Newcastle University ePrints

Goswami M, Murdoch A, Haimes E. To freeze or not to freeze embryos: clarity, confusion and conflict. *Human Fertility* 2015. DOI: 10.3109/14647273.2014.998726

Copyright:

© Informa Healthcare 2015

DOI link to article:

http://dx.doi.org/10.3109/14647273.2014.998726

Date deposited:

29/05/2015

Embargo release date:

07 February 2016

This work is licensed under a Creative Commons Attribution-NonCommercial 3.0 Unported License

Newcastle University ePrints - eprint.ncl.ac.uk

Title: To freeze or not to freeze embryos: clarity, confusion and conflict.

Authors: M. Goswami, A.P. Murdoch, E. Haimes

Abstract

Although embryo freezing is a routine clinical practice, there is little contemporary evidence on how couples actually make the decision to freeze their surplus embryos, or of their perceptions during that time. This study explores this neglected area. This is a qualitative study of 16 couples who have had IVF treatment. The study question was: ‘’What are the personal and social factors that patients consider when deciding whether to freeze embryos?” The study shows that while the desire for a baby is the dominant drive when contemplating whether to freeze embryos, couples’ views revealed more nuanced and complex considerations in the decision making process. It was clear that the desire to have a baby influenced couples’ decision-making and that they saw freezing as ‘’part of the process”. There were confusions associated with the term ‘’freezing” related to concerns about the safety of the procedure. Despite being given written information, couples were confused about the practical aspects of embryo freezing, which suggests that couples were preoccupied with the immediate demands of IVF. Couples expressed ethical conflicts about freezing ‘’babies”. Findings from this study will inform clinicians and assist them in providing support to couples confronted with the difficult decision-making.

22 **Key words:** cryopreservation, embryo freezing, decision making

23 Introduction

24 Cryopreservation of surplus embryos is a standard practice in most IVF units.
25 According to HFEA data, there were 8,959 cycles using frozen-thawed embryos
26 in 2008 in the U.K (Human Fertilisation and Embryology Authority, 2011),
27 which increased to 10,548 cycles in 2010, resulting in 2,032 live births from the
28 frozen-thawed embryo cycles in 2010 (Human Fertilisation and Embryology
29 Authority, 2012). The benefits of freezing good quality surplus embryos following
30 fresh embryo transfer include the replacement of the thawed embryos on several
31 different frozen embryo transfer cycles (FET) using the stored embryos. This
32 potentially maximises the use of a single egg collection procedure in IVF in terms
33 of transferring embryos on multiple occasions (Trounson and Mohr, 1983). It also
34 eliminates the need for repeated ovarian stimulation and egg collection
35 procedures, and the associated risks, but still gives women another opportunity
36 to have a baby. Furthermore, it gives every good-quality embryo a chance to
37 develop into a baby, rather than being discarded. Whilst these arguments are
38 legitimate, they also smooth over the complex decision making by the couples
39 involved, especially in view of the contentious ethical nature of this practice.

40 The moral status of the elusive entity, 'the embryo', has been extensively debated
41 in the literature (Haimes and Luce, 2006; Waldby and Squier, 2003). It is argued
42 that the practice of freezing embryos can be associated with various ethical
43 dilemmas, such as the paradox of freezing life (Lyerly, et al., 2006; Parry, 2003).

44 Qualitative research has demonstrated that IVF couples can have a range of
45 views regarding their frozen embryos. Some perceive their frozen embryos as no
46 different from "virtual children whose development was suspended", as described
47 by de Lacey (2007) and interviewees have described them as their "babies" (de
48 Lacey, 2005; de Lacey, 2007; Haimes, et al., 2008; Nachtigall, et al., 2005; Parry,
49 2006; Söderström-Anttila, et al., 2001; Svanberg, et al., 2001; Svendsen and
50 Koch, 2008). To many individuals, frozen embryos are siblings to their existing
51 children (Nachtigall, et al., 2005), whereas some see the embryos as 'seeds'(de
52 Lacey, 2007).On the other hand, others perceive the frozen embryos as
53 "inanimate tissue" or "a bunch of cells" (Fuscaldo, et al., 2007).

54 There are suggestions that couples perceive freezing embryos as establishing an
55 "insurance policy" for the future, as "backup" embryos in case current IVF
56 treatment fails, or in the situation of anything happening to their existing
57 children (Bankowski, et al., 2005; Koryntova, et al., 2001; Stoleru, et al., 1997).
58 In the sparse evidence that is available, couples have cited the following reasons
59 for embryo freezing: providing security and hopefulness (Lyerly, et al., 2006;
60 Nachtigall, et al., 2009; Svanberg, et al., 2001), reducing stress (Bankowski, et
61 al., 2005; Koryntova, et al., 2001; Stoleru, et al., 1997) and "buying time"
62 (Haimes and Taylor, 2009). There is some evidence that a few couples are
63 sceptical about embryo freezing because of concerns regarding the health of the
64 potential children (Svanberg, et al., 2001) and worries about laboratories
65 mishandling embryos (Bankowski, et al., 2005).

66 Most previous studies report the attitudes of patients whose embryos have
67 already been frozen. Little is known about their actual decision-making process
68 about freezing which occurs at one of the most stressful times during the IVF
69 treatment process. At this stage the embryo cohort includes those of differing
70 potential and the decision on freezing needs to be made within a short time
71 period. Furthermore the outcome of treatment is unknown. To help them
72 through this stage, it is relevant to understand how patients perceive their
73 embryos at this time and how they make decisions. This paper reports the
74 second part of a larger two part post-graduate study, which examined two
75 related aspects: first, an evaluation of the influence of embryo freezing on in
76 vitro fertilization (IVF) success rates and second, an exploration of the decision-
77 making process through which couples decide whether or not to freeze any
78 surplus embryos. The findings of first part of the study showed a modest increase
79 in the overall cumulative pregnancy rates following embryo freezing (Goswami,
80 et al, 2013).The aim of the second part of the study was to bridge the gap in the
81 literature on how couples make decisions about embryo freezing by interviewing
82 couples just after they have completed an IVF treatment. The aim was to provide
83 information for clinicians so that they can better assist couples confronted with
84 difficult decision making. The central research question for this part of the study
85 was: 'What are the personal and social factors that patients consider when
86 deciding about freezing embryos?' This paper outlines the various issues which
87 emerged from this exploration.

Materials and Methods

This study was conducted in a tertiary care centre in the north-east of England, following appropriate approval from the Newcastle and North Tyneside Local Research Ethics committee. Due to the scarcity of evidence in the literature, a hypothesis generating, rather than hypothesis testing, research design was adopted. One possibility was to conduct “purposive or systematic sampling”, which involves the deliberate, theoretically led choice of respondents (Pope and Mays, 1995), but due to the lack of previous evidence, “heterogeneity sampling” was conducted, where the categories of sampling were tentative to allow for the widest variation in responses and with the goal of reaching thematic saturation (Silverman, 2001). The aim was to recruit couples who had just been through at least one IVF treatment, and who thus had had to consider the prospect of freezing embryos, interviewing them while the process of IVF was still a ‘’live”, active issue in their minds. However, a limitation of this study was that it failed to capture the perceptions of certain froups of couples, for example those with strong reservations against embryo freezing, or those with existing children, which could potentially have influenced their views on this issue. Two hundred letters were sent to couples attending the clinics following IVF treatments, as well as those attending ultrasound scans to confirm pregnancy. Sixteen couples expressed interest in participating in the research, comprising couples who were successful as well as unsuccessful following the preceding treatment. The response rate was in keeping with the experience from other qualitative research experience at this centre. After obtaining informed consent, qualitative

111 interviews were conducted with a semi-structured questionnaire informed by
112 issues identified from the literature. Interviews encompassed the couples'
113 demographic details and fertility history, their views on frozen embryos and
114 embryo freezing, their views on any benefits from, and any concerns about,
115 embryo freezing, their experiences of freezing if applicable, and the information
116 they received about embryo freezing. Each interview lasted between 60 and 90
117 minutes. Both partners were encouraged to participate in the interview and
118 express their views without any inhibitions. All the participants seemed to have
119 a sufficient understanding and command of English. The interview was "semi-
120 structured", with an open-ended approach and the aide-memoire was only used
121 from time to time to guide the interview. New ideas emerging from the early
122 interviews were introduced in subsequent interviews in order to compare and
123 elicit similarities, dissimilarities, or contrasting views of different individuals,
124 and the nuances of the emerging themes. There were no new themes emerging
125 towards the later interviews, implying that thematic saturation of data was
126 achieved.

127 The interviews were transcribed and thematic analysis was performed, based on
128 identifying similarities, dissimilarities, conflicts, variations and ambiguities of
129 the responses, using the "constant comparison" technique. Possible relationships
130 in the data were identified and several hypotheses were derived, using 'inductive
131 theorizing'. Analysis of "deviant" or negative cases (that is, cases which seem to
132 contradict the emergent themes) was also performed (Pope, et al., 2000;
133 Silverman, 2001).

Results

Sixteen interviews were conducted: 5 couples had frozen embryos and 11 couples did not, owing to a lack of suitable embryos to freeze. The broad categories that emerged from the thematic analysis were as follows: the context of couples' infertility experiences; their fertility treatment history; their views of the frozen embryo; their views regarding the perceived benefits and difficulties of embryo freezing; financial factors influencing their decision on embryo freezing; information that the couples obtained about embryo freezing; couples' experiences of making the decision to freeze their embryos, and their views of the clinic professionals. Salient features from these themes which are relevant to clinicians and practitioners in understanding the perspectives of couples, and potentially useful in providing support to the couples, are discussed below. Essentially, all the couples, given the opportunity, were in favour of freezing their embryos, to maximise the chances of having a baby. Nonetheless, their decision making was nuanced; various facets of their concerns, reservations, views, expectations are presented here.

The context of infertility and the IVF experience

The key driver for couples embarking on IVF treatment was the desire to have a baby. The NHS (National Health Service) funds a maximum of 3 IVF treatments so couples were aware of their limited chances of having a baby. The strong desire to maximise their opportunity to have a baby through embryo cryopreservation was voiced by this interviewee: "*I think the more treatment cycles that we did, the more it probably would have … affected* [our decision to

157 freeze embryos]”. Her partner agreed: “*… yeah, I agree… by the time we got to*

158 *number three … it would have been last chance saloon’* (I7:1685–1740). They felt

159 pressured by the limitations on the number of funded treatment cycles and this

160 pressure, both emotional and physical, increased in successive treatments,

161 impacting directly on their decision about embryo freezing. An interesting

162 finding in this study was how the framing of IVF treatment changed over time

163 and influenced the views of many couples, who changed from seeing embryo

164 freezing as ‘freezing life’ to perceiving it as a “medical aid” or a tool to achieve a

165 pregnancy. . The following couple initially had ethical reservations about the

166 process, but changed their view: “*… what made us change our mind … on the*

167 *issue was … having had the experience of IVF …* [it] *put things into perspective*”

168 (I1: 273–290).The male partner later continued: “*… we came to view IVF and*

169 *even the freezing part just as a ‘medical aid’ … to someone who can’t really*

170 *naturally have babies”* (I1: 927-960).

171 **Conceptualising the frozen embryo**

172 The way the couples envisaged embryos, for example as a ‘living entity’ or a

173 ‘baby’, or as ‘tissue’, underpinned their decision-making process.

174 Couples who saw embryos as “babies” also saw frozen embryos as babies; the

175 “frozen” prefix did not alter their opinion. The following interviewee perceived

176 his frozen embryos as : *“Just my babies in waiting … waiting to get a place to*

177 *grow … so I don’t think the word “frozen” really matters in that context”* (I11:844–

178 861).

179 There were also couples who were not quite comfortable with the paradoxical
180 concept of freezing their babies, as this interviewee expressed: "*I would be*
181 *thinking: I've frozen my kids.* (Laughs) *…and I don't think I would like that very*
182 *much, to be honest … they could turn into children and we've actually got them*
183 *frozen"* (I8:975–1013).

184 Uncertainties about the concept of the embryo emerged from the interviews. The
185 interviewees' deliberations showed how their conceptualisation of the embryo
186 changed over different phases of the IVF treatment, reflecting the dynamic
187 nature of the concept of the embryo. One interviewee commented: "*To me, when*
188 *I've got sort of rational, sensible head on … it's cells. When I'm on the Menopur*
189 [laughs] *… and hormones are kicking in … then it becomes, I think, a life"*
190 (I4:1632–1677). The couples, although not easily able to articulate and
191 characterize their concepts of the frozen embryos, were not paralysed by the
192 uncertainty of the conceptualization. Instead, in their deliberations, the couples
193 acknowledged the uncertainty of what the embryo is, but this confusion did not
194 dissuade them from going ahead in their journey through IVF treatment; they
195 moved on in the pursuit of having a baby.

196 Regardless of the initial framing of their conceptualisation of frozen embryos,
197 many couples came to perceive the process of creating or freezing embryos as a
198 scientific exercise. One interviewee commented: *"it's just part of the proce*ss
199 (I4:1881–1893) *… it's a means to an end, isn't it?"* (I4:2601–2614).This
200 deliberation further demonstrates the metamorphosis of couples' views in seeing

201 the embryos, and seeing freezing as a 'medical aid' to achieve the goal for a baby,
202 rather than as a 'life'. Rather than seeing the embryo as the beginning of a baby,
203 which could potentially lead to ethical and moral dilemmas when considering
204 freezing, couples started to view the frozen embryo in a more instrumental
205 fashion, as part of the IVF process, towards the ultimate goal of having a baby.
206 Thus, freezing is viewed as a means to an end, as just another step towards
207 achieving their ultimate objective. This change in view seems to suggest a
208 "transformation" in the IVF journey. Conceptualising the embryo as a scientific
209 or medicalised entity enabled them to overcome their moral dilemma and sense
210 of guilt regarding freezing 'life'. This transformation allowed them to maximise
211 their opportunities of being a parent on one hand, and overcoming any ethical
212 reservations on the other.

213 **Views on embryo freezing**

214 Couples' views on the benefits or concerns regarding embryo freezing were as
215 follows:

216 ***i. Extra chance***

217 The experiences of going through IVF treatment, and its many uncertainties,
218 taught interviewees to value embryo freezing more than they had when setting
219 out on IVF, as is captured in this interview: *"… having been through the process,*
220 *I very strongly believe that you need to maximise your chances now as I very*
221 *strongly believe that you should freeze embryos if you get the opportunity…"* (I7:
222 1741–1772).

223 An appreciation of the extra chance of having a baby from frozen embryos
224 propelled the decision-making of the majority of the interviewees; some
225 described it as a "bonus": *"… you only have a limited number of goes on the NHS*
226 *and by freezing embryos you potentially circumvent that a little bit …"* (I7: 953–
227 973). There was also a sense of freedom in being able to extend the chances of
228 pregnancy beyond the regulated three NHS-funded treatments.

229 ***ii. Control and ownership***

230 To some couples, embryo freezing was their opportunity to exercise autonomy in
231 deciding the fates of the embryos they 'owned'. This interviewee mentioned:

232 *"… so if I wasn't allowed to freeze them, I would have a lot of problem with that –*
233 *not knowing what was going to happen to them … then I've lost control of that*
234 *decision erm and because they're my embryos … so surely it's for us to make that*
235 *decision as to what happens to them …"* (I9:677–752). This deliberation testified
236 that embryo freezing can reinforce the feeling of being in control in couples who
237 seem to be suffering from a feeling of lack of control, due to their subfertility. It
238 also helps them to exercise their autonomy regarding the fate of "their" embryos,
239 which couples distinctly see as belonging to them.

240 ***iii. Insurance Policy***

241 When the concept of embryo freezing as an insurance policy, as cited in the
242 literature, was introduced to the interviewees, there was a polarized response,
243 with some supporting and others refuting it on ethical and other grounds. The

244 following interviewee said in support: *"If this* (fresh IVF treatment) *doesn't work*
245 *– you fall back on your insurance policy, isn't it?"* (I7X:948–978).

246 However, another interviewee disapproved of the term, not only because it failed
247 to respect the emotions and aspirations of the couples, but also because it had
248 business and financial connotations. In her view, the term was a misnomer, as
249 there was no reimbursement, as there would be with an insurance policy: "…
250 *that kind of terminology to me shows a lack of understanding about why people*
251 *go through this … it sounds like the kind of business decision. So the terminology*
252 *kind of doesn't fit really ... an insurance policy… when this one goes wrong it's an*
253 *immediate swap and an immediate replacement which obviously … it isn't really*
254 *for this kind of process"* (I7:849–905).

255 Freezing embryos was seen by many as being a "backup", in case of failure of the
256 fresh cycle. As one interviewee said: … *if something went wrong or if … we*
257 *suddenly changed our minds in the future and thought: let's give it one more go –*
258 *there is that back up."* (I4:740–752). She carried on: *"Again it's like I suppose*
259 *what you call belt and braces – isn't it …"* (I4:1375–1402).

260 ***iv. Concerns***

261 A few individuals had reservations about any potential harm to embryos from
262 freezing, as there is uncertainty surrounding the fate of frozen embryos. One
263 interviewee deliberated: *"… I think somehow morally it's not right. Because …*
264 *what happens if those embryos are not placed in a womb where they can grow and*
265 *become babies? What happens with them?"* (I1:418–437). He had mentioned

266 earlier on: "… *Because we wouldn't like any spare embryos just left somewhere*

267 *waiting in limbo"* (I1:384–386).

268 Many interviewees worried about the safety of the process, and any ill effects on

269 the health of the resultant offspring. The association with freezing food was a

270 common theme and added to their concern. One interviewee commented: *"It*

271 *sounded a little bit scary I guess."* (I12:253–267). She continued: *"... I know it's*

272 *not done in the same way but if you put something in your freezer and it's not*

273 *wrapped up properly you get freezer burn and therefore it's useless afterwards*

274 *…you hear about it* (embryos) *stored for a number of years; well you don't store*

275 *things like food for a number of years"* (I12:359–379).

276 **Other key factors influencing couples' decision making**

277 ***i. Funding issues***

278 A key finding in this study was that financial issues had a major impact on the

279 decision-making on embryo freezing The majority of the couples appreciated the

280 NHS funding for embryo freezing and found the 12 months funded storage period

281 to be of huge benefit, especially in view of the economic climate. One interviewee

282 commented: "*it* (NHS funding) *gives you a chance to move on and research and*

283 *make your decisions. ..it gives you a window of time. I think you need to keep*

284 *that… if there was a financial penalty from day one I think it would put a lot*

285 *more people in a lot more stressful position"* (I5:1372-1421).

286 The decision to freeze surplus embryos for the future became almost automatic

287 in the presence of NHS funding, which appears to relieve some of the burden of

288 decision-making. For example, one couple said with reference to NHS funding,

289 *"... I think we would just very instinctively have them* (frozen)*…there wouldn't be*

290 *much thinking"* (I6:672-721). He later said: *'' Yeah, it's a no brainer"* (I6:1196-

291 1205).

292 However, for those couples funding their treatment privately, the decision-

293 making was more carefully thought out; the potential expenses of freezing and

294 storing embryos, and then having a frozen-thaw cycle were calculated against

295 the cost of a fresh IVF cycle. One interviewee said, "so *you freeze it, keep it for*

296 *years and defrost it and it doesn't survive…what's the point? You could have*

297 *saved that money… There's half your money towards your full IVF treatment so*

298 *you might get a better chance"* (I9:1451-1566).

299 On the other hand, for some private fee paying couples, the positive aspects of a

300 frozen cycle, such as shorter treatment duration, less invasive treatment, and

301 lower fees compared to those for a fresh cycle, almost counterbalanced the

302 negative considerations of, for example, reduced success from frozen embryos.

303 One interviewee commented: *"I don't see that that extra ten per cent lower*

304 (success rate) *is going to make any difference. And it's almost counter balanced by*

305 *the fact that the frozen cycle is so much less intrusive … and there's less trips back*

306 *here for scans and … that I'm paying less* (in frozen cycle, compared to the

307 fresh)*so yes, the success rates aren't that good but the other part of it is actually*

308 *much easier'* (I9:1607–1639).

309 ***ii. Information regarding embryo freezing***

310 All couples embarking on IVF treatment were given detailed written and spoken
311 information about IVF, including embryo freezing. However, at the beginning of
312 treatment, freezing embryos was a secondary issue, as couples were preoccupied
313 with their immediate treatment, the complexity of which demanded intense
314 attention, especially in the first cycle. This is reflected in this interviewee's
315 comment: "*We've never, honestly, all the way through we've never really thought*
316 *about embryo freezing,…what implications that will have …because we were just*
317 *taking one step at a time. We weren't thinking about* (it) *too much because it was*
318 *so much to take on board at the time … So anxious [about] getting to the next*
319 *stage"* (I2:236–334).

320 A few couples, especially the ones who did not have any embryos to freeze, had
321 little or poor quality recollection about the freezing information. For example,
322 one couple had no idea that the frozen cycle could provide extra treatment in
323 addition to the three NHS-funded cycles. The woman, who had been through two
324 IVF cycles, seemed surprised: *"… So that* (frozen-thaw cycle) *wouldn't class as a*
325 *third go?* Her partner added*: I didn't know that. Well of course, it makes sense*
326 *now – doesn't it?"* (I4: 760–842).

327 Appreciating the huge volume of information, the following interviewee
328 advocated a separate session to discuss embryo freezing *"… I think … you'd need*
329 *a separate appointment about freezing embryos and you'd really need to go*

330 *through that whole decision. I think it would add a lot of info, for you to consider"*
331 (I11:1490–1546).

332 Couples deciding to freeze embryos often wanted information related to the
333 wellbeing of the future offspring. For example, several weighed any potential
334 harm to the offspring on the one hand, against the benefits of the procedure on
335 the other, before making the decision to freeze. The following interviewee viewed
336 the overwhelming desire to have a baby even at the risk of compromising the
337 health of the offspring through freezing, as "selfishness": *"We asked the*
338 *questions: what are the facts? I'd be wanting to know more about the risk factor"*
339 (I5: 1538–1571). He carried on: *"… because obviously I wouldn't want to bring a*
340 *child into the world who was so severely disabled due to a factor that I wanted a*
341 *baby so much that I was going to put their lives in such a lot of trauma … because*
342 *of my selfishness"* (I5:1572–1603).

343 **The decision**

344 The verdict from all the interviewees was that, given the opportunity, all would
345 freeze their embryos. One interview said: *"…Yeah, definitely. I don't think I*
346 *would think twice about it* (embryo freezing) *if the opportunity's there."* (I14:498–
347 508).

348 Nonetheless, it is clear from the preceding sections that their decision making
349 was nuanced and complex, as further indicated by the following interviewee. She
350 was pregnant from the fresh cycle, and in retrospect was relieved not to have any
351 frozen embryos. However, in view of the benefits of embryo freezing, she was not

352 certain about her decision in any future IVF cycle. She said: *"… I'm pleased we*
353 *didn't have that opportunity* (to freeze embryos) (laughs) *because it would have*
354 *really messed with my mind. … I know it's an extra chance and y'know if I had to*
355 *go through this again and we got the choice to have them frozen I probably would*
356 *have them frozen erm but hopefully – I don't know"* (I8:1219–1241).It is a key
357 finding of this study that some couples experienced relief at having no frozen
358 embryos after achieving a pregnancy, and hence were able to avoid any ethical
359 dilemma. This suggests that couples might make an ethical compromise by
360 freezing embryos as a result of their desire to have a baby.

361 **Discussion**

362 Contrary to other studies of couples with frozen embryos, where the embryos had
363 already been frozen for a period of time, this study focuses on a different point in
364 the IVF process. In these situations, couples' conceptualisation of frozen embryos
365 can change with time. This was evident in the situation that the Swiss couples
366 experienced (Scully, et al., 2010), with changing legislation in the country with
367 the introduction of the new law on stem cell research (LSCR) in 2004 (Scully and
368 Rehmann-Sutter, 2006). The couples had had their embryos frozen from prior to
369 2001, and with the new legislation, were faced with the options of either
370 discarding their unused embryos or donating them to stem cell research. These
371 couples distinguished the frozen embryos from "babies";the emotional
372 attachment to these embryos seemed to have disappeared, and these were
373 perceived by the couples as belonging to the biomedical domain. Thus, the
374 "embryo" can have different meanings to individuals in different socio-cultural

375 time and space (Haimes, et al., 2008).However, in the study reported here,
376 couples were interviewed just following their IVF treatment, and they had just
377 confronted the option of whether or not to freeze any surplus embryos, so this
378 decision was very likely to have been influenced by their conceptualisation of the
379 embryos at this point in time.

380 The key findings of this study were as follows:

381 1. Couples do not regard embryo freezing as an obvious or straightforward
382 decision.

383 All the couples, regardless of whether they had the opportunity to freeze their
384 embryos or not, were eventually in favour of freezing embryos to maximise their
385 chances of having a baby. While for some couples, it was a "common sense",
386 "straightforward", decision, this was in light of the uncertainties of the IVF
387 context. Other couples when reflecting on the IVF process articulated their
388 considerations in greater detail, having considered the various pros and cons of
389 embryo freezing, such as: the success rate from frozen embryos, the alternative
390 options available for disposal of the surplus embryos, and the risks versus the
391 benefits of freezing their embryos. This decision was impacted by the limitations
392 on the number of funded treatments, and the experience of the physical and
393 emotional tensions of the treatment. Therefore, prospective thinking about the
394 possibility of embryo freezing shows that it can be a nuanced and complex
395 decision to make.

396 2. The desire for a baby overcomes all ethical concerns about embryo
397 freezing.

398 Couples experience tension between the morality of freezing and their own
399 increasing vulnerability and stress. The key factor in generating ethical
400 reservations was the dilemma of 'freezing babies'. For a few couples it was
401 ethically acceptable to freeze embryos, as the embryo cannot be compared to an
402 individual, since it cannot survive independently if not transferred into the
403 uterus under congenial circumstances. However, for most couples experiencing
404 difficulty eventually the desire for a baby overcame all ethical considerations; it
405 is this tension that might have led to their coming to view embryo freezing as
406 instrumental to their needs/objectives.

407 3. IVF couples transform their views on embryo freezing to overcome any
408 reservations.

409 As discussed, developing views on embryo and embryo freezing enabled couples
410 to come to terms with the moral dilemma of freezing, the desire for a baby and
411 their own vulnerabilities. Given that embryo freezing is routinely incorporated
412 into IVF/ICSI treatment processes and is thereby normalised discursively, the
413 couples' view of it as a medicalised process can seem very natural. This
414 transition of the embryos in the perception of IVF couples into a 'utilitarian' role
415 is a unique finding of this study. The experiences of the journey of IVF as if lead
416 the couples to unravel the numerous layers of the conceptualities of the 'embryo'
417 at different stages of the process. On reaching the stage when confronted with

418 the decision to freeze or not to freeze, there is metamorphosis of their views to
419 see the 'embryo' as a medical instrument, which could just be another scientific
420 aid to help them to achieve their goal.

421 4. Embryo freezing imparts a sense of being 'in control' or 'autonomy' to the
422 couples.

423 The suggestion that embryo freezing reinforces the couples' sense of control
424 reflects findings of a past study where interviewees perceived benefits from
425 embryo freezing, as it prevented "relinquishing control", and allowed them to
426 determine the fate of their embryos (Nachtigall et al., 2009).

427 5. Does NHS funding for embryo freezing override the ethical issues in the
428 decision making process?

429 Funding for embryo freezing, whether NHS funded freezing, or private financial
430 investment, seemed to have a significant influence on the decision making. The
431 question arises whether the automatic availability of NHS funding for embryo
432 freezing overrides the ethical or other considerations of the decision making.
433 Conversely, for those who need to pay for freezing privately, the financial
434 implications and ethical considerations may have equal weight in the decision. If
435 there is concern that NHS funding over-rides ethical considerations, the option of
436 NHS-funded fresh IVF treatment without embryo freezing could be considered
437 although this would be contrary to the principles of the NHS and the NICE
438 recommendations (National Institute for Health and Clinical Excellence, 2013).
439 Levying a tariff on embryo freezing could mean that more weight and critical

440 thought is given by couples to the embryo freezing decision, rather than making
441 it a routine exercise available for free. This could, however, simply exacerbate
442 inequality amongst IVF couples. On the other hand, it is possible that underlying
443 the seemingly easy decision for freezing with the availability of the NHS funding
444 lay the difficult dilemma and hidden moral quests of many couples, regarding
445 this decision making. In this context, surely the status of an 'embryo' has a
446 significant role to play, as any finance related decision would have a totally
447 different dimension to it, if the embryo was the same as a child. Further in depth
448 research in this area would help in exploring the dilemma of couples in this
449 regard.

450 6. More information regarding embryo freezing may not influence the
451 decision made by couples.

452 Many couples were not able to recollect information regarding the practical
453 aspects of embryo freezing: its safety; success rates; freeze- thaw regulations;
454 duration of NHS funding for freezing, despite receiving detailed clear verbal and
455 written information . This could be because most couples found the information
456 overwhelming and were preoccupied with the complexities of going through IVF
457 especially the first cycle, when embryo freezing did not seem to be the focus
458 (Carroll and Waldby, 2012; Haimes and Taylor, 2009; Haimes and Taylor, 2011).
459 Therefore the question arises as to what then is the most appropriate time to
460 give couples detailed information regarding embryo freezing? There could be two
461 options. First, organizing a separate information session to discuss the different

462 issues about embryo freezing at the beginning of the IVF treatment,although
463 with associated logistic and cost implications, and the risk of unnecessary
464 information overload. The second option would be to hold a debriefing session for
465 the couples at the end of the IVF treatment, where the issue of embryo freezing
466 would be revisited in detail. This could give couples the opportunity to reflect
467 and make informed decision for the future, and also would facilitate interaction
468 with others and the exchange of views.

469 A further recommendation to fertility clinics based on the emergent data would
470 include clinics taking the initiative in facilitating discussion and communication
471 among patients e.g. developing a Web-based forum as a platform for patients to
472 share information, views and experiences. Nonetheless, the big question
473 remains whether the provision of further detailed information would make any
474 difference to couples' decision making, as the dominant desire to maximise the
475 chances to have a baby has been shown to override all other issues.

476 **Clarity, confusion, and conflict: issues for further study.**

477 From analysing the repertoire of couples' considerations, certain key areas of
478 clarity, confusion and conflict were manifest in the couples' decision on whether
479 to freeze embryos. The main issue clear in the mind of all the couples, and the
480 key factor connecting all the themes, was the desire for a baby being the
481 dominant drive for freezing embryos. Despite having various concerns, given the
482 chance, all couples, including those who did not have the opportunity to consider

483 this option in the last cycle, would freeze their embryos to maximise the
484 opportunities to have a baby.

485 There were a few issues which confused couples. The embryo seemed to be an
486 enigmatic entity, whose nature couples struggled to comprehend, and they
487 vacillated from one view to another. Couples who initially envisaged the embryo
488 as a living object, shifted their conceptualisation to seeing the embryo as a "cell",
489 or as objects generated as "part of the process" of IVF treatment. The embryo
490 thus has a dynamic conceptualisation, which fluctuated with the various stages
491 of circumstances and treatment of the couples. The subtleties in the nuanced
492 views of the embryo emerged from this study , as in previous studies
493 (Bankowski, et al., 2005; Boada, et al., 2003; Haimes, et al., 2008; Svanberg, et
494 al., 2001), along with the view that the meanings attributed to the embryo
495 shifted over the different stages of the IVF process (Haimes, et al, 2008).

496 The confusion experienced due to the potential overloading of information has
497 been discussed.

498 The major conflict, as discussed was the moral conflict of 'freezing babies'.
499 Another conflict was in perceiving embryo freezing as an ''insurance policy",
500 although it was frequently perceived as a backup in case of an unsuccessful fresh
501 cycles. Although in essence conveying a similar perception, many interviewees
502 had moral objections to the term ''insurance policy", when quoted, as a term used
503 by researchers in previous studies (Bankowski, et al., 2005; Koryntova, et al.,

504 2001; Stoleru, et al., 1997). The disapproval of the term “insurance policy” could

505 be because of the implied association between babies and money.

506 **Strengths and weaknesses of the study**

507 The main strength of this study is that it sheds light on areas that are deficient

508 in the literature, with regards to the actual decision-making process behind

509 embryo freezing, and the personal and social factors influencing that decision. A

510 good kernel of original data has emerged from these interviews, which can form

511 the basis of further in-depth research and follow up studies.

512 The authors accept that not all aspects of embryo freezing were covered in this

513 study, such as the views of those who strongly decline embryo freezing, the views

514 of those couples who already have a baby, or opinions of women in the older age

515 group. Also, no relationships with religion, education, profession and ethnicity

516 have been captured in this study, and further work needs to be done to explore

517 these areas.

518 **Conclusion**

519 This study is a maiden attempt to explore the perceptions of IVF couples when

520 confronting the nuanced and complex decision making of whether or not to freeze

521 their embryos. The clarity, confusions and conflicts of couples during the process

522 have been captured, and the findings would help clinicians provide better

523 support to couples.Accepting the few limitations of this study, the framework of

524 data generated can potentially guide future work for further in-depth study to

525 elicit more ideas of couples' views, as well as provide opportunities to test these
526 hypotheses.

527 **Authors' Roles**

528 M.Goswami co-designed and implemented the study design, conducted the
529 interviews, analysed and interpreted the results, and drafted the article.

530 A.P. Murdoch had overall responsible for the post-graduate study of which this
531 work was one part and was involved in co-design, analysis and interpretation of
532 the data, revising the article critically for intellectual content, and in final
533 approval of the version to be published.

534 E. Haimes co-designed the study, provided support for the analysis and
535 interpretation of the data, revising the article critically for intellectual content,
536 and in final approval of the version to be published.

537 **Acknowledgements**

538 We are grateful to the patients of the Newcastle Fertility Centre at Life, and to
539 all the staff who helped in recruiting the patients for interviews.

540 **Funding**

541 This study was funded by the fertility research fund of the Newcastle Fertility
542 Centre for Life.

543 **Declaration of interest**

544 The authors report no conflicts of interest. The authors are responsible for the
545 content and writing of the paper.

546 **References**

547 Bankowski, B. J., Lyerly, A. D., Faden, R. R. and Wallach, E. E. (2005). The
548 social implications of embryo cryopreservation. Fertility and Sterility,84, 4, 823-
549 832.

550 Carroll, K. and Waldby, C. (2012). Informed consent and fresh egg-donation for
551 stem cell research: the case for incorporating embodied knowledge into ethical
552 decision-making. Journal of Bioethical Inquiry,9, 1, 29-39.

553 de Lacey, S. (2005). Parent identity and 'virtual' children: why patients discard
554 rather than donate unused embryos. Human Reproduction,20, 6, 1661-1669.

555 de Lacey, S. (2007). Decisions for the fate of frozen embryos: Fresh insights into
556 patients' thinking and their rationales for donating or discarding embryos.
557 Human Reproduction,22, 6, 1751-1758.

558 Fuscaldo, G., Russell, S. and Gillam, L. (2007). How to facilitate decisions about
559 surplus embryos: patients' views. Human Reproduction,22, 12, 3129-3138.

560 Haimes, E. and Luce, J. (2006). Studying potential donors' views on embryonic
561 stem cell therapies and preimplantation genetic diagnosis. Human Fertility,9, 2,
562 67-71.

563 Haimes, E., Porz, R., Scully, J. and Rehmann-Sutter, C. (2008). "So, what is an
564 embryo?" A comparative study of the views of those asked to donate embryos for
565 hESC research in the UK and Switzerland. New Genetics and Society,27, 2, 113-
566 126.

567 Haimes, E. and Taylor, K. (2009). Fresh embryo donation for human embryonic
568 stem cell (hESC) research: the experiences and values of IVF couples asked to be
569 embryo donors. Human Reproduction,24, 9, 2142-2150.

570 Haimes, E. and Taylor, K. (2011). The contributions of empirical evidence to
571 socioethical debates on fresh embryo donation for human embryonic stem cell
572 research. Bioethics,25, 6, 334-341.

573 Human Fertilisation and Embryology Authority (2011, Nov 2010). "HFEA
574 Fertility facts and figures 2008." from http://www.hfea.gov.uk/docs/2010-12-
575 08_Fertility_Facts_and_Figures_2008_Publication_PDF.PDF.

576 Human Fertilisation and Embryology Authority (2012). "Fertility treatment in
577 2010,trends and figures." Retrieved 14.06.12, 2012, from
578 http://www.hfea.gov.uk/104.html.

579 Koryntova, D., Sibrtova, K., Klouckova, E., Cepicky , P., Rezabek, K. and Zivny,
580 J. (2001). Effect of psychological factors on success of in vitro fertilization [in
581 Czechoslovakian]. Ceska Gynekol,66, 264-269.

582 Lyerly, A. D., Steinhauser, K., Namey, E., Tulsky, J. A., Cook-Deegan, R.,
583 Sugarman, J., Walmer, D., Faden, R. and Wallach, E. (2006). Factors that affect
584 infertility patients' decisions about disposition of frozen embryos. Fertility and
585 Sterility,85, 6, 1623-1630.

586 Nachtigall, R. D., Becker, G., Friese, C., Butler, A. and MacDougall, K. (2005).
587 Parents' conceptualization of their frozen embryos complicates the disposition
588 decision. Fertility and Sterility,84, 2, 431-434.

589 Nachtigall, R. D., Mac Dougall, K., Harrington, J., Duff, J., Lee, M. and Becker,
590 G. (2009). How couples who have undergone in vitro fertilization decide what to
591 do with surplus frozen embryos. Fertility and Sterility,92, 6, 2094-2096.

592 Parry, S. (2003). The politics of cloning: mapping the rhetorical convergence of
593 embryos and stem cells in parliamentary debates. New Genetics and Society,22,
594 2, 177 - 200.

595 Parry, S. (2006). (Re)constructing embryos in stem cell research: Exploring the
596 meaning of embryos for people involved in fertility treatments. Social Science &
597 Medicine,62, 10, 2349-2359.

598 Pope, C. and Mays, N. (1995). Qualitative Research: Reaching the parts other
599 methods cannot reach: an introduction to qualitative methods in health and
600 health services research. British Medical Journal,311, 42-45.

601 Pope, C., Ziebland, S. and Mays, N. (2000). Qualitative research in health
602 care:Analysing qualitative data. British Medical Journal,320, 114-116.

603 Silverman, D. (2001). Doing qualitative research:A practical handbook. London,
604 Sage.

605 Söderström-Anttila, V., Foudila, T., Ripatti, U.-R. and Siegberg, R. (2001).
606 Embryo donation: outcome and attitudes among embryo donors and recipients.
607 Human Reproduction,16, 6, 1120-1128.

608 Stoleru, S., Cornet, D., Vaugeois, P., Fermanian, J., Magnin, F., Zerah, S. and
609 al., e. (1997). The influence of psychological factors on the outcome of the
610 fertilization step of in vitro fertilization. J Psychosom Obstet Gynaecol,18, 189-
611 202.

612 Svanberg, A. S., Boivin, J. and Bergh, T. (2001). Factors influencing the decision
613 to use or discard cryopreserved embryos. Acta Obstet Gynecol Scand 80, 849-855.

614 Svendsen, M. and Koch, L. (2008). Unpacking the spare embryo: facilitating stem
615 cell research in a moral landscape. Social Studies of Science.,38, 93-110.

616 Trounson, A. and Mohr, L. (1983). Human pregnancy following cryopreservation,
617 thawing and transfer of an eight-cell embryo. Nature,305, 707-708.

618 Waldby, C. and Squier, S. (2003). Ontogeny, ontology and phylogeny: embryonic
619 life and stem cell technologies. Configurations.,11, 27-46.

620