International Journal of Behavioral Medicine
https://doi.org/10.1007/s12529-021-10001-5

FULL LENGTH MANUSCRIPT

Persevering in Fertility Treatments Despite Failures: Unrealistic Optimism and the Reality of a Pronatalist Culture

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Accepted: 5 May 2021

Abstract

Background Fertility treatment discontinuation is difficult as it entails accepting childlessness. In most countries, financial limitations provide sufficient justification to terminate treatment. In Israel, unlimited funding enables women to undergo multiple treatment cycles, even when the odds of success are poor, thus providing a context for studying the psychological mechanisms involved when financial constraints are set aside. The study aimed to investigate the contribution of unrealistic optimism to Israeli women's willingness to continue fertility treatments even after repeated failures and to their psychological adjustment, comparing age groups.

Methods A longitudinal study of 100 women (ages 31–45) undergoing in vitro fertilization (IVF) treatment (1–22 previous cycles), who filled in questionnaires assessing their estimates of treatment success (theirs/for same-age patient), estimates received from the physician, intentions to continue treatment, and psychological adjustment. Follow-up was conducted 17(±4) months later, by phone ($n=71$) and/or medical records ($n=90$).

Results Most women (57%) reported that they will continue as long as needed till they have a child, 13% did not know, and 25% mentioned a specific plan; 5 did not reply. Women's estimates of treatment success showed vast unrealistic optimism, which was unrelated to their age, history of unsuccessful treatment cycles, or intentions for treatment continuation, yet was related to better psychological adjustment. At follow-up, almost all women who did not conceive were found to have continued treatments.

Conclusions Unrealistic optimism helps women maintain hope and well-being along the demanding journey to (biological) parenthood, where childlessness is highly stigmatized, and contributes to perseverance in treatment, regardless of objective factors.

Keywords Infertility · In-vitro-fertilization · Unrealistic optimism · Treatment discontinuation · Distress · Israel

Introduction

The average age at first birth among women over 35 has been on the rise in the past few decades in Europe and the USA [1, 2]. Many women wish to bear children between the ages of 30 and 40, or even later, and are optimistic about being able to do so [3]. Even after the age of 40 and when aware of the decline in fertility with age, many women believe that by means of in vitro fertilization (IVF) treatments they can overcome the problem [1, 4]. However, the evidence suggests otherwise: Success rates in IVF decline at all ages after the first 3–4 treatment cycles, and at ages 40 and above, the initial odds are lower and they decline more rapidly [5]. IVF does not fully compensate for the decline in fertility with age [6]. In addition, reviews of the literature show that fertility treatments exact a high emotional price (e.g., sadness,

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Published online: 18 May 2021

anger, anxiety, loss of control, stigmatization) and physical toll (symptoms such as nausea, hot flushed, tiredness, headaches, weight increase) [7, 8] and are stressful in themselves, over and above the stress of being infertile [9].

Taken together, such findings raise questions about the factors that lead women to persevere in fertility treatments even in older ages and following a history of unsuccessful treatment cycles. Our aim was to investigate these factors among women undergoing fertility treatments in Israel, where infertility has been highly medicalized, as in many other high-income countries. Perceptions of and access to treatment are highly dependent on the social context [10] and Israel stands out in this respect: Social pressures to procreate are strong and both funding and eligibility for fertility treatments are generous. This context sets aside financial constraints on treatment continuation, thus providing an opportunity *to study the psychological mechanisms that lead (or enable) women to continue fertility treatments even when chances of treatment success are low and despite the high price to be paid*.

Motherhood is perceived as a national mission in Israel [11] and there is tremendous pressure to have a biological child [12]. Oocyte donation is complicated from a Jewish religious perspective because the religion of the mother determines that of the child, and in Islam third-party donors are unacceptable [13]. Adoption is extremely uncommon: Compared with about 180,000 birth a year, in 2016 only 24 children under age two were adopted locally and 24 more internationally (36 and 17 in 2017) [14]. While IVF treatments are mostly covered, oocyte donation, surrogacy, and adoption require additional out-of-pocket expenses, so that policy and ideology combine to promote the 'Natural Family' [12]. Childlessness is socially unacceptable, even if involuntary [15]; even having one child does not ease the pressure [16]. Voluntary childlessness is virtually unheard of and highly stigmatized [17].

It is not surprising therefore that the number of fertility clinics and treatment cycles per capita in Israel is the highest in the world [18]. This reflects social, historical, political, and cultural forces that shape Israeli women's reproductive health and health care [19]. Mostly, it arises from the value of the family in Jewish tradition [20], which has over the years created a discourse surrounding fertility and fertility treatments that has expanded to include arguments to do with human rights and patient rights [21]. This discourse has affected health policy, leading to generous government funding for fertility treatments, at an unprecedented level worldwide: The Israel national health insurance covers an unlimited number of IVF treatment cycles for women up to age 45 (from own gametes; to age 54 with donor eggs), for up to two children with the same partner, even if the woman already has children. Such funding is provided to all women, regardless of marital status, that is, it includes women in same-sex couples and single women. In the absence of financial constraints, many couples continue treatment endlessly, which can reach even 10–20 cycles [22].

In many countries, pronatalism and patriarchy create social norms about the importance of childbearing and pressures to procreate [9]. These make it difficult to discontinue fertility treatments, as it requires coming to terms with childlessness [23]. However, with limited public funding, it is not surprising that many couples terminate fertility treatments for financial reasons [24]. Nevertheless, even in Western Europe and the USA, psychological burden is frequently cited by women and couples as the main reason for treatment discontinuation [25], often before financial coverage is exhausted [26]. A review of 22 studies concluded that treatment burden was the main reason and noted that many couples did not view it as discontinuation but rather as postponement of treatment [27]. Relatedly, women's depression was also found to be a major factor leading to treatment discontinuation [28]. Older age is also a factor [29], possibly due to the lower chances of success, though active censoring by physicians did not seem to be the underlying factor [30]. In contrast, while infertility specialists tend to attribute treatment drop-out to financial constraints and active censoring, patients more often point at emotional distress as the primary reason [8].

In Israel, where financial constraints do not exist, psychological burden was found to be the main reason to cease treatment, followed by loss of hope, yet most couples who dropped out from treatment eventually returned, or expressed their intention to do so [22]. In contrast with studies elsewhere, medical staff recommendation was not a significant reason, probably because of the lack of a procedural or financial limit to the number of treatments. Thus, the cultural context makes it difficult to stop treatment and creates a culture of perseverance [31].

During the past two decades, the number of IVF treatments in Israel has rapidly increased, at a rate which greatly exceeds the growth of the population [32]. In 2017, 5% of live births in Israel resulted from IVF. Due to this high usage, the average rate of success is around 16% [33]. This number masks the large variation in age and continued treatments. As in other countries, success rates drop after 3–4 treatment cycles, and after age 40, they are much lower to begin with [34]. One study reported a success rate of 16.7% for the first treatment cycle among women up to age 40, compared with 4.7% above 40; cumulative success rates showed that the rate dropped to about 2% per cycle after the fifth cycle for the younger women and after the third cycle for those over 40, and, after seven cycles, they dropped to less than 1% per cycle in both age groups [35].

In contrast with these data, many couples believe that if they persevere with treatment, their chances of becoming pregnant will improve. The media plays a major role by publicizing

cases of women who fulfilled their dream of becoming mothers after many years of treatment, with little attention to stories that include only unsuccessful treatment cycles or to the risks involved [36]. Research has shown that fertility patients overestimate their chances of pregnancy [37]. Couples interpret the physician's explanation as what they thought s/he had meant, rather than what was actually said [38]. These perceptions are an example of an extensively documented psychological mechanism called "unrealistic optimism" [39, 40], which can be manifested in overestimation of the *absolute* chances of success or, on a *relative* basis, overestimation of the chances of success relative to a reference group. From a rational point of view, unrealistic optimism is an erroneous belief, as the term suggests, yet it is a normal and adaptive psychological mechanism, which has been found to be self-serving in a way that contributes to emotional health [41, 42].

Cognitive biases are also evident along the course of fertility treatments. While the chance of conception declines with additional cycles, as noted above, many women feel that each cycle brings them closer to their goal; instead of a failure that predicts an even lower chance of success, they view it as a step on the way to possible success [43]. Following failure, couples reassess the goal of becoming pregnant and its feasibility, yet over time, their estimate of the odds of success rises again, which serves as a defense against depression [44].

The lack of financial constraints and the strong cultural pressures to procreate render unrealistic optimism a likely coping mechanism among women in Israel. Indeed, a survey conducted among fertility patients in 2006 found that most women planned to continue the treatments "as many times as needed" [45]. Therefore, *our first aim* was to study intentions to (dis)continue IVF among Israeli women of diverse ages and treatment experience and to examine whether these intentions were acted upon over a follow-up period of about one and a half years. *Our second aim* was to examine whether unrealistic optimism regarding the chances of treatment success constitutes a factor that improves well-being and thus may provide the women with the strength and hope that enable them to persevere with the treatments. The focus was on having experienced treatment failure, i.e., on women who had at least one unsuccessful IVF attempt and not only on those who have had a large number of (failed) treatment cycles, in order to ensure variability in the extent of experienced failure, which would allow us to assess the role of this factor. The study hypotheses were:

1. Based on the survey mentioned above [45], we assumed that *many women undergoing IVF plan to continue as much as needed*. That study was based on data collected a decade earlier than ours, so it deserves replication, particularly in light of significant improvements in assisted reproductive technologies. In addition, we hypothesized that *older age (40+) and a higher number of previous treatment cycles will be associated with a specific plan regarding treatment (dis)continuation, in terms of planned duration or number of cycles, or of considering alternatives to biological parenthood, such as oocyte donation*. We will also examine whether women carried out their plans within the next 1–2 years.
2. *Absolute and comparative unrealistic optimism will be associated with intentions to continue treatment and a lower likelihood of considering alternatives*.
3. *Unrealistic optimism will be associated with better psychological adjustment, which will in turn be associated with intentions to continue treatments*. The associations of the study measures with need for parenthood were also tested.

Materials and Methods

Study Sample

One hundred women undergoing treatment at the IVF unit of a hospital in central Israel were recruited to the study. Eligibility criteria included age 31 and over; no children or one child; having had at least one unsuccessful IVF treatment cycle; no language barriers. As the study materials were in Hebrew, the sample included only 11 Arab women,

Table 1 Sample characteristics ($N = 100$)

Variable		*n*/%
Age group	31–34	30
	35–39	37
	40+	33
Country of birth	Israel	83
	Former USSR and Eastern Europe	11
	Other	6
Cultural group	Jewish	89
	Arab	11
Religiosity	Secular	62
	Traditional	21
	Religious	14
	Did not respond	4
Marital status	Married/cohabitating	78
	Single	18
	Divorced/separated	4
Children	None	65
	One	35
Education	High School	22
	Non-academic post-high school	30
	Academic	48

proficient in Hebrew, who did not differ from the Jewish participants in the sample characteristics and study variables, with the exception of age (participants' mean age was 37.3 ± 4 in the full sample; 37.7 ± 4.0 among Jewish women and 33.8 ± 2.7 among Arab women, $t(98) = 3.09$, $p = 0.003$). Sample characteristics are presented in Table 1.

Recruitment and Procedure

The study was approved by the Institutional Review Boards of Hillel Yaffe Medical Center and Tel Aviv University. Most women were approached by the study team at the clinic while waiting for their appointment. All women received an explanation about the study and signed an informed consent form before filling out the study questionnaire. They also provided their contact information and consent to be contacted later for follow-up and for the study team to obtain information on treatment cycles and outcomes from their medical records. Out of 114 women who were approached on random dates between June 2015 and September 2016, one hundred women agreed and participated, four refused, and ten signed the informed consent form but did not fill in the questionnaires (88% participation rate; note that the sample comprises 100 women so frequencies and percentages are identical).

Follow-up was conducted in April–May 2017, on average 17 (± 4) months after baseline. Full or partial information on treatment cycles and outcomes after baseline was obtained from the medical records for 90 of the women (some of the women continued treatment in other medical centers so the medical information about continued treatment after baseline was partial or missing). This information was supplemented by women's reports over the phone. Of 100 participants, 71 took part in the phone follow-up, ten refused and 19 were not located. There were no differences in the sample characteristics or study variables between those who participated and those who dropped out from the follow-up.

Measures

The study questionnaires included self-reported information on the following variables:

Socio-demographics—age, family status, origin, religion, religiosity, and education.

Fertility treatment history—duration of fertility problem and treatment, number and outcomes of IVF cycles in other centers and at Hillel Yaffe Medical Center, current stage of treatment. Mothers were asked to respond in regards to the current attempt to conceive.

Plans regarding continuation of treatment—women were asked "If the current/ upcoming treatment cycle is unsuccessful, how many additional treatment cycles do you plan to undergo?" and "How much more time do you plan to continue fertility treatments?" Since many women responded with the same answer to both questions or answered only one of them, the responses were classified to three categories: (1) does not know; (2) as much as needed/until I bear a child; and (3) a specific plan, in terms of number of treatment cycles and/or length of time they have allotted to the attempt to conceive via IVF.

Plans regarding alternatives to conventional IVF treatment—women were asked about their intentions regarding oocyte donation and adoption, with the following options for each one: (1) I have not considered it; (2) I have considered it but have not taken any action; (3) I am looking into it; (4) I have chosen this option and am in the process of carrying it out.

Perception of chances of treatment success—women were asked to rate the chances of success of the current/ upcoming treatment and of success in the coming year, for themselves and for a patient their age. Altogether, this amounted to four ratings, each on a horizontal scale from 0 to 100% with ticks marked with numerical labels every 10%.

Information from the doctor regarding the chances of treatment success—women were asked whether in their meeting with their doctor (the fertility specialist), s/he had provided information on their chances of treatment success. Those who replied positively were asked to report in an open-ended answer what was the information the doctor had told them. Some of them reported specific percentages and some verbal answers, such as "good" or "low".

Psychological adjustment was assessed with the infertility-specific distress and well-being scales [46]. A shorter 12-item version (6 items per subscale) was developed on the basis of data from previous studies in Israel [16]. Participants were asked to rate for each item the extent they felt that way recently, on a 5-point scale from 0 = "not at all as I felt" to 4 = "exactly as I felt." Internal reliability was high, $\alpha = 0.88$ and $\alpha = 0.90$, for the distress and well-being subscales, respectively.

Need for parenthood was assessed with two subscales of the Fertility Problem Inventory [47], *need for parenthood* and *acceptance of a childfree lifestyle*. Together, these subscales included 18 statements, rated on 6-point Likert scales. Internal reliability was high, $\alpha = 0.79$ and $\alpha = 0.87$, for the need for parenthood and acceptance of a childfree lifestyle subscales, respectively. Their intercorrelation was $r = -0.39$ ($p < 0.001$).

Statistical Analysis

Sample size computation with G*Power [48] showed that to achieve power of 0.80 given alpha = 0.05, a sample of

92 would be required to detect a medium-sized effect in a regression analysis with five predictors. The combination of phone calls with medical records was expected to yield information at follow-up for most of the participants, and therefore, the plan was to recruit 100 women.

The study variables had between 0 and 4% missing values. Multiple imputation was used in the statistical analyses. The associations between the study variables were first tested using Pearson correlations and analyses of variance (ANOVA; with correction for multiple comparisons). Age was split to three groups, per recommendation of the fertility doctors, who use these cutoff points, and because of the possible psychological impact of ages 35 and 40. The main dependent variables were intentions to continue treatment. They were planned to be continuous variables (number of additional treatments/number of additional months the woman plans to continue treatment). However, since many women provided verbal responses, they were coded into a single three-category variable. In accordance, the multivariate analysis used for explaining the variance in these intentions was multinomial logistic regression. The second main dependent variable was actual treatment continuation as determined at follow-up, which unexpectedly (in light of the age and treatment history of the sample) had virtually no variance so its predictors could not be tested.

Results

Treatment History and Future Intentions

All participants had already experienced at least one unsuccessful treatment cycle and intended to continue treatment. The number of previous unsuccessful IVF treatment cycles ranged from 1 to 22. About two thirds of the women had already undergone more than two unsuccessful IVF treatment cycles in a period of time spanning more than a year. Table 2 shows the distribution of previous treatment cycles and duration by age group. One-way ANOVAs showed that these variables were not significantly related to age group ($ps > 0.21$).

When asked how much longer or how many more treatment cycles they are planning to undergo, the responses fell into three general types, as described above: (1) "As needed"—over half the women (57%) stated that they will continue IVF as long as it takes to bear a child; (2) "Specific plan" (25%)—about half planned to continue up to one year (see Table 2 for details of longer plans); and (3) "Don't know" (13%). Five more women did not reply to these questions. They were not sufficiently similar to any of the other groups so they were included in descriptive information but not in statistical analyses with the intention groups.

Table 2 Participants' treatment history and intentions by age (*n*/%)

Variable	Ages 31–34, $n=30$	Ages 35–39, $n=37$	Ages 40+, $n=33$	Total, $N=100$
Number of previous treatment cycles				
1–2	9	11	11	31
3–5	14	11	14	39
6–10	6	8	5	19
11–15	1	5	1	7
16–22	0	2	2	4
Years in IVF treatment				
≤1	11	15	11	37
>1–2	3	5	12	20
>2–5	9	4	7	20
>5–7	4	5	1	10
>7–13	1	7	2	10
Missing	2	1	-	3
Intentions				
As much as needed	21 (70%)	22 (60%)	14 (42%)	57
Does not know	4 (13%)	6 (16%)	3 (9%)	13
Specific plan[a]	5 (17%)	6 (16%)	14 (42%)	25
Did not reply	0 (0%)	3 (8%)	2 (6%)	5

[a]Thirteen women planned to continue up to 1 year (planning 1–6 treatment cycles in that year); seven planned to continue up to 2 years (4–6 cycles, or do not know how many); two planned to continue for three more years; two were in the midst of a treatment cycle and did not plan to continue if it was not successful; and one was inquiring about oocyte donation (four other women who stated they have decided to go for oocyte donation also mentioned that they will continue treatments endlessly and were therefore included in the "as needed" group)

These three future intention groups did not differ in the number of previous treatment cycles. As for age, in the 40+ age group, there was a trend towards more women with a specific plan ($\chi^2(4) = 8.74$, $p = 0.07$) (see Table 2). Six of these 14 women had a plan that would bring them to age 45, the limit for treatments allowed from one's own gametes, so in a sense, these women too were planning to continue as long as they can (for a biological child).

The distribution of responses to questions about considering oocyte donation or adoption shows that most of the women had not even considered these options (76% and 65%, for oocyte donation and adoption, respectively), regardless of the number of previous treatment cycles they have had. Very few women were actively inquiring about these options or taking steps to implement them (8% for oocyte donation, 7% for adoption). When breaking down the responses by age, for oocyte donation there was a significant difference between women of ages 40 and above and the two younger groups ($\chi^2(6) = 13.35$, $p = 0.04$). Among those 40+, 55% had not considered this option, compared with 87% of the women in the younger groups. However, only 9% of those 40+ had begun inquiring about oocyte donation and 6% were working to implement it. No age differences were seen for adoption.

In sum, our first hypothesis was partly supported regarding the role of age, but not of previous treatment cycles, as a factor contributing to more specific plans regarding treatment continuation or considering alternatives. However, it is important to note that even within the older age group, most women were not planning to discontinue treatment or considering alternatives. It seems more accurate to conclude that most participants intended to continue IVF treatments with their own gametes.

Perceived Odds of Treatment Success

On average, women estimated their chance of conceiving in the current/upcoming treatment cycle as 59% (±27). However, as can be seen in Table 3, these estimates ranged between 0(!) and 100%, with 77% of the women showing absolute unrealistic optimism by estimating their chances of success as being higher than 30%. The average estimate for a same-age peer was similar (58%) as was the range (0–100%). Estimates for the chances of conceiving within a year showed similar patterns, only more optimistic (see Table 3).

Comparative unrealistic optimism was examined by subtracting the odds for a same-age peer from the odds for oneself. Most of the differences between the odds for self and other were small (10% or lower). For the upcoming treatment cycle, only 14% showed substantial (20% or greater difference) comparative optimism and 13% showed substantial comparative pessimism. For the estimated success rates within a year, paired *t*-tests showed evidence of comparative optimism: The estimates were on average 5% (±20) higher for self in comparison to a same-age peer ($t(95) = 2.53$, $p = 0.01$).

In contrast with our second hypothesis, the four unrealistic optimism measures (estimates of treatment success for current treatment and in one year, for self and peer) and the two comparative ones were unrelated to women's plans to continue treatment. They were also all unrelated to age or to the number of previous treatment cycles.

When the women were asked about the information they received from the doctor regarding treatment success, about half did not report any specific information. The rest reported specific odds or provided verbal descriptions of the doctor's explanation regarding their chances of treatment success. Grouping the responses and comparing them to the women's own perceived odds of treatment success provided further evidence of self-serving biases and unrealistic optimism (see Table 4). For example, women who stated that their doctor said their chances are low estimated their chances of conceiving within a year on average as 55%. Those who reported having been told that they have a fair chance (33–50%), a good chance, or that there is a chance estimated their odds around 80% on average.

Psychological Adjustment and Need for Parenthood

Psychological adjustment levels ranged from 0 to 4 with a mean of 2.77 (±0.93) for well-being and 1.67 (±1.07) for distress. They were unrelated to previous treatment cycles

Table 3 Women's perceived odds of treatment success

Odds for success	My odds		Odds for same-age peer	
	Current/upcoming treatment	Within 1 year	Current/upcoming treatment	Within 1 year
0–10	9	4	7	3
20–30	14	7	16	9
40–50	22	17	23	22
60–80	34	27	36	30
90–100	20	33	15	32
Did not reply	1	2	3	4

Table 4 Women's reports of information from doctor compared to their estimates of treatment success

Odds provided by doctor	*n* (=%)	Own estimate of treatment success within 1 year (mean)			Percent in the 40+ age group[a]
		Mean	Minimum	Maximum	
May have to consider alternatives	2	75	70	80	50
Up to 10% (includes verbal responses such as "low", "not high due to age")	14	55	10	100	86
15–30%	5	64	20	100	20
33–50%	7	80	40	100	14
I understood there is a chance (includes verbal responses such as "in the end, it will happen"; "usually it does not succeed in the beginning")	5	80	50	100	20
Good chance (includes verbal responses such as "you are fertile"; "your body works"; "the chances are good")	18	84	30	100	22
Received only general or technical information, not about success rates	6	68	50	100	0
Did not receive information or did not reply	43	73	10	100	30

[a]The 40+ age group comprises 33% of the sample

yet differed among age groups (well-being $F(2,97)=4.24$, $p=0.02$; distress $F(2,97)=5.02$, $p=0.01$; adjustment was significantly better in the middle age group (35–39), compared to the younger and older groups). Perceived odds of treatment success for self or peer were correlated with psychological adjustment: Higher optimism was related to greater well-being and lower distress (seven of eight |*r*|s ranged between 0.21 and 0.39, $ps \leq 0.05$). Comparative optimism (odds for self > peer) for the current cycle was correlated with well-being ($r=0.24$, $p=0.02$).

In contrast with our third hypothesis, distress was unrelated to future intentions. Well-being showed a trend in the hypothesized direction, with higher values in the group that planned to continue "as needed," compared to the other two groups ($F(2,92)=2.69$, $p=0.07$).

Finally, we tested the associations of the study variables with need for parenthood and acceptance of a childfree lifestyle. Both scales were unrelated to age group, number of previous cycles, all unrealistic optimism and psychological adjustment measures. However, the three intention groups differed on these measures (need for parenthood $F(2,92)=6.12$, $p=0.003$; acceptance of childlessness $F(2,92)=3.47$, $p=0.03$). Women who planned to continue "as needed" reported greater need for parenthood (4.53 ± 0.89) than those who had a "specific plan" (3.85 ± 1.01). A similar pattern was seen for (non-)acceptance of childlessness.

In sum, future intentions were related to need for parenthood, with a borderline association with age group and well-being. Using these three variables as predictors in a multinomial logistic regression analysis with the three future intention groups as the dependent variable revealed significant associations for well-being and need for parenthood. The associations of well-being and need for parenthood with future intentions were largely independent. Therefore, this analysis is not shown as the findings are similar to the univariate results reported above.

Longitudinal Follow-up: Treatment Continuation and Future Intentions

Information about treatment continuation was obtained at follow-up for 88 of the women, through the phone follow-up and/or the medical records. Five of the women conceived following the treatment cycle they were undergoing when they filled out the baseline questionnaire. Of the 83 remaining women, 80 continued treatments (the other three discontinued due to specific problems, such as another medical condition). Of these 80 women, 74% underwent between 1 and 3 additional treatment cycles during the follow-up period and the remainder underwent 4–7 cycles. The time from filling out the baseline questionnaire until the next treatment cycle was unrelated to the study variables.

In the phone follow-up, only three women (of those who had not conceived yet) clearly stated that they plan to discontinue treatments (two because of objective constraints). None of the few women who reported earlier that they were considering alternatives, had begun inquiring or acting upon them. At follow-up too, most of the women who were considering an alternative had not inquired about it or taken any action. *In sum*, between baseline and follow-up, almost all of the women who had not conceived and given birth, continued with IVF treatment. Very few had taken any action regarding alternatives to biological parenthood.

Discussion

The current study investigated one hundred women who were undergoing IVF treatment in a culture where being childless is unacceptable and even having one child does not "satisfy" the motherhood obligation or relieve the stress of infertility [16]. Most of the women (65%) had no children, the remainder had one child. They greatly varied in age

(from 31 to 45) and in their treatment experience in the current journey towards bearing a(nother) child: It ranged from 1 to 22 unsuccessful cycles, spread over a period from several months to 13 years. When asked about their intentions in terms of treatment continuation, most said they would continue as much as needed, some did not know and only one fourth gave a specific answer. These findings resemble those of Birenbaum and Dirnfeld [45]. More importantly, in practice, over about a year and a half, *all of the women who had not given birth during this period and were not pregnant, continued with IVF treatment* (with very few exceptions of non-voluntary discontinuation, due to other medical problems).

The pressure to have a biological child seems to be very strong: Most of them had not even considered alternatives such as oocyte donation. Among those who had considered it, most did not take any steps, not even inquiring about it. Many of the participants had very low chances of conception, due to their age and/or treatment history. Nevertheless, the number of unsuccessful treatment cycles was unrelated to their future plans. And, although the older age group (40+) was significantly more represented in the "specific plan" group and among those who had considered oocyte donation, in that group too, most women wanted to continue IVF as long as possible and from their own gametes. Thus, our hypothesis that the major determinants of the odds of treatment success, i.e., older age and a history of failed treatments, would lead to a more realistic assessment and respective plans, was disconfirmed.

In the Israeli culture, being childless has no social legitimacy. The Jewish requirement to procreate, the legacy of Holocaust survivors, and the continuous military threats constructed a perception of the family as a momentous issue [19]. In this context, parenthood becomes a national priority and a social obligation. Childless women (and even those with one child; 16) do not fulfill the cultural expectations, which are often internalized, as the current study suggests. The accessibility and funding for fertility treatment in Israel provides hope to couples and is important from a human rights and health equity perspective. However, it also limits couples' ability to discontinue treatment. Israel may be at an extreme among Western countries in terms of pronatalism and its reflection in health policy, yet many other cultures are also pronatalist, expecting women to bear children as part of fulfilling their gender role. Setting aside financial constraints, continuation is expected; it is discontinuation of treatment that requires an explanation [43].

What Enables Women to Persevere in Demanding IVF Treatments?

The most common causes women state for their fertility problem are medical reasons, and chance or bad luck [49]. This can explain why women continue with IVF: It is a medical treatment intended to overcome medical barriers to fertility, and bad luck can change. However, these reasons may not be sufficient over time, in light of the heavy physical and emotional toll exerted by fertility treatments, particularly the more invasive IVF. One of the mechanisms that could explain how women maintain hope, which infuses them with energy to attempt IVF again and again, is unrealistic optimism.

Our sample is educated yet as they are in a bind, unable to discontinue treatment, they struggle to interpret the relevant information. They do so in a way that provides hope and enables them to cope with the "rollercoaster" of fertility treatments [50]. Our findings reveal strong evidence of unrealistic optimism, in absolute terms. On average, women estimated their chance of conceiving in the current/upcoming treatment cycle as being 59%. Most of them (77%) estimated their chances of success for their next cycle as being higher than 30%, the highest estimate they could have realistically heard from any medical source. There was less evidence of comparative unrealistic optimism: They seemed to identify with their peers.

Interestingly, women's reports of the information received from their physician provided further evidence for self-serving biases. Note that doctors cannot provide patient-specific odds, only general statistics, except for cases where age and treatment history indicate that the odds per cycle are likely to be very poor (1 to 5%) or futile (< 1%) [51]. Verbal information from the physician seemed to be interpreted in a more favorable way than the doctor had intended. For example, interpreting statements about "a low chance" as odds of over 50% and vague statements such as "a good chance" as meaning that the odds are over 80%. Even when they reported receiving specific numerical estimates of treatment success, on average, women estimated their chances to be three to six times higher.

These findings are in line with earlier studies, showing that when women were provided with statistics about success rates, they tended to believe that their own chances are higher [52], misinterpreting, for example, a 25% chance to mean that they will be the one in four who will conceive following this treatment and failing to acknowledge that their doctor was referring to their chances over multiple cycles [53]. Note that those studies were conducted about 30 years earlier. Since then, much more information has become readily available to women through the media and on the Internet, including reliable medical information, yet the need for psychological mechanisms to foster hope remains. Furthermore, in contrast with our second hypothesis, factors that were expected to reduce unrealistic optimism, even if not eliminating it, such as older age and a history of failure, were unrelated to women's estimates of treatment success.

The nurturing of renewed hope makes it possible to suppress the feeling of bereavement and loss [54], and to gather

strength in order to endure additional treatment cycles, which is in line with the literature's view of "unrealistic optimism" as an adaptive mechanism [42]. The same mechanism is also likely to prevent a decision to discontinue treatment when it is futile or there is only a poor chance of success. Instead, women persevere in treatment, which provides a feeling of control [53], and that "we have done all we can" [55], as well as making it possible not to deal with the reality of possible childlessness.

Unrealistic optimism has been found to support another mechanism which may be at work here: The sunk cost effect, which is the "tendency to continue an endeavor once an investment in money, effort, or time has been made" (p. 591; 56). This effect is seen in decision-making particularly when combined with personal responsibility [57], when the decision is important, such as in medical decision-making [58], the investment has been over a long run and the potential reward is large [59]. When the lost cost is of time and effort, cognitive dissonance may explain it [58]: Dissonance between prior investment and future commitment can be reduced by beliefs in a successful outcome. Moreover, an optimistic outlook despite negative feedback to date can even lead from sunk costs to an escalation of commitment [60]. All these conditions characterize the fertility treatment situation.

Our third hypothesis touches upon another mechanism through which unrealistic optimism could contribute to further commitment to treatment despite unsuccessful past efforts: Its contribution to psychological adjustment. This hypothesis was confirmed only for well-being, which was related to unrealistic optimism and was higher among women who planned to continue "as needed" (although unrealistic optimism in itself was unrelated to future intentions). As for distress, in contrast with findings from other countries showing that psychological burden is one of the main factors in the decision to discontinue fertility treatments, our findings suggest that the pressure to procreate in Israel is so strong that psychological distress does not provide sufficient justification to cease treatment.

Finally, we also examined the need for parenthood, which was unrelated to age group, number of previous treatment cycles, unrealistic optimism, or psychological adjustment. Women who planned to continue "as needed" reported greater need for parenthood than those who had a "specific plan." A lower need for parenthood may allow women to set limits to treatment. Conversely, setting a limit may lead women to re-conceptualize parenthood and its value in their lives. Another Israeli study has shown that when infertility is central in women's identity, goal disengagement and reengagement are difficult, predicting greater current and future psychological adjustment [61].

Study Limitations

Several limitations to our study should be noted. First, most of the variables were assessed only at baseline so the findings are mostly cross-sectional and causality could not be determined. Second, the sample was recruited in a single medical center and included primarily Jewish women. Thus, it does not represent the entire population of fertility patients in Israel. Arab women are likely to experience similar pressures to bear children, for historical and cultural reasons [19], so they were not excluded from the study if there were no language barriers. However, this group was too small (11%) to study on its own. Third, we could not establish what the physicians had told patients specifically about their chance of success, though it was known that many do not provide specific numbers and when they do, 30% per cycle is the highest number a woman could have heard from her physician. Finally, the Israeli context is both a strength and a limitation of the study: It provides a unique opportunity for examining and exposing the psychological processes at work when financial constraints are set aside, yet it limits direct generalization to other contexts.

Practice and Social Implications

The current study underscores the importance of encouraging public discourse that legitimizes diverse family structures, including childlessness and non-biological parenthood (e.g., social parenthood via oocyte donation). Such discourse could lead to changes in policy, including state funding for oocyte donation and adoption procedures.

Social change may be slow. Until meaningful change is achieved, many women will continue to struggle with the stress and the family and social pressures to bear a child. Two of the authors [MA and ESP] provide services to this population and witness the stress and agony women and their partners' experience. Where fertility treatments are provided, resources should also be allocated to psychosocial support alongside the treatments and counseling to couples who may need it at critical decision points along the way. Those who continue treatment despite accumulating lack of success could benefit from accessible professional support in coping with the stress involved. Those who are considering discontinuation may need support in goal adjustment [61] and counseling on how to cope with the personal loss and societal pressure [23]. Fertility care should include reaching out to all patients to support them, both in coping with the stress and in making decisions along the way.

Funding This study was funded by the Israel National Institute for Health Policy Research (grant #R/110/2016).

Declarations

Ethical Approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare that they have no conflict of interest.

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