape preference for AI where interpersonal evaluation feels threatening.

With advanced AI, robots can simulate social behaviours that lead humans to perceive them not just as tools, but as surrogate family members (Jiang et al., 2025; Krämer et al., 2025; Robertson, 2007). Participants reported higher attachment when the robot was role-playing as a caregiver rather than the receiver (Kim et al., 2013) or when they were more proactive than their counterpart (Youssef et al., 2015). Randall et al. (2019) demonstrated that individuals consistently view robots as a source of companionship, with many likening it to a family member or loved one. Weiss et al. (2009) pointed out that grown-ups are more sceptic towards these intense relationships with robots while for children positive emotions lead to longer and more intense interaction with robots. Consistent, long-term interaction with robots can foster trust and emotional bonds, much like the caregiving that builds secure attachments in child development (Ainsworth et al., 1978; Bowlby, 1969). The controversy around robot-assisted childcare is fundamentally about interference with the child–caregiver attachment bond, which attachment theory treats as the foundation for later personality, mental health, and intimate relationships.

The controversy around robot-assisted childcare therefore centres on the difference between secondary support and primary substitution. Philosophical accounts of childcare robots suggest that when a parent delegates everyday nurturing to a machine, the child may interpret this withdrawal of time and presence as evidence of diminished love, regardless of how warm or ‘fatherly’ the robot appears (Ho, 2022). Even when caregivers genuinely believe that a robot could provide superior care, critics argue that -unless there are compelling constraints- loving parents have a moral obligation to improve their own caregiving rather than delegate it, reinforcing the view that robots may assist but cannot fully replace human parents (Ho, 2022). Petters et al. (2010) argue that robots are unlikely to serve as competent primary attachment figures even if they provide routine supervision and care. Attachment-like security continues to centre on human carers, and it is the perceived availability and responsiveness of these human figures (not the robot’s performance) that will primarily determine whether children develop secure or insecure attachment patterns (Petters et al., 2010). Although children

readily form apparently genuine bonds with interactive robots, Sharkey and Sharkey (2020) contend that current systems lack the nuanced, context-sensitive responsiveness needed for secure attachment, so extended or near-exclusive robot care risks insecure or even pathological attachment patterns and may need to be treated as a form of neglect rather than a benign substitution of labour.

From a family-systems perspective, a social robot effectively becomes part of the household system, influencing and being influenced by parenting practices, family rituals and values, which suggests that robot caregiving is likely to reconfigure existing attachment relationships within the family rather than simply adding a neutral extra carer (Cagiltay et al., 2023). Likewise, Rabb et al (2022) argue that people may form attachments to non-human figures when human attachment figures are perceived as unreliable, unavailable, or insufficient. However, robot carers are ultimately embedded in corporate incentive structures rather than in caregiving instincts, which may further undermine children's and parents' sense that these agents are truly committed attachment figures (Bryson & Bogani, 2021). Robotic co-parenting should be understood as a possible reconfiguration of attachment roles, caregiving responsibility and family boundaries. This provides the conceptual basis for examining when prospective users interpret robots as acceptable secondary supports and when they reject them as illegitimate substitutes for primary human attachment relationships.

3. METHODOLOGY

3.1. Research Design

We adopted a multi-method qualitative approach via online interviews and in-person focus groups with pre-determined cohorts. We used AI-enabled interviewer MimiTalk developed by the Generative AI for Research Initiative (GAIForResearch, n.d.). We chose this multi-method, AI-mediated qualitative design for three reasons. First, robotic surrogacy and co-parenting are anticipatory phenomena, as few prospective users have direct experience with the technology, so an interview format that elicits imaginaries and moral reasoning is appropriate (Vila-

Henninger et al., 2024). Second, the topic is intimate and potentially stigmatising, therefore speaking to a non-human interviewer can reduce social desirability and embarrassment when participants disclose private reproductive or relational preferences (Chopra & Haaland, 2023). Existing evidence also suggests that AI-enabled interviews can produce comparable information entropy and semantic coherence to human-led interviews (Liu & Yu, 2024). Third, combining AI-mediated interviews with in-person focus groups enabled methodological triangulation. Interviews maximised breadth and anonymity, while focus groups surface argumentation, disagreement and collectively negotiated moral positions that mirror different groups (students, parents, middle-aged people without kids, and older adults) are likely to evaluate these technologies in practice (Terry et al., 2017). Before data collection took place, the study received ethical approval from [EDITED TO ENSURE ANONYMITY]. Data collected via interviews and focus groups was later analysed by using thematic analysis.

3.2. Sampling

We conducted 40 online automated interviews with UK-based adults recruited via the Prolific platform. Compared to alternatives, Prolific Academic produces higher data quality and a much more diverse participant pool (Peer et al., 2017). Participants were compensated in accordance with the suggested wage at the time of data collection. Interview participants ranged from 19 to 80 years old, with an average of 44 (the average age in the United Kingdom is 40.5 years old as of 2024). Gender distribution was 21 female participants and 19 male participants. To identify participants for the focus groups we used purposive sampling, in particular maximum variation (Palinkas et al., 2015) to gather different perspectives on the potential adoption of humanised robots within surrogacy and co-parenting roles.

In the next round of data collection, we conducted four in-person focus groups with students, parents, middle-aged people and older adults. All focus group participants were UK residents and were recruited via social media and physical flyers. There were 15 female participants and 7 male participants in total, with a balanced gender distribution across groups. The

average age was 42 years old. (Appendix 1 Table 1 and 2 provide a summary of the demographics of participants in the online interviews and focus groups with pseudonyms to protect the identity of participants.)

3.3. Data Collection

Before starting the interview and the focus groups, all participants provided informed consent. Following a pilot in January 2025, the interviews were conducted in February 2025 and lasted an average of 24 minutes. Focus groups were conducted in-person on university grounds between March - November 2025. In total, the four focus groups lasted 6 hours and 14 minutes with an average duration of 1 hour and 33 minutes. To set the scene, two scenarios related to robots as surrogates and robots as co-parents were introduced to participants (see Appendix 2). The focus groups were recorded and transcribed with Otter.ai. The transcripts were then manually verified for accuracy by a member of the research team.

3.4. Data Analysis

The data from both the online interviews and the focus groups was analysed by using thematic analysis (Terry et al., 2017) by two of the authors to ensure validity. We used NVivo software to help with the coding process and theme development. The analysis involved an iterative process of data immersion, systematic coding by two coders, and theme development. This method was selected for its theoretical flexibility, allowing for a rich and detailed account of the data that also considers the researcher's active role in knowledge production. The coding adopted an abductive approach, a research strategy that starts from surprising or puzzling observations and seeks the most plausible explanations for them. Rather than strictly testing existing theories (deduction) or building theory solely from data (induction), abduction moves back and forth between empirical evidence and theory. Researchers use this iterative process to refine concepts, generate new theoretical insights, and develop explanations that best account for both the observed data and relevant theory (Vila-Henninger et al., 2024). In line with Braun and Clarke (2019), the thematic process aimed to identify both semantic and latent

meanings related to our research questions. The following section presents the findings and discusses them in relation to the existing literature.

4. Findings and Discussion

4.1. Forecasting benefits of using robots for surrogacy and co-parenting

Our study shows that there is a relative acceptance of the introduction of this new technology in the context of assisted reproduction and child rearing. Some participants argued that surrogate robots are an evolution of IVF technologies and the use of incubators:

“... we do various methods now IVF and the like to help nature along so yes thinking ahead why wouldn't we use technology to help grow a baby so to speak yes form a surrogacy so it's certainly something that's interesting to think about”. (Sergi, 65, HS)

“I suppose we already do IVF... We put premature babies in an incubator, so .. the lines are kind of blurred anyway”. (Mary, 42, PG)

Research suggests that surrogate robots could possibly support infertile families, alleviate loneliness, and extend reproductive possibilities (Seetharaman, 2025). By building on the foundations laid by assisted reproductive technologies (Meseguer et al., 2012), humanoid surrogate robots are framed as potentially making reproduction more accessible, inclusive, and medically controlled (Seetharaman, 2025). Some participants highlighted some of these benefits, especially in relation to helping same-sex couples to have a child as well as for women who experience complications affecting their ability to complete a full-term pregnancy:

“I think if the artificial intelligence were that advanced, growing a baby up to full-term, it could be extremely beneficial for people who cannot have babies, maybe they have healthy eggs, but their body isn't able to carry a baby. I think it would be a strange but kind of magical thing to be able to have your own baby without the need of a surrogate. I think that would be kind of amazing” (Naomi, 37, HS)

In line with some feminist scholars (e.g., Corradi, 2020), who consider surrogacy as a form of reproductive agency, one participant claimed that robot surrogacy would be beneficial not only to women who cannot have children but also to women who do not want to go through the often hard experience of childbirth:

“I think this could be beneficial as some mothers do not want to go through the birthing process because it's quite traumatising and can lead to long lasting effects on them, which I understand and can be very mentally challenging. So, I think this could be a great concept”. (Arantxa, 19, HS)

Although nearly half of the participants were reluctant to the idea of robot surrogacy, some reported they would consider having a humanoid robot to help with parenthood chores:

“I definitely wouldn't want a robot to carry my baby, but if I was to have a kid and I was struggling with things like homework, packing the bags, changing nappies, emotional support, then I probably would use a robot or I'd consider it” (Israel, 25, UG)

Many participants emphasized that a robot co-parent would be particularly helpful for single parents. For instance:

“I think helping with single parents would be really good because sometimes, as a single parent, I've been one, you come across questions, self-doubt, and I think having the robot there just to let you know that you're doing something right, or maybe doing something wrong, would be good”. (Gissele, 45)

Following this line of argument, other participants also pointed out that a co-parent robot would be useful to provide emotional support to parent in relation to children's education:

“I definitely believe that the idea of having a robot support parental decisions and that kind of thing, help with the children would be very useful. More for like the whole helping with the knowledge aspect or having someone to talk to when you're worried about your kids”. (Emily, 25, UG)

Most participants were inclined to accept humanoid robots to help with household chores and helping children with their homework. This is line with current research that shows that the use of learning companion robots for young children is increasingly adopted within informal learning environments (Ho et al., 2024). Ho and colleagues (2024) argue that if robots take care of repetitive task, such as reading the same story multiple times, would allow parents to focus on more personalised interactions with their children. Likewise, some participants highlighted that using robots to support with practical parental chores, such as cleaning, cooking and helping children with their homework would allow parents to work more or to free time to spend more quality time with their children, for example: *“I think if a robot can fulfil practical parental responsibilities to leave a human parent free to do the emotional work which is arguably even more important”* (Helena, 52, HS). Analysed through the lens of care ethics, this pattern of acceptance is notable: endorsing robotic involvement in what Tronto (1993) calls the earlier phases of care (caring about by noticing the need, and caring for by assuming responsibility for tasks) but stop short of the later phases of care-giving, care-receiving and caring with, unless in very specific cases. For example, a few participants also mentioned that humanoid robots could serve as co-parents and fulfil some emotional needs from children who do not receive enough love from their parents:

“I think overall it may be better for the child to have parental love from a robot than to have no parental love at all and if it means that single parents can be supported then they can give their child a better environment to grow up in and I think that could be very beneficial as there are a lot of kids at the moment that aren't getting parental love” (Carmen, 20, HS).

As observed by DiGioia (2021), children may interact with robots as parental or nurturing figures if they provide social cues like empathy and warmth. It appears that the openness towards humanoid robots in these settings are influenced by paradoxical expectations consumers hold toward them, where the desire for human-like intelligence is often offset by technology anxiety regarding relational intrusion (Zhu et al., 2023). The issue of children

potentially bonding with co-parent robots and its negative effect on the emotional attachment with their biological parents will be discussed in section 4.3. The next section discusses the main concerns surrounding robot surrogacy and co-parenting, that may hinder their widespread adoption.

4.2. Ethics of robot surrogacy

There was an ethical polarisation surrounding robot surrogacy in our data. Despite the potential benefits of robots in supporting gestation and parenthood highlighted in the previous section, we identified opposing views towards robot surrogacy and co-parenting, especially among younger participants, there were a few participants who claim that they did not agree with surrogacy in general, while others were specifically against robot surrogacy in particular:

“I would not at all consider having a robot to support me. If I am healthy and well enough to carry a child, I will be doing it myself. If I'm not, I'll explore other options in terms of, I don't know, surrogacy, things like that. If that doesn't work out, I would adopt a child. There is no way that I would be using a robot to grow my child. Also, no, just absolutely no way. Absolutely no way. This is actually crazy. (Cecile, 24, UG)

By contrast, Kristina (65, PG) voices a more permissive, harm-based stance, willing to endorse robotic gestation providing there are no scientific or medical risks: “Providing there are no scientific or medical reasons why it's unsafe, it seems like a really excellent idea. I don't see any problems with it ethically”. This split mirrors the broader surrogacy debate, where some frame surrogacy in terms of autonomy and reproductive choice, while others foreground exploitation, commodification and threats to the integrity of motherhood and family (Rashid et al., 2024).

The exploitation concerns are especially visible in the way some participants contrasted robot surrogacy with human surrogacy. They treat robot womb as the less harmful option amongst assisted gestation because it does not expose another woman's body to risk or potential

coercion. Some participants explicitly struggled with the morality of using a human surrogate before concluding that an artificial womb would feel more acceptable, since it avoids placing emotional and physical burdens on a third party and keeps pregnancy “within parents”:

“I think that (surrogacy) is breaking some natural rules, and instead of having a mom surrogate, I think that this scenario (robot surrogacy), for me, looks a bit more acceptable, because when you grow a baby in a womb, then that connection will be forever for both mom and child. So instead of having that break, because the surrogates will give the babies, and then, with nobody has any studies how that person is behaving long term, was the impact nobody did, at least I didn't see any of them.”
(Lorena, 39, PG)

“... but instead of using a surrogate and pushing on what to eat, what to do, how to move, I don't know so many things that you hear about, and hear lots of the stories you have that thing in your home, and you're seeing the child develop. It's both you and your husband. You're not intervening with anyone's life. That's brilliant.” (Aurora, 50, PG)

Lorena and Aurora imagine robot surrogacy as a way to reap the benefits of assisted reproduction without enlisting another woman's body as the site of contractual labour. For these participants, the key advantage of robot surrogacy lies in eliminating the embodied vulnerability and emotional risk placed on human surrogates. This maps onto feminist critiques of commercial surrogacy as the “outsourcing” or “rental” of a womb that transforms economically disadvantaged women into reproductive workers for wealthier clients (Rashid et al., 2024). Some participants explicitly linked these issues to transnational surrogacy markets in the global South, echoing concerns about reproductive outsourcing and stratified reproduction (Kessler, 2009):

“I'm going back to my global south countries, where a lot of women do this task, and they are doing it out of compulsion, because it's a lot of money, yeah, and they do it.

But then when you carry a child for nine months, you do get emotionally attached and but your family forces you to do it, so you do it. So, there are a lot of emotional stuff that goes on there, and many women, they really lose it". (Astrid, 59, PG)

These accounts are striking from a care-ethics standpoint because they invert the usual reading of robot surrogacy as a displacement of human care. For some participants (Lorena and Aurora), the robotic womb is preferable precisely because it removes the asymmetric vulnerability that surrogacy imposes on a third caregiving body, echoing care-ethics concerns about the power and dependency asymmetries embedded in any caring arrangement (Krause, 2017; Banerjee & Sharma, 2023). Yet, as the subsequent quotes show, the same participants withdraw their support once the robot is imagined occupying a relational rather than purely gestational role. Care ethics helps explain this apparent contradiction: what is being protected is not the human womb as such, but the moral integrity of the caring relationship, removing one source of relational harm (surrogate exploitation) is acceptable, whereas substituting the relational practice itself with a non-human agent is not.

Other participants expressed their concerns of robot surrogacy through a precautionary lens, focusing on the experimental status of such technologies and the moral costs of testing them on future children. Several worried that unknown side-effects and failures and framed this as unacceptable even when they acknowledged the medical potential of artificial wombs. This language of experimentation and harm dovetails with broader concerns about AWT as a site where scientific ambition may outpace ethical oversight, with unknown long-term consequences for gestated children (Graham, 2002; Savona-Ventura & Grech, 2014). While legal and bioethical debates highlight children's rights to health and identity (Van Oosbree & Von Wald, 2023), our participants emphasise a more intuitive form of the precautionary principle: if a procedure is still "in testing", it is wrong to expose future babies to it.

"...Testing that these robots are gonna have to go through and also to be able to know if they could carry a baby, that's unethical, because what's happened to these babies,

it's just like it's just harming them, whereas you know that through like, surrogacy, the baby's gonna be okay. Or, like, whether it's adoption or you know that baby isn't being harmed by a test, the process is still in testing". (Olaya, 23, UG)

Beyond the clinical risks, the possible adoption of robotic surrogates is hindered by a perceived human identity threat, as the automation of gestation is viewed as an intrusion into a uniquely human domain that risks collapsing the boundaries between the 'natural' and the artificial (Sindhvani et al., 2024; Chang et al., 2023). In addition, child-centred ethics also surfaced in worries about origins, kinship and the "right" family form. Lina, who identified as being in a same-sex marriage, drew on her own deliberations about assisted reproduction to question where eggs and sperm would come from, whether donors would be known, and how this would affect the child later on.

"...So, where's the egg coming from? Does the baby have to know the father, or know the mother, or, you know? So those are things. For me, it's not the, in a way 'it's a machine', although is only that one thing that we can do right now? But for me, it's more that kind of the impact on the child later." (Leticia, 55, UG)

Bioethical discussions increasingly recognise a child's interest in knowing their genetic and gestational origins and in having access to stable caregiving relationships (van Oosbree & Von Wald, 2023). Our participants extend this concern into the robotic domain, questioning not only who supplies the gametes but also whether it is just for affluent would-be parents to use robots as a route to parenthood that sidesteps relational commitments to other adults, in line with the study conducted by Singh et al. (2022). Thomas framed robot-enabled solo parenthood as an indulgent choice that infringes upon the child's presumed right to a "proper" family structure:

"For very selfish reason, reasons someone can decide, 'oh, I want to have a child, but I don't want to bother with a relationship with somebody else, and I just want to buy a robot because I can afford it'. But, and as a previous case, again, you are infringing of

the rights of the child. You know, the child to have mother, and to have a parent and you know, who is going to take the role of some other. So, I think again, it this is, this is probably the one that, yeah, caused me most concerns, ethical concerns, because the fact that somebody is taking that right, natural right, from a child that way, I think that is makes it quite unethical to me". (Thomas, 55, UG)

These intuitive moral objections reflect ethical frictions among participants, such as discomfort with the opacity of robotic decision-making (Fischer & Frennert, 2025). In line with existing literature, some aspects of reproduction (i.e., reducing medical risk) may legitimately be technologized, while the relational and identity-defining aspects of pregnancy and parenting raise deeper ethical questions (Veysey, 2024).

4.3. Breaking the parent-child bond

From an attachment theory point of view, the recurrent objections raised by participants included elements of replaceability, absent reciprocity, opaque caregiving, and a fear that the child will form a primary bond with the wrong figure, these fears map directly onto failures of the sensitive, contingent, consistent and predictable caregiving on which secure attachment depends (Bowlby, 1969; Ainsworth et al., 1978; Raikes et al., 2019). In intimate contexts such as co-parenting, humanoid robots may be perceived as creepy or unsettling rather than supportive, because their near-human appearance can trigger discomfort explained by the uncanny valley theory (Kim et al., 2022). Many participants described that surrogacy carried out by humanoid robots as well as co-parenting would be weird.

Safety issues in childcare were also highlighted by some participants, claiming that "robots could become violent or dangerous" (Kristina, 65F) due to malfunction, which could potentially harm children. Other potential negative outcomes included unknown psychological effects on children engendered or reared by robots, as discussed in the previous section, as well as lack of proper parental guidance by co-parent robots as compared to human parents. However, the main concern raised in both interviews and focus groups was related to the disruption of

the child-parent bond. Findings suggest that introducing humanoid robots into intimate domains like pregnancy and co-parenting may disrupt, weaken, or replace core human-to-human connections, in this case, the child-parent connection. It implies a concern that reliance on robots could reduce emotional reciprocity, empathy, and shared responsibility between people, potentially undermining trust, attachment, and the relational processes that traditionally sustain child-parent bonds. For example:

“A negative could be that you could potentially move away that natural bonding that a female would have given birth, natural birth. There is a bond there that I don’t believe can be produced so that would not be there. I’m pretty sure that’s the case”. (Sergi, 65, HS)

Participants repeatedly anchored their objections in the idea that supposedly natural pregnancy in human womb and consecutive early caregiving generate a unique, irreplaceable bond between mother and child. These perspectives echo classic attachment theory’s emphasis on early caregiver-infant interactions as foundational for later socio-emotional development (Bowlby, 1969; Ainsworth et al., 1978). Yet empirical work shows that secure attachment can form in diverse configurations, including premature infants in intensive care and non-parental caregiving (Suarez et al., 2022; Raikes et al., 2019), so our participants’ view draws a sharper line between gestational experience and the real bonding than contemporary attachment research, which increasingly distinguishes biological maternity from relational caregiving.

A second cluster of concerns focused on the possibility that co-parent robots involved in daily care, would displace human parents as primary attachment figures. Several participants worried that children would come to see the robot, rather than their human carer, as their real parent:

“My only concern would be that the child would, maybe small children, will do this, they would begin to think that that was their parent and that could take away from the emotional bond that a child has with its human parent.” (James, 74, PG)

“It can create some sort of misalignment when it comes to attachment between the robot and the child. Growing up, the child can sort of see the robot more as a parent, just because they've been taught more by them rather than their own parents. This can cause a lot of chaos in the future.” (Penelope, 21, UG)

The fear that robots might displace human parents as primary attachment figures could further exacerbated by the fact that adult humans are increasingly forming functional and emotional bonds with AI based on their technical accuracy and interactivity (Kang et al., 2024). The fear is not only that robots might fail as carers, but that they might succeed too well in eliciting infant affection, assuming a zero-sum model of attachment. Overall, they assumed that a strong bond with a robot will take away from the bond with human parents and distort children's internal working models of what counts as a real authentic relationship. This view sits uneasily alongside extended attachment accounts in which children can maintain multiple secure attachments with nonparents if the caregiving is consistent and sensitive (Raikes et al., 2019).

Several participants drew analogies between robot co-parents and the practices in outsourcing childcare to servants or nannies in the past: *“... it's not that much different from, you know, children being raised by the servants in the past. And that obviously then led to the difficulties in having close relationships with their actual parents.” (Theo, 46, UG)* as well as a negative perspective in case of losing the bond:

“It's like that with nannies? Like children go very attached, you know, and they invite them to their weddings and graduation. What happens if the robot is not longer needed? Are we just gonna get rid of it? Or is that quite cruel to the child? It's just all of a sudden take away something that's probably been like a, probably more a mother

than her mama. To her, she's never around, yeah, that's quite cruel. That would to her, surely, that'll feel like someone's died. (Katia, 22, UG)

The ethical problem therefore is magnified by the replaceability and commodified status of robots. A co-parent robot can easily be switched off, upgraded or resold, in line with Veysey's (2024) reading of robotic parents as commodified carers embedded in capitalist logics. Designing robots to provide quasi-parental warmth while remaining disposable products risks normalising a model of caregiving where attachment is engineered for user engagement but can be terminated at will.

5. Conclusions

5.1. Theoretical Implications

This research answers the call for more interdisciplinary scholarship to explain technological change (Li et al., 2026) by bridging robotics, psychology and ethics. We extend attachment theory by including humanoid robots as possible surrogate, caregiver or co-parent figures. Prior attachment research shows that secure bonds may form through sensitive, contingent and predictable nonparental care (Bowlby, 1969; Ainsworth et al., 1978; Raikes et al., 2019). Our findings show that prospective users do not automatically extend this logic to robotic carers: robotic caregiving becomes morally contested when it is perceived to replace rather than support primary human attachment.

Second, we extend the ethics of care framework beyond care bots in elderly and disability settings (Chan, 2020; Yuan, Coghlan & Lederman, 2023) into the previously unexplored domain of robotic surrogacy and co-parenting. Existing care-ethics work assumes a relatively stable cared-for subject whose needs the robot supplements; reproductive and early-parenting contexts differ in that the relational subject is being constituted, and the caring bonds at stake are foundational. Our participants morally evaluated robotic surrogates and co-parents not only against criteria of technical competence, but against the phases of caring about, caring

for, care-giving and care-receiving (Tronto, 1993, 2013). In the reproductive domain, this care-ethics framing exposed a moral inversion: participants endorsed the robotic womb as preferable to human surrogacy because it removes the asymmetric vulnerability imposed on a third caregiving body, yet withdrew that endorsement once the same technology was imagined occupying a relational rather than purely gestational role. This suggests that what care ethics protects in reproduction is not the human womb as a biological site, but the moral integrity of the caring relationship being constituted through gestation, such that relieving one source of relational harm (i.e., surrogate exploitation) becomes acceptable while substituting the foundational caring bond itself does not. Robotic surrogacy therefore stands as a theoretically distinctive case in which care ethics must reckon both with the embodied burdens that reproductive labour places on human surrogates and with the relational scaffolding through which parental attachment is first formed. When looking at robots as co-parents, what participants reject is not the robot's incapacity to perform parenting tasks; many accept its functional contribution in principle. What emerges as a barrier is the robot's perceived inability to embody the attentiveness, embodied vulnerability and reciprocal moral commitment that constitute caregiving as a moral practice rather than a service. Adoption resistance is therefore reframed not as generalised technology anxiety nor a deficit of perceived usefulness, but as a normative judgement that the robot fails to qualify as a participant in a relational care practice. Third, we contribute to the experiential ethics research on AI and robotics (Fischer & Frennert, 2025) by showing that, in reproductive and parenting contexts, ethical concern is not only about data, safety or accountability, but also about whether robotic systems are perceived to dehumanise care, commodify attachment or simulate parental presence without genuine reciprocity or emotional commitment. Together, these contributions reposition robotic surrogacy and co-parenting adoption as theoretically significant cases through which the boundaries of attachment, care and human identity are negotiated under conditions of technological change.

5.2. Implications for social change

Our study challenges the zero-sum model of attachment often assumed in technophobic discourses (Rabb et al., 2022). Our findings suggest that a boundary line for AI adoption is crossed not when machines take over physical labour, but when they threaten to erode the relational foundations of parenting and reproductive settings. Findings suggest that introducing humanoid robots into intimate domains like pregnancy and co-parenting may disrupt, weaken, or replace core human-to-human connections, in this case, the child-parent connection. It implies a concern that reliance on robots could reduce emotional reciprocity, empathy, and shared responsibility within families, potentially undermining trust, attachment, and the relational processes that traditionally sustain child-parent bonds. The findings show a pattern of conditional openness to functional technological assistance, paired with strong moral resistance to relational substitution in reproduction and childcare (Figure 1).

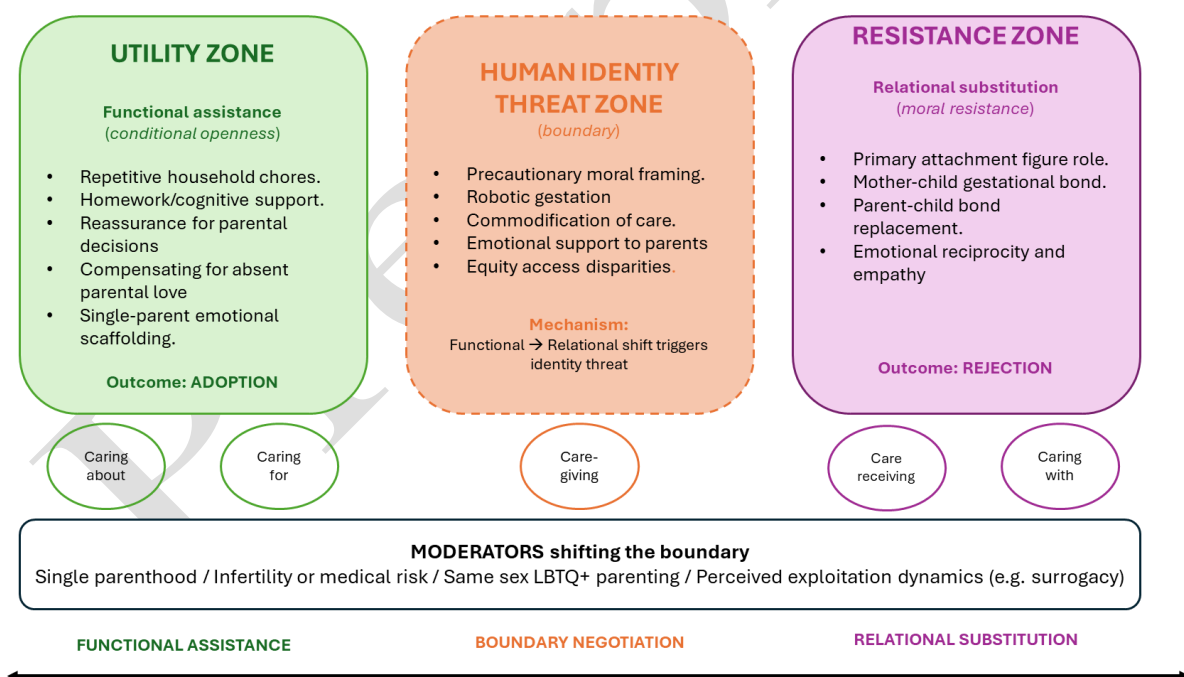


Figure 1. Human identity threat framework for adopting robotic surrogacy and co-parenting.

This pattern also characterised discussions about parenting robots. Participants accepted robots as ethically permissible when framed as extensions of domestic and assistive tools that relieve parental overload, particularly for single parents, but not as substitutes for parental

presence. Concerns about malfunction, safety and unknown psychological effects on children were also raised, though the dominant worry across interviews and focus groups was the disruption of the child-parent bond.

There are several implications for social change from our findings. Firstly, as humanoid robots transition into the private sphere, firms and policymakers must navigate this shift. Mass adoption of robotic surrogacy and co-parenting could remain a long-horizon prospect, constrained by the moral resistance our framework identifies and by tightening regulatory regimes, particularly in surrogacy where transnational legal divergence is narrowing the conditions under which any human, let alone robotic, gestation may legitimately occur (Marinelli, 2024; Valc, 2025). An evolution of the legal landscape is therefore needed before mass deployment is feasible, alongside frameworks for product liability and distributed accountability across designers, manufacturers and users to address potential technological neglect or attachment disorders that might arise if humanoid robots ever enter these spaces. There are also other practical implications for other sectors such as healthcare and education. Robot surrogacy and the framing of it as an IVF extension could increase the adoption of the technology since there is already some social legitimacy for the former (Malina et al., 2021). In educational settings across the spectrum, humanoid robots with parental capabilities might offer support not only to parents, but also to a sector that in certain countries struggle to continue recruiting in these fields (UNESCO, 2025).

5.3. Limitations and Future Research Agenda

While our study offers an exploratory look into perceptions of robot surrogacy and co-parenting, several limitations suggest avenues for further investigation. First, the UK-only focus may not capture other cultural or religious contexts, where views on reproduction and family vary significantly; future research could employ cross-cultural designs to track how perceptions evolve as humanoid technology becomes more accessible. Second, the psychological effects on children gestated or reared by robots remain speculative given the

novelty of AWT; future studies could use infant simulators or longitudinal tracking to move beyond "imaginaries" toward evidence-based developmental data. Finally, future work should examine the impact of these technologies on broader family subsystems, including sibling dynamics and intergenerational care. Table 3 outlines a research agenda for future researchers to explore the scope of robotic surrogacy and parenting further.

Table 3. A Research Agenda to Explore Robotic Surrogacy and Parenting

Research Theme	Core Findings	Key Investigation Areas
Commodified gestation and disposable care	Participants reframe robotic surrogacy as the less commodifying option than human surrogacy yet remain alarmed by robots' replaceable, disposable status	- How does the externalisation of pregnancy into a commercial robotic agent affect the authenticity of the biological bond? - How do pricing models for robotic surrogates (one-off purchase, lease, subscription) shape moral acceptability and adoption pathways?
Functional vs. Relational Intimacy	Openness to offloading repetitive tasks (homework, cleaning) but resistance to relational substitution.	How are the boundaries of relation substitution constructed in the mind of the service users?
Attachment reconfiguration in family systems	Fear that co-parent robots will displace human carers as the primary attachment figure and that robot replaceability will repeatedly rupture the child–caregiver bond	- Can robotic carers be designed so that extended interaction produces secure secondary attachments rather than insecure or pathological ones? - How does extended robot care reshape children's internal working models of self, others and "authentic" relationships? - What happens to attachment continuity when a robot is upgraded, retired, replaced or recalled mid-childhood?

To conclude, the successful integration of robotic surrogacy and parenting depends not merely on technical advancements but on systemic alignment between designers, policymakers and users to ensure that innovation enhances rather than erodes the empathetic and reciprocal foundations of intimate human life, contributing to debates that will sit at the forefront of human-robot co-evolution in the years to come.

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Appendix 1 – Details of participants

Table 1. List of interviews' participants

Name	Gender	Age	Education*
Aarantxa	M	19	HS
Carmen	F	20	HS
Penelope	F	21	UG
Sonia	F	24	HS
Julia	M	24	UG
Heather	F	24	UG
Hugh	M	24	PG
Cecile	F	24	UG
Margot	F	25	UG
Israel	M	25	UG
Emily	F	25	UG
Camila	F	25	UG
Ann	F	25	PG
Joan	M	29	HS
Vivian	M	33	UG
Sven	M	33	PG
Steve	M	35	UG
Silvio	M	37	PG
Sharine	F	37	UG
Naomi	F	37	HS
Albert	M	37	UG
Karen	F	38	HS
Biel	M	39	HS
Laura	F	40	UG
Ron	M	41	PG
Mary	F	42	PG
Gissele	F	45	Not disclosed
Theo	M	46	UG
Helena	F	52	HS
Corinne	F	58	HS
Brian	M	61	HS

Sergi	M	65	HS
Mario	M	65	UG
Kristina	F	65	PG
Donna	F	67	HS
Amanda	F	68	UG
Heather	F	71	UG
James	M	74	PG
Nicolas	M	77	HS
Roman	M	80	HS

(*) Measured last graduated degree. HS: High School; UG: Undergraduate studies; PG: Postgraduate studies.

Table 2. List of focus groups' participants

Sample	Name	Gender	Age	Education*
Young adults	Esther	M	24	UG
	Jordan	F	24	UG
	Katia	F	22	UG
	Olaya	F	23	UG
	Rick	M	21	UG
Middle-aged adults	Cinthia	F	38	PG
	Emma	F	32	PG
	Eduard	M	41	UG
	Gabriele	F	38	N/A
	Sofia	F	27	UG
	Tim	M	45	UG
Parents	Aurora	F	50	PG
	Fernanda	F	42	PG
	Lorena	F	39	PG
	Thomas	M	55	UG
Older adults	Astrid	F	59	PG
	Claire	F	56	PG
	Katiuska	F	57	PG
	Kent	M	60	PG
	Leticia	F	55	UG
	Monica	F	58	PG
	Neil	M	50	UG

(*) Measured ongoing/ last graduated degree. UG: Undergraduate studies; PG: Postgraduate studies.

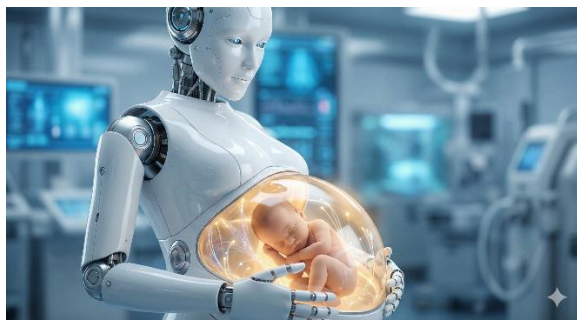
Appendix 2. SCENARIO-BASED FOCUS GROUP

Rationale for this scenario:

The scenario of the pregnant robot has been inspired by news that this technology is being tested in places like China, as illustrated by the following news articles:

- Fike, A. (2025). Robot With Artificial Womb Could Give Birth to Humans by Next Year [website]. Available at: <https://www.vice.com/en/article/robot-with-artificial-womb-could-give-birth-to-humans-by-next-year/> [Accessed 12-03-2026].
- Nurse.org (2025). China Develops First-Ever Pregnancy Robot—Could It Replace Human Surrogates? [website]. Available at: <https://nurse.org/news/pregnancy-robot-artificial-womb-china/> [Accessed 12-03-2026].

Malayil, J. (2025). Chinese tech firm is allegedly working on the world's first "gestation robot" [website]. Available at: <https://interestingengineering.com/innovation/china-worlds-first-pregnancy-humanoid-robot> [Accessed 12-03-2026]



Source: Gemini, 2026 (see prompt 1 below)

Paul, a 43-year-old lawyer, has been single for the last 5 years but wants to be a parent. He decides to buy a female robot with an artificial womb in order to become a father. Since he wants to enjoy the "pregnancy" period, he lives with the robot, named Elara. Elara, which is powered by AI, can maintain human-like interaction and can behave as a mum. Paul has developed feelings for Elara, and he has decided to keep her for more years so it/she can help him with the baby care and also be a mother figure for the child.

Rationale for this scenario:

The idea of the domestic robot helping with family chores and homework has been portrayed in the media by some early prototypes:

- Tidy, J. (2026). Eggie, Neo, Isaac and Memo are domestic robots. But would you let them load your dishwasher? [website]. Available at: <https://www.bbc.co.uk/news/articles/clyg63e3mq4o> [Accessed 12-03-2026].
- Stanford Report (2025). Exploring a future with in-home robot caretakers [website]. Available at: <https://news.stanford.edu/stories/2025/03/soft-robotics-caretaking-home-robots> [Accessed 12-03-2026].

Temming, M. (2019). Robots are becoming classroom tutors. But will they make the grade? [website]. Available at: <https://www.sciencenews.org/article/robots-are-becoming-classroom-tutors-will-they-make-grade> [Accessed 12-03-2026].



Source: Gemini, 2026 (see prompt 2 below)

Patricia is a 35-year-old investment banker. Patricia has been raising her daughter Ella by herself. Patricia heard of Elara, a robot with parental capabilities that can be configured to have fatherly or motherly traits. Elara can help with parenting chores, help with homework, read bedtime stories and take Ella to school.

Images created using Google Nano Banana Pro using prompt the following prompts:

Prompt 1

“Create an image with the following characteristics: The Robot Mother: The figure has a serene, human-like face and a polished, white shell. Its design suggests a high level of advanced technology, combining fluid curves with visible internal wiring and mechanical structures. The most prominent feature is the robot's transparent abdomen. Inside, a human infant is curled in a foetal position, bathed in a warm, glowing amber light. This suggests the robot is serving as a life-support system or an artificial womb. The background is a blurred, clinical environment with cool, soft lighting, resembling a high-tech laboratory or a futuristic medical facility. The image evokes a sense of wonder and clinical precision. It raises provocative questions about the future of biology, caregiving, and the potential for technology to mimic or replace natural human processes. The contrast between the cold, white machinery and the warm, vulnerable life inside creates a powerful visual narrative about creation and protection. “

Prompt 2

Create an image of a candid, medium shot of a modern open-plan living and kitchen area on a bright, sunny afternoon. On the left, a Caucasian woman in her late 30s with wavy blonde hair, wearing a taupe and black plaid blazer over a dark top, is seated at a white quartz kitchen island, smiling as she looks down and types on an open silver MacBook. A blue pamphlet is on the counter near the laptop. In the centre, a young girl, about 7 years old with brown hair tied back, wears a blue t-shirt and laughs joyfully while looking at a robot. She is writing with a pencil in a notebook. To the right, a humanoid companion robot is seated. The robot has a smooth, cream-colored, articulated plastic body with black joints, two multi-jointed arms, and five-fingered hands resting near the notebook. Its head features an illuminated digital screen face with friendly, expressive blue cartoon eyes. The robot is looking toward the girl. In the background, a light grey L-shaped sofa is positioned near two large, bright windows with white blinds, letting in soft, natural light. A green plant and a lamp are on a side table. To the far left, a glass-panelled door is visible, next to which a colourful pattern backpack is on the floor. A stainless-steel refrigerator is partially visible on the far right. The overall feeling is warm, domestic, and futuristic. The shot is high-resolution with natural lighting.