Submitting to:	Journal of Reproductive and Infant Psychology
Title:	A pot of gold at the end of the rainbow? A spectrum of attitudes to Assisted Reproductive Technologies in Ireland
Authors:	Maria Dempsey, Rob King and Andrea Nagy

Maria Dempsey is a counselling psychologist and lecturer in the School of Applied Psychology, University College Cork. Email: m.dempsey@ucc.ie

Rob King

Andrea Nagy

Word Count 2598 (excluding title page, table, figure and references)

This paper has not been published elsewhere and is not under consideration elsewhere

Abstract

Objective: New technologies present new ethical dilemmas. Our ethical intuitions may mislead us in relation to new technologies such as nuclear power, vaccines, GMOs and assistive reproductive technologies (ART). Between 1999 and 2008 the number of ART treatment cycles increased by 265% in Ireland. The implications and potentials of such technologies are profound—challenging existing understanding of humans' relationships to reproduction. Because such technologies are comparatively unregulated, and their use has only been occurring for a single generation, detailed investigation of how awareness of ART influences understanding of personal fertility is needed.

Method: Data from an Irish population of varied ages and both sexes ($N = 611$) were collected through an on-line survey which included demographics, knowledge of fertility, knowledge of ART and personal fertility.

Results: Latent class analysis revealed a typology of five groups of responders to ART distinguished by their attitudes and knowledge of this technology. These groups are labelled as 'Worried Yet Willing', 'Live and Let Live', 'Disengaged', 'Judgemental' and 'Conflicted'.

Conclusion: Responses to the introduction of ART in Ireland fall into at least five distinct groups. Understanding of the distinguishing features of these types of responders is important for fertility health care professionals in terms of service development and delivery. Implications for the direction of future related research is discussed.

Keywords: fertility, assisted reproductive technologies, infertility

Introduction

Reproduction lies at the heart of biology. In species like humans, which consciously plan and experience deliberation, said reproduction presents itself in active desires as well as in hidden mechanisms. The earliest art of human beings has reproductive themes (King, 2015) and such representation is robustly cross-cultural, making such concerns and expressions species typical. However, approximately 15 percent of every human population is affected by the inability to conceive at some point in their reproductive lives (Inhorn & Van Balen, 2002; Hughes & Da Silva, 2011). In a study looking at international estimates, Boivin et al. (2007) reported that 56% of couples seek medical intervention for infertility.

Assisted Reproductive Technologies (ART) were introduced to Ireland in 1999. An analysis of ten years since that point showed the number of ART treatment cycles increased by 265% (Naasan et al. 2012). The number of those availing themselves of treatment is rising because of women's interests in delaying pregnancy, and their increased awareness about advances in medicine and technology (Rayner, Willis & Burgess, 2011; Mosajanelad & Koolee, 2013). An analysis of world data for 2006 put average delivery rate from In-Vitro-Fertilization (IVF) treatment at 20.5% per aspiration and 25.2% cumulative from a single started treatment cycle (ESHRE – European Society of Human Reproduction, 2011).

The risk of permanent childlessness is 6% when women delay pregnancy attempts until age 30, 14% when those attempts begin at 35 and 35% when they begin at 40 (Lockwood, 2011). Among couples confronted with reproductive difficulties, 50% will likely never bear children (Ridenour, Yorgason &Petersen, 2009). Infertility has long been conceptualized as primarily a female issue. Despite the broadening roles available to women in Western societies, motherhood is still emphasized as their primary social role (Parry, 2006). The desire to experience genetic and gestational connections to one's offspring is perceived as normal and natural (Park, 2006). While there is nothing unnatural about adoption or fostering it is also notable than humans, along with many other animals, have a suite of adaptations making them more likely to show preferences for their own genetic kin (Daly & Wilson, 1998).

Regardless of the causes of infertility, most of the fertility treatments are aimed at the female partner. The men in this process are marginalized with their role often reduced to providing a semen sample on time (Mikkelsen, et al. 2012). The available treatment methods have steadily developed to address and manage more and more aspects of the biology of fertility. IVF itself is

only one among many other strategies that expands the traditional notion of human reproduction. While ART has given hope to millions of couples suffering from infertility, it has also challenged some ideas about life, nature and the human. These new technologies introduced ethical, legal, and social challenges (Brezina & Zhao, 2012). As noted by Konrad (2003) dealing with the kinship implications of ART frequently entail unresolved processes of moral decision-making.

New technology can often raise moral questions that did not previously exist. For instance, it is now possible to prolong life with artificial processes that replicate failed natural ones, or to support premature children who would previously never have survived. Both these sets of technologies raise specific questions about euthanasia and abortion that previously would not have occurred (see Eden & Callister, 2010, for a review) Similarly, ART can set our common-sense or traditional moral notions against current possibilities. Examples could be the role of three genetic parents in a child's life, or the possibility of children with no biological father through the use of artificial sperm. Less extreme, though by no means unimportant, ART can raise questions for individuals about their relationship to roles and processes normally not put under scrutiny.

One obvious area of new tension results from the change in the fact that conception can occur outside the usually understood boundaries of body and self. In addition, the phase of pre-conception, which can last for years, becomes a significant part of this process. ART furthermore is a catalyst in the commodification of genetic material (Bokek-Cohen & Gonen, 2015). Social egg freezing became a viable option for women who wish to preserve their fertility, and delay childbearing. This treatment method can be invested with redemptive power for some users. Past and future become meaningful and valuable, rather than being perceived as time lost or wasted (Mertes & Pennings, 2011; Waldby, 2015). This topic of discussion had become popular in the news media and in high end women's magazines, for example Vogue. Waldby (2015) noted that for most of the women in her study, their initial knowledge of egg freezing came either from print media coverage, or from the experience and knowledge of their peer group. The same technologies that enable some infertile people to become genetic parents also place the whole notion of genetic parenthood in jeopardy (Hafstein, 2007). Distributed motherhood, having the biological, the gestational and social mother separated (Inhorn & Van Balen, 2002; Haynes & Miller, 2003) has become a possibility. Facts and values remain conceptually distinct (Hume, 1888). However, new facts—in the form of scientific advances—can generate new areas to respond to, in that characteristically human way of meaning-making.

The current study considers how knowledge and awareness of reproductive issues and ART influences understanding of personal fertility.

Method

Following institutional ethical approval for the study, data was collected using an on-line survey which included sections on demographics, knowledge of fertility, knowledge of ART, personal fertility and attitudinal questions to ART.

611 Irish participants were recruited through third level education institutions and a variety of social media platforms. All were aged 18 or over. Prior to starting the survey, participants were given information on the study and it was noted that 'By completing the questionnaire you are agreeing to take part in this study. No personally identifying material will be collect and you can withdraw from the study at any point up to submission of your responses'.

The survey consisted of a variety of open and close-ended questions—designed by the researchers—and focussed on knowledge of and attitudes to ART, There was a section at the end presenting vignettes of reproductive scenarios. in order to prompt moral reactions to ART and permitting validation of the initial typology generated through latent class analysis.

Results

Demographics.

The sample comprised 611 participants. Mean age was 23.28 (*SD 7.78),* median age 20 years. The Age range was from 18 to 78. Overall, 21.7% identified as male, 77.9% as female, and fewer than 1% either identified as transgendered or preferred not to answer.

Analysis.

Key discriminating elements of the questionnaire were subjected to latent class analysis to reveal any underlying trends in the data. These elements were sex (categorical), educational level (treated as ordinal) and the pattern of answers to the attitudinal questions to ART. Participants were asked to assess the validity of potential objections to ART on a 6 point Likert scale where (1) indicated 'totally invalid' and (6) indicated 'totally valid'. The questions pertained to naturalness; messiness; fate; expense; hubris; redirection of health care resources; time; pain, need to take drugs; invasiveness, and impersonality.

Age (squared) was treated as a covariate in order to control for possible linear age-related factors.

Table 1: Latent class analysis of survey data

Model	LL	BIC(LL)	Npar	L^2	df	p-value
1-Cluster	-11370.7635	23153.7476	64	18121.7364	563	2.9e-3392
2-Cluster	-10802.4908	22126.6982	81	16985.1909	546	5.4e-3166
3-Cluster	-10614.5060	21860.2248	98	16609.2214	529	1.1e-3099
4-Cluster	-10480.1634	21701.0356	115	16340.5361	512	6.4e-3056
5-Cluster	**-10385.0154**	**21620.2357**	**132**	**16150.2401**	**495**	**1.0e-3028**
6-Cluster	-10334.0571	21627.8152	149	16048.3235	478	3.6e-3020

The 5-Cluster model bold was preferred.

Latent class analysis is somewhat akin to K-means cluster analysis in that it is model-based but allows the modeller to relax certain parameters to produce a good fit. The lowest score on Bayesian Information Criteria (BIC) is generally considered the best fit for the data and here the lowest BIC was for the 5-cluster model.

A typology of five clusters was revealed. This typology was validated against other self-descriptions, and used to predict attitudes to ART in other populations. The five clusters were called 'Worried Yet Willing', 'Live and Let Live', 'Disengaged', 'Judgemental' and 'Conflicted'.

Table 2: Cluster descriptors

Cluster	Cluster Name	Mean Age	n	%
1	Worried Yet Willing	28.7	192	31.4
2	Live and Let Live	19.2	130	21.3
3	Disengaged	22.8	63	10.3
4	Judgemental	19.1	155	25.4
5	Conflicted	31.1	71	11.6

Cluster 1, 'Worried Yet Willing', constituted 31.4% of the sample (n=192). It contained all those who preferred not to declare their sex (n=5) but was otherwise (77%) likely to be female with a generally high educational level (75% undergraduate level or above). The mean age was 28.7 years. While they were worried about the expense of ART (M= 5.3) and how time consuming it might be (M= 3.5), they otherwise scored in the mid-range and would be willing to engage with ART if necessary.

Cluster 2, 'Live and Let Live', comprised 21.3% of sample (n=130). This cluster contained the only declared transsexual participants (n=2) but was otherwise predominantly female (80.3%). 98% of this sample were of educational level of secondary or below. They had a mean age 19.2 years. They scored in the low range for all objections (next to cluster 5) but especially low for the "unnatural" (M=1.5); "fate" (M=1.39) and "playing god" objections (M = 1.18).

Cluster 3 was labelled 'Disengaged'. It was the smallest grouping (10.3% of sample, n=63) and were more likely than any of the other cluster to be male (though the female percentage was still in majority with 68.8%). There was a bimodal educational distribution with 60% having secondary level or below, and 26% having undergraduate level or above. The mean age of this group was 22.8 years. They scored the lowest in all the questions of validity of objections in comparison to the other clusters, typically finding all objections to ART to be "somewhat" or "totally" invalid.

Cluster 4 (n=155) fell within the 'Judgemental' cluster. Similar to the 'Live and Let Live' cluster these participants tended to be younger (mean age of 19.1 years). They were predominantly female (79%) with a typically lower educational level (97% with secondary level or below educational level). Unlike the 'Live and Let Live' cluster, the 'Judgemental' group tended to view ART as unnatural (M = 3.2), against fate (M = 2.8), playing god (M = 2.4) and taking resources from other medical care (M= 2.6).

Cluster 5, 'Conflicted', comprised 71 participants, 77.8% of this cluster were female. This cluster had the highest mean age (M= 31.1 years) of all five clusters and the highest average educational level of any of the clusters (82% were of undergraduate level or higher, with 33% having a master's level of education or above). These participants were conflicted in that they were worried about their own fertility yet scored the highest in accepting arguments against ART in all categories.

In order to validate these clusters, we used them to see if they would predict answers to the questions about describing attitudes to fertility. Multivariate analysis on the 8 self-description questions was performed and overall there was a significant main effect (Roys Largest Root = 0.2, partial eta squared = 0.166, $p < .001$ F= 15.02, observed power = 1.0). Validation — in answer to the "would you consider using ART (self or partner) this predicts membership of clusters 4 or 5 (n= 611, chi squared = 38.1, df = 4 p <.001)

Cluster 1 ("Worried Yet Willing") scored highest in "would consider as get older"; Cluster 2 ("Live and Let Live") were least worried about moral concerns; Cluster 3 ("Disengaged") scored low in all descriptions apart from "this will increase in importance as I get older"; Cluster 4 ("Judgemental") scored lowest in predicting use of ART and Cluster 5 ("Conflicted"), despite

being of an age where ART would be likely to be helpful, and self-describing as worried about their fertility, were most likely to reject it on grounds of unnaturalness and moral concerns.

Overall there was a main effect of the cluster type on attitudes to others use of ART (Roy's largest Root = 0.41, $F = 4.26$, $p < .001$, partial eta squared = .29, observed power = 1.0).

Across all cases, Clusters 4 ("Judgemental") and 5 ("Conflicted") had the strongest objections to the use of ART; although it should be stressed that no group had very strong objections to others' use of ART.

Discussion

New technologies bring both threats and opportunities. This has been obvious in the case of early interventions for previously unviable children, and late interventions that can prolong life. However, comparatively little research has been done into the psychological impact of ART on potential service users.

Ireland offers an excellent opportunity to assess the impact of these newly introduced technologies on a population which has not yet had chance to get used to them. This study represents a first pass at sketching out the terrain of understandings in this population with a relatively high number and, in some ways, demographically-representative sample. This last point is to be qualified by the fact that only just over one fifth of respondents were male. However, this proportion is in line with previous studies where males tend to be under-represented in analysis of reproductive behaviours (see Thompson & Lee, 2011 for a more extended discussion of this). Follow-ups might specifically target male respondents to explore attitudes To ART in greater depth.

The questions we asked were somewhat informed by Haidt's (2006) moral foundation framework to determine understanding how people frame medical interventions in terms of naturalness/unnaturalness. We found that participants split along two main discriminatory axes those of factual knowledge, and moral concern. Most potential users in Ireland were non condemnatory of the technologies but demonstrated a lack of knowledge of what was involved in their use. There was also a small group who did not know how these technologies would affect them. Unsurprisingly this group contained most of the males in the sample, but more surprisingly a number of young females also fitted this profile. Interestingly, while this group were disengaged from the relevance of ART for them currently, they were willing to participate in a survey on

fertility—perhaps suggesting that they may be an audience who would be open to information on these issues. In a similar vein, it would be useful to collect data on those planning to have families, and to detail what time-frame they envisage this occurring in.

Given that effective use of ART often requires earlier intervention that most of the population are aware of, this lacuna in understanding should be of interest to fertility health experts. For instance, a lot of potential users are unaware that to maximise effectiveness of (say) egg freezing it should be taking place in their 20's not left until later in the reproductive life. This also generates a raft of new ethical issues which might be addressed in sex education classes.

Detailed data were not collected allowing us to understand why participants have the moral attitudes they do. This presents a challenge to interpreting the data, but also opportunities for future research. The intention is to follow up with sophisticated vignette based studies (similar to those in the moral foundations framework (Haidt, 2006)) to more effectively unpack the individual patterns of moral preferences and reasoning underlying these attitudes.

Conclusion

Across generations, there was a persistent theme in a small but significant section of the population that ART is "against nature". Fatalism and the attitudes attendant upon it (such as the idea that earthly success reflects moral quality) are issues worth pursuing in their own right. In this group, the fatalist intuition survives personal concerns about fertility. Knowledge of the details of ART remains patchy, despite ART existing in Ireland for close to a generation now.

Ireland presents a raft of interesting challenges and opportunities. A highly family-oriented and religious culture that still restricts access to abortion, yet willing (for example) to be the first country to embrace homosexual marriage through a popular vote. Against this backdrop the growing willingness of people to talk about fertility-related issues, rather than have them relegated to the category of things in the shadows is welcome. However, it is still a work in progress.

References

Bokek-Cohena, Y. and Gonen, D. L. (2015). Sperm and simulacra: emotional capitalism and sperm donation industry. *New Genetics and Society*, Vol. 34(3): 243 –273.

Boivin, J., Bunting, L., Collins, J. A. and Nygren K. G. (2007). International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. *Human Reproduction*, Vol. 22(6):1506-12.

Brezina, R. B. and Zhao, Y. (2012). The Ethical, Legal, and Social Issues Impacted by Modern Assisted Reproductive Technologies. *Obstetrics and Gynecology International,* Vol. 2012:1-7.

Daly, M., & Wilson, M. (1998). *The truth about Cinderella: A Darwinian view of parental love*. Yale University Press.

Eden, L. M., & Callister, L. C. (2010). Parent involvement in end-of-life care and decision making in the newborn intensive care unit: an integrative review. *The Journal of perinatal education*, *19*(1), 29.

Haidt, J., & Graham, J. (2006). Planet of the Durkheimians, where community, authority, and sacredness are foundations of morality. In J. Jost, A. C. Kay & H. Thorisdottir (Eds.), Social and psychological bases of ideology and system justification.

Hafstein, Tr. V. (2009). Spectacular Reproduction. Ron's Angels and Mechanical Reproduction in the Age of ART (assisted reproductive technology). *Journal of Medical Humanities*, Vol. 28(1):3-17.

Haynes, J. and Miller, J. (ed.) (2003). *Inconceivable conceptions. Psychological Aspects of Infertility and Reproductive Technology.* Brunner-Routledge. Taylor and Francis Group.

Hughes, E. G. and Da Silva, A. M. (2011). A pilot study assessing art therapy as a mental health intervention for subfertile women. *Human Reproduction*, Vol. 26(3):611–615.

Hume, D. (1888). *A Treatise of Human Nature: Reprinted from the Original Edition in Three Volumes*. S. L. A. Selby-Bigge (Ed.). Clarendon Press.

Inhorn, M. C. and Van Balen, F. (ed.) (2002). *Infertility Around the Globe*. University of California Press.

King, R. (2015). Venus in Mammoth Furs: Modern Minds with Dark Corners? *Mankind Quarterly*, *55*(3), 205.

Konrad, M (2003). From Secrets of Life to the Life of Secret: Tracing Genetic Knowledge as Genealogical Ethics in Biomedical Britain. *Journal of Royal Anthropological Institute*, Vol. 9:339-358

Lockwood, M. G. (2011). Social egg freezing: the prospect of reproductive 'immortality' or a dangerous delusion? Reproductive BioMedicine Online Vol. 23:334-340

Mertes, H. and Pennings, G. (2011). Social egg freezing: for better, not for worse. Reproductive BioMedicine Online Vol. 23:824 829

Mosalanejad, L. and Koolee, K. A. (2013). Looking at Infertility Treatment through The Lens of The Meaning of Life: The Effect of Group Logotherapy on Psychological Distress in Infertile Women. *International Journal of Fertility & Sterility*, Vol. 6(4): 224–231.

Naasan, M., Waterstone, J., Johnstone, M. M., Nolan, A., Egan, D., Shamoun, O., Thompson, W., Rishi, R., Wingfiled, M., Harison, R. F. and Mocanu, E. (2012). Assisted Reproductive Technology Treatment Outcomes. *Irish Medical Journal*, Vol. 105(5):136-9.

Park, M. S. (2006). Adoptive Maternal Bodies: A Queer Paradigm for Rethinking Mothering? *Hypatia,* Vol. 21(1):201-226.

Rayner, J., Willis, K. and Burgess, R. (2011). Women's Use of Complementary and Alternative Medicine for Fertility Enhancement: A Review of the Literature. *The Journal of Alternative and Complementary Medicine*, Vol. 17(8):685-690.

Ridenour, F. A., Yorgason, B. J. and Peterson, B. (2000). The Infertility Resilience Model: Assessing Individual, Couple, and External Predictive Factors. *Contemporary Family Therapy,* Vol. 31(1):34–5.

Thompson, R., & Lee, C. (2011). Fertile imaginations: Young men's reproductive attitudes and preferences. *Journal of Reproductive and Infant Psychology*, *29*(1), 43-55.

Waldby, C. (2015). 'Banking time': egg freezing and the negotiation of future fertility. *Culture, Health & Sexuality*, Vol. 17(4): 470–482.