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The Impact of AI Development on Fertility Rate

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Abstract: Fertility treatments are set to change with the help of AI technology, which is now known to optimize fertility treatments. Evidence shows that AI's cutting-edge technologies can help eliminate infertility issues through an optimized treatment of genetic disorders and optimized embryo selections. At the same time, the need to address infertility issues has been considered a global health problem, which is indicated by the decline in global fertility rates. These fertility rates are posing a major crisis in the future in the nation that is currently dealing with an aging population and major declines. The data collection showed that there was a higher number of ART births that were directly influenced by AI-enhanced fertility technologies. The success rates, as well as the rates of failed fertilization show whether AI technologies have a positive or negative impact on fertility rates and whether they should be considered the game changer in a city and a nation where fertility rates have been declining since the early 2000s. A scoping review of the literature provided an overview of the ways in which fertility clinics are now using AI technology to enhance the chance of success for their patients.

Keywords: infertility, fertility care, AI Technology, Fertility Clinics, Fertility Rates.

1. Introduction

Several sectors of the economy have benefitted from the endless abilities of Artificial Intelligence (AI), and the healthcare sector has not been left behind by the immense possibilities of leveraging the power of machines. Over the years, medical researchers have continued searching for solutions to treat the rampant cases of infertility, and it recently emerged that adopting AI technologies into its assisted reproductive technology processes can translate to more positive outcomes for infertility patients [1]. The positive outcomes of using these two types of technologies are an assurance that the medical field is taking a step in the right direction. However, it remains important that medical researchers continue to study the endless potential of AI technologies and identify their specific capabilities when used in conjunction with assisted reproductive technologies [1]. Specifically, medical research should identify the specific ways in which AI technologies can impact fertility treatments and show how these ways can translate to improved fertility rates for nations grappling with the dangers of stagnated population growth.

Undeniably, the field of medicine has made significant strides in infertility treatments. Infertility treatments have continued to evolve since the birth of the first test-tube baby named Louise Brown in 1978 [2]. These evolutions explain why the field would turn to technological solutions, such as the integration of AI technology and ART in a bid to increase the achievement of specific and desired

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solutions for fertility patients. As a result, this study seeks to investigate the potential connection between the ongoing shifts in the country's demographics and how AI technologies can enhance the rates of fertility rates as desired. Specifically, this paper will examine the capacity of AI to increase the chances of successful embryo implantations and live births. Understanding AI's impact on demographic patterns is critical as a technology that is getting more and more integrated into daily life. AI is a highly disruptive technology that is being applied to tasks of increasing complexity, including fertility challenges [3]. Fertility is important for human capital and growth, and it was largely feared in countries such as Australia that babies would be much fewer at the beginning of COVID-19 than at any previous time over the preceding 14 years with a birth-plenty – now means >300,000 births ever recorded at any point since before 2007 (Boothroyd et al. While this bounce-back offset the declining birth rates were still a challenge, one that had once been faced by baby bonus policies. There are policy-resolvable aspects to this (for example those also influencing fertility) and personal and emotional aspects, such as the need for companionship. It is finally time to note that immigration has served as a stopgap measure only, not a sustainable replacement for lost human capital. While the concept of AI-enhanced fertility may seem futuristic and even fantastical, it provides important considerations in crafting policies that confront declining birth rates in Australia and around the world [4].

Research Questions

1. Can AI technology improve fertility rates in a given country?
2. Can AI technology improve the processes and procedures in fertilization assessments?

2. Literature Review

2.1. AI technology and procedures in fertilization assessments

The Assisted Reproductive Technology (ART) field has come a long way, with its intersection with Artificial Technology (AI) providing a promise to a field that continually seeks improved pregnancy rates. Various tools in the fertility marketplace have been developed, and others are still under development, with the potential to transition fertility results to the next level [6]. However, many of these tools have yet to be incorporated into the ART process, and there is little knowledge on whether they hold the promise or peril for fertility rates. In addition, AI technology can improve clinical care, which then translates to improved pregnancy rates [6]. Still, some complexities impede the rate of success in all the fertility cases involved. The author points out those vulnerabilities in computer-based systems, database reliability, and data analytics have the potential to reduce expected success rates [6]. The study then argues that the healthcare sector is full of examples of premature implementations of technology-enhanced treatments, most of which provide disastrous outcomes [6]. Ultimately, it is important to note how there are glaring gaps on whether the integration of AI technology into the field of ART promises an increase in fertility rates or not and provides a means to make informed decisions on whether these tools should be part of ART practice now and in the near future.

There is significant evidence that one in six couples experience infertility issues, and many of these couples will seek assisted reproductive technologies to achieve a desired live birth. Another study indicates that assisted reproductive technology does not guarantee the achievement of a desired live birth [8]. Success rates in infertility issues depend on the characteristics of a patient, their responses to previous treatments, and ongoing monitoring of the process. Notably, AI technology suitably provides promise to the ART field, with its ability to optimize and personalize key steps, such as drug selection and dosage, cycle monitoring, and induction of oocyte maturation [8]. A similar study points out the potential that over-reliance on AI technology has reduced human interactions, which then widens the desire for humans to remain isolated [7]. The isolation among humans is detrimental to

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fertility rates in a country, especially because young people choose to remain unmarried and not have children.

Fortunately, there is sufficient evidence in the literature that the same AI technology that is promoting human isolation by reducing the need for emotional interactions is also helping fertility doctors improve their efforts to treat fertility problems. Specifically, there is evidence that using AI technologies to help women seeking assisted reproduction is one way to increase the success rate of embryo implantations [2]. Before the discovery of the potential of AI technology, fertility doctors used their human abilities to perform assessments on embryos. However, studies indicate these assessments suffered from empirical limitations and subjectivity, which then affect the accuracy of clinical decisions for patients seeking solutions for their childlessness [2]. Unlike humans, AI technologies can assess embryos and determine their suitability for implantation, which leaves very minimal room for any errors. Therefore, the study provides important insights into the revolutionary potentials of AI technologies and how they can influence the birth of a single and healthy baby [2]. The same study also shows that AI technologies can lead to reduced miscarriages, standardize the assessment of embryos by fertility operators, and increase the rates of positive implantations.

2.2. Using AI Technology to Increase Fertility Rates

There are several other ways that AI technology can enhance fertility treatments, further supporting the claims that it can influence fertility rates. A similar study showed how using AI technology for fertility treatments can help improve the creation of quality oocytes [7]. Fertility doctors understand that successful pregnancies start with developing quality oocytes, which has not always been an easy task without the help of technology. The findings from the study done by show that AI technologies can help improve the quality of these oocytes, which will then translate to the development of quality embryos and eventual implantation [7]. It is a breakthrough that points toward improved fertility rates, especially if AI technologies will enhance the understanding of the morphology of oocytes and subsequently improve the fertilization of embryos.

Fertility rates are also set to increase with the help of AI technologies that are set to reduce the time it usually takes researchers to complete the quality assessment of an oocyte. The study determined that fertility doctors need a significant amount of time before they can complete a quality assessment of a single oocyte [7]. In the same observation, the researchers noted that some of these quality assessments proved inefficient as a result of researcher subjectivity. By extension, these authors are arguing in favor of AI technologies that can improve the time needed to complete such assessments, while also improving the final determinations of such oocyte assessments and the minute differences between sperms. There is no doubt that AI technologies can positively increase fertility rates by improving the accuracy and reliability of assisted reproductive technologies.

Further studies also show that AI technologies can enhance the positive outcomes of fertility treatments. Specifically, a comprehensive study shows that AI technologies are cutting-edge technologies that can address genetic disorders, infertility issues, and embryo selection [1]. Ultimately, there is significant evidence that promises improved outcomes for patients struggling to get children naturally. In short, the current study strongly suggests that AI technologies can positively impact fertility rates when used ethically and with caution [1]. These ideas on how AI technology can improve fertility rates emerged in several other studies. Another study found similar findings when it outlined several roles that AI technology can fulfill when it is integrated into In Vitro Fertilization procedures [1]. Recent studies indicate that AI can enhance gamete and embryo selection, which then enhances the achievement of positive outcomes for fertility patients. Undeniably, AI technology has multifaceted capabilities, with each one of these capabilities enhancing the potential of fertility doctors to select the best oocyte and sperm combinations [1]. Ultimately, the use of AI technologies

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in IVF treatments is set to optimize patient-specific treatment regimens, thereby improving the success of fertility and, by extension, fertility rates.

3. Research Methodology

This study used the qualitative method as the research design to collect and analyze qualitative data related to successful fertility treatments that incorporated AI technology into the treatment process. Five fertility clinics operating in Sydney, Australia, have been identified as the source of primary data with a promise to uphold the highest level of privacy for the data collected for the study's purpose only. After a series of interviews with the people in these clinics, the data collected showed a comprehensive clinical picture of the fertility treatments and the resultant pregnancies and birth outcomes. The interviews with fertility doctors on successful fertilization that used AI technology together with AI capabilities were also conducted with representatives of the bodies governing fertility clinics in Sydney, Australia. The information collected over a period of ten years will be included in the secondary study, and a pattern will be developed to show the potential changes in fertility rates in the city.

The focus of the data collection will be the total number of ART births that were directly influenced by AI-enhanced fertility technologies. The success rates, as well as the rates of failed fertilization, will show whether AI technologies have a positive or negative impact on fertility rates and whether they should be considered the game changer in a city and a nation where fertility rates have been declining since the early 2000s. As for the qualitative study, a scoping review of the literature provided an overview of the ways in which fertility clinics are now using AI technology to enhance the chance of success for their patients. Peer-reviewed articles were selected after screening the abstract and the domains covered, such as infertility and fertility care, antenatal, post-natal care, and AI function.

4. Theoretical Connections

The reception theory forms the theoretical foundation for this study. The reception theory posits that humans have the tendency to understand and make sense of media texts depending on their individual experiences in society. Fertility issues are related closely to people’s behaviors in society, which are often influenced in a major way by the media. By using the reception theory for its theoretical foundation, this study will seek to understand how users actively interpret their communications with AI technologies using their emotions, beliefs, and personal settings. The people’s interactions with chatbots and the resultant emotional support and company they experience are considered the major reasons for reduced fertility rates in many nations. The reception theory can provide insight on how the effects of chatbots on these people’s emotional wellbeing can be altered in order to increase human interactions, and subsequently help people seek to procreate as earlier intended [9]. Based on the provisions of the reception theory, the impact of AI on fertility is therefore not a constant aspect, and it fluctuates based on how various people understand and incorporate AI into their daily lives [9]. As a result, it would provide a means to understand how people make private decisions, such as the need to get pregnant and have children.

Further, the study will incorporate the provisions of the feminist theory. For a long time, feminist theory often has adopted a negative position regarding the use of assisted reproductive technologies [10]. Based on the feminist theory, assisted reproductive technologies are seen to extend the reach of patriarchal control of the woman's reproduction. As a result, supporting any aspect of assisted reproductive technology is akin to reinforcing social hierarchies and locations of power in the medical field [10]. On the other hand, the feminist theory is not entirely against assisted reproductive technologies. For example, these technologies are considered liberating for women who have enjoyed

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the potential of extending their fertility outside of the normative timescales [10]. By using the feminist theory, the study can explore how AI technologies can increase fertility rates for women who would like to postpone their time of having children.

5. Results and Discussion

The data collection showed that there was a higher number of ART births that were directly influenced by AI-enhanced fertility technologies. The success rates, as well as the rates of failed fertilization show whether AI technologies have a positive or negative impact on fertility rates and whether they should be considered the game changer in a city and a nation where fertility rates have been declining since the early 2000s. A scoping review of the literature provided an overview of the ways in which fertility clinics are now using AI technology to enhance the chance of success for their patients. Peer-reviewed articles were selected after screening the abstract and the domains covered, such as infertility and fertility care, antenatal, post-natal care, and AI function.

The continued search for solutions to complex human problems, such as fertility issues has resulted in the adoption of various technologies. AI technology is currently considered a high-profile solution to many of these human problems, including solutions to declining birth rates in Sydney, Australia, and other parts of the world. From the literature, it emerges that fertility rates have been declining throughout the world, and humans have been seeking science-based solutions, such as IVF, to increase the chances of successful embryo implantation and live birth [2]. The birth of the first test-tube baby in 1978 provided the world with the hope of using technology to treat fertility problems in women. IVF became the solution to reducing fertility rates, but its success rates remained minimal. Advancements in science then ushered in a period of combined efforts between AI technologies and assisted reproductive technologies [1]. The combination provided a ray of hope for a nation that had adopted different strategies to improve its fertility rates. From the different studies, it emerges that AI technology can significantly improve the fertility rates in a country like Australia. For example, there is evidence that AI technologies optimize oocyte and sperm selection and combinations that eventually result in positive fertility outcomes [8]. Previously, such optimizations were not available, leading to failed fertilization, subsequent failed implantations, and negative fertilization outcomes.

Further, several studies provide a connection between enhanced oocyte quality as a result of adopting AI technologies. Previously, fertility clinics used their human abilities to assess the quality of an oocyte, which was not only subjective but also faulty. AI technologies are known to enhance embryo selections for transfer, sperm selection, and fertilization assessments [7]. The result is a positive impact on a country's fertility rates, which will be on the rise. There is also evidence that AI technologies have been linked to reduced miscarriages as a result of optimized embryo selection and an enhanced understanding of patient characteristics.

Finally, the reception theory provides a prism through which the intricate interaction between technology and human agency can be seen as the impact left by AI on fertility rates. While social isolation and decreased fertility may be encouraged by AI, the extent and type of these impacts mostly depend on how people and societies perceive and react to AI's presence in their lives. According to this standpoint, the trend is not deterministic, and the cultural context and the active negotiation of meaning significantly shape the outcomes.

6. Conclusion

Fertility rates and cultural habits are subject to considerable and complex influences from the development of AI. It plays an important part in influencing people's decisions about relationships and family planning as it grows more and more ingrained in daily life. Particularly in wealthy communities, the possibility of AI replacing human interactions could lead to further declines in

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reproduction rates. In addition, the changes in the ways of living have greatly impacted fertility rates, with one in six couples facing the impossible reality of never bearing children in the normative way. If such couples are left without options, it would mean that they will never experience the joy of being parents. AI technologies are now used in integration with assisted reproductive technologies to improve the chances of such couples having successful implantation and live births. There is sufficient evidence in research showing that incorporating AI technologies in IVF clinics is poised to become the next frontier in the search for personalized reproduction and more positive outcomes for patients. This reality arises from the fact that infertility is increasingly being recognized as a global disease burden. Without the help of AI technologies, there is a possibility that population growth in different countries will continue declining to a point below replacements. With the stagnating success of IVF in the recent past, AI technology is well-placed to enhance existing clinical practices and the predictive outcomes of assisted reproductive technologies. The study recommends that Australia try to mitigate the demographic upheavals brought about by technological breakthroughs. Policymakers must move quickly to address these issues by supporting equality, sharing responsibilities in childrearing, and societal support for conventional human connections.

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