Vilma Kodyte
Beecher Prize Submission
Spring 2025

Take Your Pick: Exploring the Moral Permissibility of Denying Access to Polygenic Embryo Screening through the Lenses of Autonomy and Justice

Infertility treatments, such as in vitro fertilization (IVF), have come a long way in enabling couples and individuals to better control their procreative futures. By analyzing polygenic risk scores, polygenic embryo screening (PES) aims to estimate embryos' predispositions to complex, heritable conditions like type 1 diabetes, coronary heart disease, certain cancers, and even certain non-medical traits, such as intelligence and athleticism[1]. As an add-on procedure to in vitro fertilization (IVF), PES ostensibly empowers parents to make more informed choices about which embryo they wish to select for transplantation, enhancing the prospect of giving their future child the "best chance" at a healthy life. However, U.S. regulation of infertility diagnostics, such as preimplantation genetic testing for embryo selection (PGT-ES), the methodological underpinning of PES, is scant. Medical societies (e.g., American College of Medical Genetics and Genomics) have avoided endorsing PGT-ES, citing unfounded clinical utility and validity for patients[2]. Companies nonetheless market PGT-ES as a tool that enhances reproductive autonomy by enabling informed embryo selection[3].

This essay argues that clinicians are morally justified in refusing to provide PES to patients at its current stage of development and that indeed, professional medical societies must anticipate the ethical challenges raised by PGT-ES and produce guidelines in response, even if the technology is not yet fully robust. Reproductive autonomy is a cornerstone of patient rights, encompassing individuals' ability to make

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[1] Treff, Nathan R., Jennifer Eccles, Diego Marin, Edward Messick, Louis Lello, Jessalyn Gerber, Jia Xu, and Laurent C.A.M. Tellier. 2020. "Preimplantation Genetic Testing for Polygenic Disease Relative Risk Reduction: Evaluation of Genomic Index Performance in 11,883 Adult Sibling Pairs." *Genes* 11 (6): 648. https://doi.org/10.3390/genes11060648.

[2] Grebe, T. A., Khushf, G., Greally, J. M., Turley, P., Foyouzi, N., Rabin-Havt, S., Berkman, B. E., Pope, K., Vatta, M., & Kaur, S. (2024). Clinical utility of polygenic risk scores for embryo selection: A points to consider statement of the American College of Medical Genetics and Genomics (ACMG). Genetics in Medicine, 26(4), 101052. https://doi.org/10.1016/j.gim.2023.101052

[3] Siermann, M., Valcke, O., Vermeesch, J. R., Raivio, T., Tšuiko, O., & Borry, P. (2024). "Are we not going too far?": Socio-ethical considerations of preimplantation genetic testing using polygenic risk scores according to healthcare professionals. Social Science & Medicine, 343, 116599. https://doi.org/10.1016/j.socscimed.2024.116599

decisions about their own reproductive journey. While respecting patients' reproductive autonomy, clinicians must also navigate their ethical obligations as providers to ensure informed consent and equitable access. Furthermore, special attention to advancing justice by promoting diversity in fueling PGT-ES development and ensuring equitable access is paramount. Professional societies seeking to address the portrait of unequal access and benefit that characterizes PGT-ES should include drafting guidelines, with the assistance of diverse stakeholder engagement, that incentivize technical PGT research and promote PGT's generalizability across under-represented populations once PGT-ES is proven to be clinically useful. Professional lobbying at the federal level should aim to curb misleading marketing practices by private PES providers, particularly as federal oversight has altogether been absent in the emerging reproductive technologies space so far.

Why Pursue PES/PGT-ES?

From the birth of the first IVF baby in 1978 to the proliferation of fertility clinics offering egg freezing, genetic testing, and now PGT-ES, reproductive medicine has increasingly merged with consumer markets and genetic data science. PGT-ES embodies not only scientific progress but also evolving values around health, optimization, and choice. This emerging technology arrives at a time when debates about reproductive autonomy, eugenics, health disparities, and the commodification of reproduction are intensifying, especially in a post-Dobbs world and an administration that has expressed deep interest in expanding IVF access[4]. The timeliness of this discussion is further underscored by the absence of U.S. regulatory oversight and the expanding role of private companies marketing PES directly to consumers. As patients, particularly in the U.S., navigate an increasingly consumer-driven healthcare system, and as access to assisted reproductive technologies like IVF remains stratified by race, class, and geography, the ethical stakes of integrating PES into clinical care are worth careful consideration.

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[4] Tanne J. H. (2024). Trump presidency will mean changes for healthcare, reproductive rights, and global heating. *BMJ (Clinical research ed.)*, 387, q2461. https://doi.org/10.1136/bmj.q2461

Parents may seek PES for a variety of reasons. The information derived from PES might help them select embryos with lower risks of certain conditions, particularly so if a family history for a medical condition already exists. Alternatively, parents might desire and use this information to prepare emotionally and financially for raising a child with higher risks for specific conditions, especially if the couple is older and they do not have any "perfectly healthy" embryos available[5]. However, I argue that the allure of PES is grounded in a deeper, more ubiquitous value system, stemming from a broader societal "technological imperative."

The technological imperative refers to the pervasive moral pressure to adopt technologies, even when their utility or appropriateness is uncertain[6]. This phenomenon manifests in several ways, including but not limited to commitment, demand, and unknown imperatives. The commitment imperative suggests that once couples begin IVF, they may feel compelled to pursue additional procedures like PES. The demand imperative illuminates how patients' growing medical knowledge and consumer-driven expectations often lead clinicians to feel pressured to provide unproven interventions to such patients. And finally, the unknown imperative attends to how societal norms around "procreative beneficence" encourage parents to use any available means to ensure their child's health, fostering a sense of moral obligation to adopt PES[7] [8].

While these imperatives drive interest in PES, the procedure's clinical utility remains limited, raising concerns about proportionality or how to balance potential benefits with its harms. PGT-ES does not

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[5] Barlevy, Dorit, Ilona Cenolli, Tiffany Campbell, Remy Furrer, Meghna Mukherjee, Kristin Kostick-Quenet, Shai Carmi, Todd Lencz, Gabriel Lazaro-Munoz, and Stacey Pereira. 2023. "Divergence Between Clinician and Patient Perspectives on Polygenic Embryo Screening: A Qualitative Study." *medRxiv*, October, 2023.10.12.23296961. https://doi.org/10.1101/2023.10.12.23296961.

[6] Hofmann, Bjørn. 2002. "IS THERE A TECHNOLOGICAL IMPERATIVE IN HEALTH CARE?" *International Journal of Technology Assessment in Health Care* 18 (3): 675–89. https://doi.org/10.1017/S0266462302000491.

[7] Siermann et al., "Are We Not Going Too Far?": Socio-Ethical Considerations of Preimplantation Genetic Testing Using Polygenic Risk Scores According to Healthcare Professionals.", 2.

[8] Savulescu, Julian. 2001. "Procreative Beneficence: Why We Should Select the Best Children." *Bioethics* 15 (5–6): 413–26. https://doi.org/10.1111/1467-8519.00251.

diagnose conditions, but it can estimate susceptibility based on polygenic risk scores[9]. For many conditions, the predictive power of these scores is low. To illustrate, while PES might theoretically reduce risks for conditions like schizophrenia or type 2 diabetes up to 50%, the absolute risk reduction is minimal[10]. Reducing schizophrenia's prevalence from 1% (current prevalence in the population) to 0.5% represents a marginal benefit relative to the emotional and financial costs of the procedure.

Additionally, the efficacy of PES is contingent on the number of embryos available for selection, which varies among couples undergoing IVF[11]. The greater the number of embryos a couple can screen, the more likely that PES will help produce information that can be utilized in a selection strategy. PGT-ES is also less effective for individuals of non-European descent due to the limited diversity in genomic databases[12]. As it stands, the benefits of PGT-ES cannot be equally distributed. These factors underlie the clinical community's resistance to integrating PES into standard IVF care.

Threats to Reproductive Autonomy

Nonetheless, private companies market PES with the goal of empowering prospective patients to make more informed decisions, even if, as described above, this is not possible at the current stage of PES's development. As such, the marketing practices of private PES companies compromise informed consent. Companies often frame PES as a transformative tool, emphasizing potential benefits while downplaying

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[9] Forzano, Francesca, Olga Antonova, Angus Clarke, Guido De Wert, Sabine Hentze, Yalda Jamshidi, Yves Moreau, et al. 2022. "The Use of Polygenic Risk Scores in Pre-Implantation Genetic Testing: An Unproven, Unethical Practice." *European Journal of Human Genetics* 30 (5): 493–95. https://doi.org/10.1038/s41431-021-01000-x.

[10] Capalbo, Antonio, Guido De Wert, Heidi Mertes, Liraz Klausner, Edith Coonen, Francesca Spinella, Hilde Van De Velde, et al. 2024. "Screening Embryos for Polygenic Disease Risk: A Review of Epidemiological, Clinical, and Ethical Considerations." *Human Reproduction Update* 30 (5): 529–57. https://doi.org/10.1093/humupd/dmae012.

[11] Capalbo et al., "Screening Embryos for Polygenic Disease Risk: A Review of Epidemiological, Clinical, and Ethical Considerations.", 536.

[12] Capalbo et al., "Screening Embryos for Polygenic Disease Risk: A Review of Epidemiological, Clinical, and Ethical Considerations.", 41.

limitations and risks. They thereby exploit couples' vulnerabilities, contributing to what has been called "anxious reproduction," or heightening feelings of anxiety about how to reproduce in the best way[13].

Autonomous decision-making, as outlined by Beauchamp and Childress, requires accurate, complete, and balanced information about a procedure's risks and benefits[14]. However, misleading advertising undermines this autonomy, leading patients to make decisions that are neither fully informed nor independent[15]. Consequently, clinicians bear the burden of safeguarding patients' autonomy by counteracting the influence of deceptive marketing.

Clinicians, in turn, bear the responsibility of safeguarding patients from harm—not by offering every available technology, but by critically assessing whether those technologies align with patients' best interests. In this context, declining to provide PES is not a denial of reproductive autonomy but rather a defense of it. Until PES demonstrates clear clinical efficacy, equitable applicability, and is supported by regulatory guidance and professional consensus, clinicians have both the right and the responsibility to refrain from offering it. This approach safeguards ethical practices and helps resist the premature normalization of a technology whose potential currently exceeds its evidence.

The Stakes of Social Justice – Ought the medical profession to engage?

What do we mean by social justice in medicine? At the interpersonal scale, this requires providers to treat like patients alike and to avoid rejecting prospective patients for improper reasons[16]. Egalitarian

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[13] Faircloth, Charlotte, and Zeynep B Gürtin. 2018. "Fertile Connections: Thinking across Assisted Reproductive Technologies and Parenting Culture Studies." *Sociology* 52 (5): 983–1000. https://doi.org/10.1177/0038038517696219.

[14] Beauchamp, Tom L., and James F. Childress. *Principles of Biomedical Ethics*. 8th ed. New York: Oxford University Press, 1979. 268-279.

[15] Bayefsky, Michelle J., Alan H. DeCherney, and Louise P. King. 2020. "Respecting Autonomy—a Call for Truth in Commercial Advertising for Planned Oocyte Cryopreservation." *Fertility and Sterility* 113 (4): 743–44. https://doi.org/10.1016/j.fertnstert.2019.12.039.

[16] Beauchamp & Childress, "Principles of biomedical ethics", 268-279.

conceptions of distributive justice further require providers to, at the minimum, advocate for the least advantaged in society, extending provisions to meet health needs and working to dismantle social barriers to health. Such justice dignifies health as a human right[17].

Indeed, the purpose of medical societies in the U.S. is to advocate for physicians, and by extension, patients, for the larger cause of greater health and well-being in society[18]. Advocacy innately lends itself to considering how injustices may be afflicting the scope and nature of care providers can offer. Ensuring patients receive accurate, comprehensible, and context-sensitive counseling before beginning a new therapy is one example of practical advocacy, as it acknowledges the expertise gap between patient and provider and works to bridge it, thereby improving care. The degree of justice work expected of each society's member is disputable[19]. But minimally, as this essay continues to argue, thoughtful consideration of and attempt to rectify injustices is urgent, precisely at the professional society level[20].

The Rawlsian principle of meeting the needs of the worst off in society demands careful consideration of PES's potential to contribute to reproductive stratification. Reproductive justice calls for equal access to reproductive care, including infertility care, regardless of social status or economic ability[21]. Unfortunately, socioeconomic barriers prevent widespread access to infertility diagnostics and treatments. Advanced technologies that remain only accessible to wealthy patients exacerbate the divide in care across the socioeconomic gradient, contributing to what is known as reproductive stratification[22]. Unequal access to

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[17] Jecker, N. "Justice" in Jennings. (2014). Bioethics (4th ed.). Macmillan Reference USA. pp. 1774-1780.

[18] Dalsing, M. C. (2011). Industry working with physicians through professional medical associations. *Journal of Vascular Surgery*, 54(*3, Supplement*), 41S-46S. https://doi.org/10.1016/j.jvs.2011.04.068

[19] Huddle, T. S. (2013). The Limits of Social Justice as an Aspect of Medical Professionalism. *Journal of Medicine and Philosophy*, 38(*4*), 369–387. https://doi.org/10.1093/jmp/jht024

[20] Murphy, L. B. (1998). Institutions and the Demands of Justice. *Philosophy & Public Affairs*, 27(*4*), 251–291. http://www.jstor.org/stable/2672852

[21] Reproductive Justice. (n.d.). Sister Song. Retrieved March 25, 2025, from https://www.sistersong.net/reproductive-justice

[22] Siermann et al., "Are We Not Going Too Far?": Socio-Ethical Considerations of Preimplantation Genetic Testing Using Polygenic Risk Scores According to Healthcare Professionals.", 2.

infertility diagnostics, coupled with unequal benefits, indexes this risk. Wealthier individuals would gain disproportionate opportunities to optimize their offspring's health, while marginalized groups face limited access to even basic reproductive care.

Moreover, non-European populations stand to benefit very little from the increasing integration of PGT-ES into IVF. Genome-wide association studies, used to produce polygenic risk scores, overwhelmingly feature genetic data from individuals of European ancestry[23]. The lack of genetic data for non-European populations reduces PES utility for these groups, reinforcing systemic inequities.

Other concerns revolve around discarding healthy embryos based on disfavored characteristics, stigmatizing parents who choose not to pursue PES, and generally de-valuing the (potential) lives of those with genetic abnormalities or diseases, particularly considering that the disability may be easily manageable or curable in the near future[24] [25]. Given the myriad number of societal harms that PES stands to produce, how can professional organizations best engage these ethical issues, beyond the status quo dismissal of the technology's readiness?

A Way Forward

A system that prioritizes profit over equitable access undermines the principles of fairness and inclusivity that should guide medical practice. Medical professional societies, and by extension clinicians, have a moral responsibility to deny services that are medically unindicated and otherwise ensure equitable access to the medical services they do offer.

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[23] Forzano et al., "The use of polygenic risk scores in pre-implantation genetic testing: An unproven, unethical practice", 493–495.

[24] Barlevy, et al., "Divergence Between Clinician and Patient Perspectives on Polygenic Embryo Screening: A Qualitative Study." 14.

[25] Capalbo, et al., "Screening embryos for polygenic disease risk: A review of epidemiological, clinical, and ethical considerations", 529–557.

Current measures should first aim at protecting reproductive autonomy by curbing misinformation. This can be achieved at the federal level through the Federal Trade Commission (FTC), which oversees marketing practices in the U.S. Through their legal authority to curb "false advertising," which they lend a broad definition for, the FTC retains the ability to regulate the marketing campaigns of private, PES-offering companies[26]. However, it has been noted that the FTC has intervened to a significantly limited extent in curbing deceptive health marketing[27]. The medical community should challenge this status quo practice by mounting pressure on legislators and private companies, while in the meantime also concentrating their efforts on patient education and reproductive health management.

Another federal intervention could be simply expanding health insurance access to cover expenses associated with IVF and indicated add-on testing. Policies that extend insurance coverage or introduce government subsidies for PGT-ES could address disparities that exist in accessing assisted reproductive technologies, like IVF. Such measures would not only promote fairness but also reduce the ethical tensions surrounding stratified reproduction, creating a more inclusive framework for reproductive healthcare.

Critics may argue that denying PES in clinical settings will push patients to seek services from private companies, where oversight is minimal. This scenario could expose patients to greater exploitation and misinformation. This is a realistic and credible concern and seems to reflect the current state of PES access. However, it also underscores the need for stricter federal regulation of private PES providers. By establishing clear guidelines and holding companies accountable for their marketing practices, policymakers can mitigate the risks associated with private-sector reliance.

Another argument maintains that clinicians have an obligation to respect all reproductive choices, including the use of PES, regardless of its current limitations. However, respecting autonomy does not

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[26] Bayefsky, et al., "Respecting Autonomy—a Call for Truth in Commercial Advertising for Planned Oocyte Cryopreservation", 743.

[27] Bayefsky, et al., "Respecting Autonomy—a Call for Truth in Commercial Advertising for Planned Oocyte Cryopreservation", 743.

obligate clinicians to offer unproven or ethically contentious services. Particularly, clinicians may invoke conscientious objection to support their refusal to offer treatment they do not agree with[28]. Instead, clinicians fulfill their duty by providing evidence-based counseling and supporting patients in achieving their broader reproductive goals.

What more can medical societies do to empower prospective parents while cautioning them away from unripe technologies, such as PGT-ES? Societies have an imperative to engage a variety of stakeholders to develop nuanced, future-focused ethical guidelines. Patient advocates, including prospective parents, bioethicists and legal scholars, geneticists and reproductive specialists and researchers, and others involved in fertility care undoubtedly present with unique perspectives on the multidimensional reality of accessing infertility diagnostics and its larger role in reproductive care. Consultation with these groups produces an accurate landscape of the current disparities of need (e.g., shortcomings in patient counseling) and may even mitigate theoretical concerns (e.g., damaging embryos through biopsy).

Secondly, medical associations can motivate research interest by organizing conferences, inviting speakers to webinars, and publishing opinion pieces addressing urgent knowledge gaps. Capalbo et al. found that the two significant voids of research in PGT for polygenic conditions included investigating the ability of risk scores to predict risk reductions and the potential relationship between risk scores and embryo morphology across different diseases and ranking strategies[29]. These technical aspects severely limit the clinical utility of PGT at this time.

Moreover, as a matter of social justice, societies must advocate for the fair accessibility and generalizability of emerging medical interventions so that all patients may enjoy their eventual benefits. This practically manifests as mandating the inclusion of under-represented groups in medical society-funded

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[28] ACOG Opinion No. 385, November 2007. The Limits of Conscientious Refusal in Reproductive Medicine. *Obstet Gynecol.* 2007;110(*5*):1203-1208.

[29] Capalbo et al., "Screening embryos for polygenic disease risk: A review of epidemiological, clinical, and ethical considerations", 529–557.

research projects, prioritizing research funding that investigates the genetic contributions to disease in under-represented groups, and encouraging collaboration between institutions to pool diverse datasets, reducing reliance on homogenous research populations. Societies must also update their clinical guidelines to reflect diverse populations rather than defaulting to data derived primarily from white, affluent, or Western cohorts.

Conclusion

At its current stage of development, PES remains an ethically and clinically contentious procedure. While clinicians are morally permitted to deny access to PGT-ES, they must continue to support patients' reproductive journeys through transparent, evidence-based counseling. Additionally, addressing the broader justice concerns surrounding PES requires proactive efforts to regulate private marketing practices and ensure equitable access to reproductive technologies.

It has been argued that social justice makes claims on us as citizens, not medical professionals specifically, which casts doubt on whether professional societies have any distinctive obligation to engage in justice-driven consideration of ethical issues[30]. However, this essay has sought to demonstrate how institutions can respond to the calls of justice more effectively and robustly than any single individual can, particularly in the context of novel genetic technologies[31]. Moreover, as a care-oriented professional whose work is embedded within and determined by structures of inequity, it is an affront to justice to reject its permeance. Thus, professional societies must recognize their unique capacity—and ethical imperative—to engage with justice, ensuring that novel genetic technologies are developed and applied in ways that promote equity rather than entrench existing disparities.

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[30] Huddle, "The Limits of Social Justice as an Aspect of Medical Professionalism", 369–387.

[31] Murphy, "Institutions and the Demands of Justice", 251–291.

Bibliography

ACOG Opinion No. 385, November 2007. The Limits of Conscientious Refusal in Reproductive Medicine. *Obstet Gynecol*. 2007;110(*5*):1203-1208.

Barlevy, Dorit, Ilona Cenolli, Tiffany Campbell, Remy Furrer, Meghna Mukherjee, Kristin Kostick-Quenet, Shai Carmi, Todd Lencz, Gabriel Lazaro-Munoz, and Stacey Pereira. 2023. "Divergence Between Clinician and Patient Perspectives on Polygenic Embryo Screening: A Qualitative Study." *medRxiv*, October, 2023.10.12.23296961. https://doi.org/10.1101/2023.10.12.23296961

Bayefsky, Michelle J., Alan H. DeCherney, and Louise P. King. 2020. "Respecting Autonomy—a Call for Truth in Commercial Advertising for Planned Oocyte Cryopreservation." *Fertility and Sterility* 113 (*4*): 743–44. https://doi.org/10.1016/j.fertnstert.2019.12.039.

Beauchamp, Tom L., and James F. Childress. Principles of Biomedical Ethics. 8th ed. New York: Oxford University Press, 1979. 268-279.

Capalbo, Antonio, Guido De Wert, Heidi Mertes, Liraz Klausner, Edith Coonen, Francesca Spinella, Hilde Van De Velde, et al. 2024. "Screening Embryos for Polygenic Disease Risk: A Review of Epidemiological, Clinical, and Ethical Considerations." *Human Reproduction Update* 30 (*5*): 529–57. https://doi.org/10.1093/humupd/dmae012.

Dalsing, M. C. (2011). Industry working with physicians through professional medical associations. *Journal of Vascular Surgery*, 54(*3, Supplement*), 41S-46S. https://doi.org/10.1016/j.jvs.2011.04.068

Faircloth, Charlotte, and Zeynep B Gürtin. 2018. "Fertile Connections: Thinking across Assisted Reproductive Technologies and Parenting Culture Studies." *Sociology* 52 (*5*): 983–1000. https://doi.org/10.1177/0038038517696219.

Forzano, Francesca, Olga Antonova, Angus Clarke, Guido De Wert, Sabine Hentze, Yalda Jamshidi, Yves Moreau, et al. 2022. "The Use of Polygenic Risk Scores in Pre-Implantation Genetic Testing: An Unproven, Unethical Practice." *European Journal of Human Genetics* 30 (*5*): 493–95. https://doi.org/10.1038/s41431-021-01000-x

Grebe, T. A., Khushf, G., Greally, J. M., Turley, P., Foyouzi, N., Rabin-Havt, S., Berkman, B. E., Pope, K., Vatta, M., & Kaur, S. (2024). Clinical utility of polygenic risk scores for embryo selection: A points to consider statement of the American College of Medical Genetics and Genomics (ACMG). *Genetics in Medicine* 26(*4*), 101052. https://doi.org/10.1016/j.gim.2023.10105

Hofmann, Bjørn. 2002. "IS THERE A TECHNOLOGICAL IMPERATIVE IN HEALTH CARE?" *International Journal of Technology Assessment in Health Care* 18 (*3*): 675–89. https://doi.org/10.1017/S0266462302000491

Huddle, T. S. (2013). The Limits of Social Justice as an Aspect of Medical Professionalism. *Journal of Medicine and Philosophy* 38(*4*), 369–387. https://doi.org/10.1093/jmp/jht024

Jecker, N. "Justice" in Jennings. (2014). Bioethics (4th ed.). Macmillan Reference USA. pp. 1774-1780.

Murphy, L. B. (1998). Institutions and the Demands of Justice. *Philosophy & Public Affairs* 27(*4*), 251–291. http://www.jstor.org/stable/2672852

Reproductive Justice. (n.d.). Sister Song. Retrieved March 25, 2025, from https://www.sistersong.net/reproductive-justice

Savulescu, Julian. 2001. "Procreative Beneficence: Why We Should Select the Best Children." *Bioethics* 15 (*5–6*): 413–26. https://doi.org/10.1111/1467-8519.00251.

Siermann, M., Valcke, O., Vermeesch, J. R., Raivio, T., Tšuiko, O., & Borry, P. (2024). "Are we not going too far?": Socio-ethical considerations of preimplantation genetic testing using polygenic risk scores according to healthcare professionals. *Social Science & Medicine* 343, 116599. https://doi.org/10.1016/j.socscimed.2024.116599

Tanne J. H. (2024). Trump presidency will mean changes for healthcare, reproductive rights, and global heating. *BMJ (Clinical research ed.)*, 387, q2461. https://doi.org/10.1136/bmj.q2461

Treff, Nathan R., Jennifer Eccles, Diego Marin, Edward Messick, Louis Lello, Jessalyn Gerber, Jia Xu, and Laurent C.A.M. Tellier. 2020. "Preimplantation Genetic Testing for Polygenic Disease Relative Risk Reduction: Evaluation of Genomic Index Performance in 11,883 Adult Sibling Pairs." *Genes* 11 (*6*): 648. https://doi.org/10.3390/genes11060648.