

Socio-Demographic Characteristics and Stress Perceptions Among IVF Patients: The SOFIA-1 Study in Northern Germany

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Abstract

Emotional and psychological distress is common among patients undergoing in vitro fertilization (IVF). However, few studies have examined stress perception at standardized stages of treatment or tested methods for integrating socio-demographic data collection into clinical workflows. The two main objectives of this pilot study (SOFIA-1) are to assess the feasibility of collecting sensitive data from IVF patients and to investigate the factors contributing to stress during IVF treatment. To accomplish these objectives, an anonymous, digitally administered survey was embedded in the clinical routine at two fertility clinics in northern Germany (Lübeck and Kiel). Women undergoing their first IVF cycle were invited to voluntarily participate in accordance with ethical standards. The survey included socio-demographic and treatment-related variables, such as items on stress perception. High completion rates and acceptable response rates at both clinics demonstrate the feasibility of collecting such data during treatment. Many participants in our sample ($n = 101$) experienced significant psychological distress at the start of treatment, particularly those with longer infertility histories or previous experiences at other clinics. Stress levels were influenced by individual, partner, and relationship factors, underscoring the importance of using more detailed assessment tools, such as fertility-specific stress scales. The SOFIA-1 study provides a methodological basis for larger, multicenter studies that explore the psychosocial aspects of fertility care. Expanding data collection could highlight differences in psychological support across clinics and reveal unmet needs. Including alternative reproductive goals and addressing social pressures can promote a more inclusive, patient-centered approach to IVF treatment.

Keywords

infertility; in vitro fertilization; perceived stress; reproductive justice; social inequality; treatment-related characteristics

1. Introduction

In recent decades, assisted reproductive technologies (ART), particularly in vitro fertilization (IVF), have emerged as essential avenues for individuals and couples facing fertility problems or social barriers to realizing their desire for parenthood. As IVF has become more accessible due to biomedical advancements, its social implications have grown more complex. Despite the abundance of clinical data on ART usage and outcomes, particularly in countries such as Germany, where fertility registries meticulously document treatment cycles, success rates, and clinical protocols (e.g., Bartnitzky et al., 2024), there is still a significant knowledge gap regarding who seeks these treatments and what their motivations are. The demographic and socioeconomic profiles of individuals and couples undergoing ART are often absent from registry data, particularly in Germany, where the focus is on biomedical outcomes rather than on structural conditions and individual experiences. This omission limits our understanding of how access to and experiences with ART are shaped by various social determinants such as income, education, age, relationship status, and cultural norms about family formation, as described in the framework of Braveman and Gottlieb (2014) and discussed by Köppen et al. (2021).

This gap holds particular significance in Germany, a country that has a robust public health system yet provides only partial reimbursement for ART. Although ART is becoming more normalized within broader reproductive health practices, patients themselves bear the disproportionate financial burden and emotional toll of treatments such as IVF. Consequently, the pathways to ART are neither universally accessible nor equally navigable. Economic precarity, institutional gatekeeping, and normative assumptions about gender, sexuality, and parenthood can all operate to stratify reproductive opportunities. Despite the obvious relationship between socioeconomic status and access to ART, however, systematic empirical studies exploring this association in Germany remain scarce. This limitation hinders scholarly understanding and the development of equitable reproductive health policies and inclusive clinical practices.

To address this gap, the current study provides new empirical insights into the socio-demographic profiles of individuals undergoing IVF using data collected from a prospective, two-clinic, anonymous online questionnaire study conducted in Schleswig-Holstein, a federal state in northern Germany. Titled Socio-Economic Factors in the Context of IVF Treatments (SOFIA-1), the study is a pilot effort to gather sensitive yet essential information, such as data on household income, employment status, and perceived stress. The study was conducted at two fertility clinics and targeted partnered women in opposite-sex relationships who were undergoing their first IVF cycle. Participants completed voluntarily an anonymized online survey on the day of oocyte retrieval. The aim of focusing on this specific treatment milestone was to minimize recall bias while capturing participants' socioeconomic realities and well-being at a critical point in the IVF process.

Our study contributes to the growing body of work on reproductive justice, a framework that emphasizes the right to reproduce under conditions of dignity, support, and equity (Ross & Solinger, 2017). Originally

developed in the US to address disparities in reproductive access based on race and class, the principles of reproductive justice are becoming increasingly relevant in Europe. Here, neoliberal health care reforms, changing demographic trends, and evolving family norms are challenging longstanding beliefs about parenthood and the conditions under which it can occur.

The study has two central aims. First, it evaluates the feasibility of gathering socio-demographic, psychological, and treatment-related data from IVF patients in a clinical setting using anonymized digital tools. This consideration is crucial, as previous research (e.g., Robertson et al., 2022) has highlighted the ethical sensitivities and practical difficulties of collecting data on income, fertility (intentions), and mental health in reproductive health contexts. Thus, demonstrating the viability of this data collection method is a necessary prerequisite for expanding similar initiatives and for systematically integrating socioeconomic information into reproductive health research in Germany and beyond. Second, the study offers descriptive insights from 101 partnered women, highlighting the diverse experiences and backgrounds of individuals and couples undergoing IVF. Although the goal is not to draw generalizable conclusions, the findings reveal significant patterns worthy of further investigation. Many participants, for example, reported experiencing psychological distress, an issue that transcends economic boundaries but that may be exacerbated by unstable socioeconomic conditions. To better understand psychological distress in the context of IVF treatment, we will turn to social-psychological theories of attribution and identity.

2. Putting our Study in Context: The Development of Family Formation in Germany

In recent decades, Germany has experienced a significant delay in family formation and expansion (Figure 1). While the largest share of births in 1990 were to women aged 25–29, by 2004, women aged 30–34 had the largest share of births—a trend that has continued to increase. In 2024, 36% of all live births were to women in the 30–34 age group, and 6% of births were to women aged 40 and older, up from 1.5% in 1990 (Kuhnt & Trappe, 2024). This trend is particularly pronounced for first births. In 2024, about 58% of first-time mothers were aged 30 or older (Destatis, 2025a). Germany ranks among the European countries with the highest average maternal age at first birth, surpassed only by a few Western and Southern European nations, such as Cyprus, Ireland, Switzerland, and Spain (Eurostat, 2025). In 2024, the average age at first birth for women in Germany was 30.4 years, ranging from 28.5 years in the federal state of Saxony-Anhalt to 31.5 years in Hamburg, while the mean age at first birth for women in Schleswig-Holstein was 30.1 years, close to the national average (Destatis, 2025b). The average age at first birth in Germany has increased by 1.6 years since 2009 for women, and by 0.5 years since 2014 for men (Destatis, 2025c, 2025d).

The socio-demographic disparities are striking. Women holding university degrees typically have their first child almost three years later than women without academic degrees, and they are also more likely to remain childless (Bujard & Diabaté, 2016). Furthermore, disparities exist based on nationality, marital status, and geographic region. For instance, women in western Germany tend to be older than women in eastern Germany at the time of their first childbirth. Delaying childbearing reduces the reproductive window and increases the risk of involuntary childlessness (Beaujouan & Sobotka, 2022). This trend also reflects broader societal changes, including improved access to contraception, shifting norms of parenthood, longer periods of education, and economic unpredictability (Trappe & Köppen, 2021). Consequently, fertility postponement is a demographic phenomenon that reflects the changing position of childbearing in individual life courses in contemporary Germany.

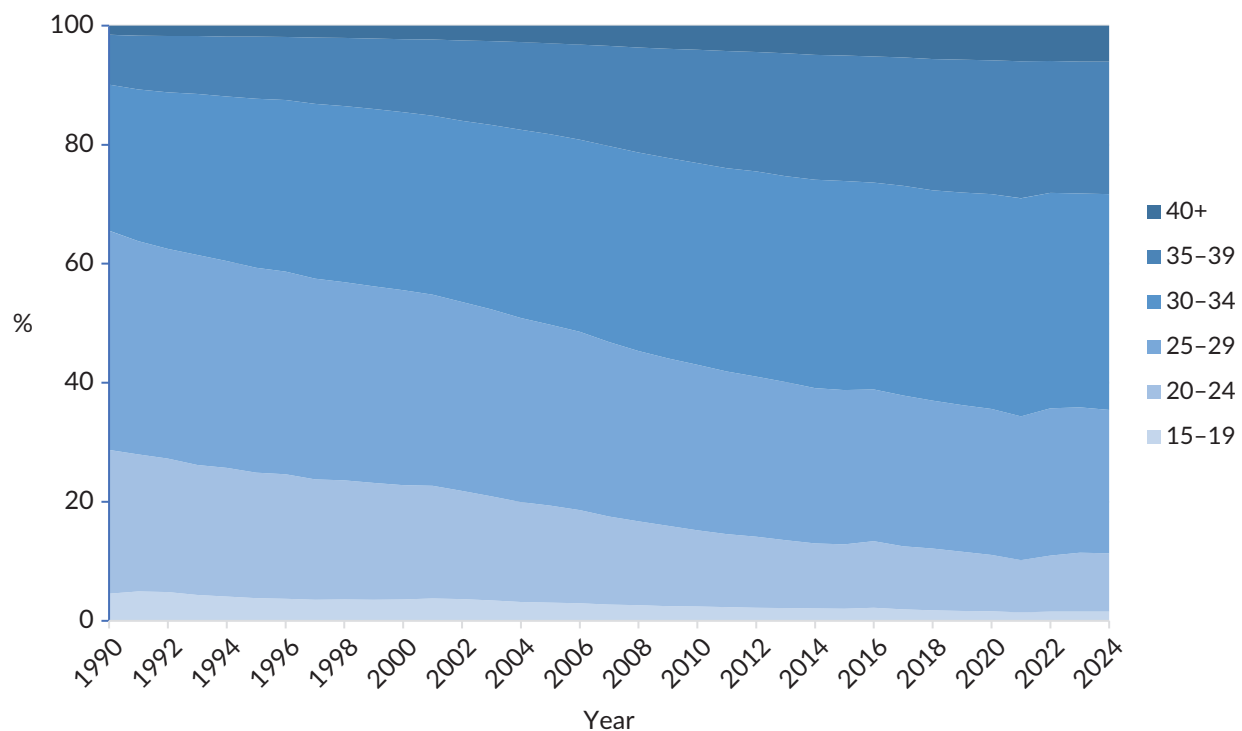


Figure 1. The proportion of live births per 1,000 women in the corresponding age group between 1990–2024. Source: Destatis (2025e).

The trend among women and men to postpone their first childbirth is mirrored in the rising ages of individuals seeking reproductive health care. Since 1997, the average age of individuals undergoing IVF treatment has increased by 3.2 years for women and by 3.3 years for men (Bartnitzky et al., 2024, p. 244). However, the German IVF Registry does not provide additional information on the socio-demographic characteristics of users of reproductive medicine beyond age. Furthermore, due to data anonymization, it does not offer disaggregated information at the federal state level. This underscores the need for an in-depth study of IVF user groups in Germany.

Socio-demographic disparities are crucial to this study because they influence how individuals perceive stress and access support during IVF. Factors such as income, education, employment, and migration background can increase the levels of psychological stress individuals experience due to financial difficulties, limited access to information, and reduced social support (Gupta et al., 2024). These factors also influence coping strategies and the availability of resources for dealing with infertility. Therefore, including socio-demographic data is essential to understanding psychological distress, identifying vulnerable groups, and developing targeted, needs-based support in reproductive health care.

3. Data and Methods

3.1. Participants and Setting of SOFIA-1

The SOFIA-1 study was conducted at two university-based clinical centers in Lübeck and Kiel in the northern German state of Schleswig-Holstein. Data for this pilot study were collected from November 2023

to December 2024 using an online questionnaire based on the SoSci Survey software (Leiner, 2024). The target group consisted of partnered women in opposite-sex relationships who were beginning IVF treatment at the fertility clinics in Lübeck and Kiel, though some of these patients may have previously undergone IVF treatment at another clinic. A total of 101 surveys were conducted (76 in Lübeck, 22 in Kiel, and three unknown), of which 88 were completed.

Schleswig-Holstein, located in Germany's northernmost region, offers a distinct setting for conducting an in-depth study of IVF users, especially in contrast to the country's more urban areas. Most of the population of this predominantly rural state lives in smaller towns and villages, with Kiel and Lübeck being the only two cities with over 100,000 residents. This geographic profile sets Schleswig-Holstein apart from metropolitan areas, where health care services, including fertility treatment, tend to be more prevalent. In addition, the state's proximity to Denmark introduces further complexity as residents may seek ART services that follow different regulations across the border. Denmark is known for its comparatively permissive legal framework for reproductive health care (Herrmann, 2022), with more comprehensive regulations on donor anonymity and age limits. Thus, Denmark provides treatment options that are not available in Germany. In Germany, access to IVF is regulated by a combination of legislation, medical guidelines, and health insurance policies. Treatment is typically offered to heterosexual married couples, while unmarried couples face more barriers, and access for single women and female same-sex couples is more restricted, although evolving. Public health insurance covers up to 50% of the cost of three IVF cycles for married couples in which the woman is between 25 and 40 years old and the man is up to 50 years old, and only their own gametes may be used. Before treatment begins, couples must undergo mandatory counseling on the medical and psycho-social aspects of assisted reproduction with a physician who will not be providing the treatment (Köppen et al., 2021).

In terms of reproductive health care, Schleswig-Holstein has five fertility centers that are scattered across the region—a number that reflects both the state's relatively low population density and its specialized health care infrastructure. While these centers provide essential ART services, including IVF, their geographic distribution and capacity can mean that access to these services may be more limited for those living in remote areas. Traveling to a fertility center often involves significant logistical and financial considerations for individuals and couples, which can pose additional barriers to accessing reproductive treatments. Another aspect of reproductive medicine in Schleswig-Holstein is the state's limited financial support for ART. Currently, 12 of the 16 federal states provide more generous coverage of fertility treatments for their residents by reducing co-payments (Bundesministerium für Familie, Senioren, Frauen und Jugend, 2025). Since Schleswig-Holstein is not one of these states, individuals and couples with fewer economic resources may face serious barriers to accessing these services.

3.2. Data Collection

To recruit participants for the study, we approached women on the day of their first IVF treatment cycle during oocyte retrieval, when they were already at the clinic and had a waiting time between different steps of the procedure. Oocyte retrieval is a central step in the IVF process, taking place after ovarian stimulation and monitoring and before fertilization and embryo transfer. By this stage, most patients have completed diagnostic assessments and started active treatment. Between 90 and 95% of individuals starting ovarian stimulation will undergo a trial at oocyte retrieval. Indications for IVF include tubal factor infertility, male infertility (e.g., low sperm count), diminished ovarian reserve, unexplained infertility, and advanced maternal

age. The oocyte retrieval appointment provides a consistent and neutral reference point in the IVF process, enabling uniform survey administration among participants (representing a common group of IVF patients). At the centers in Lübeck and Kiel, patients do not receive analgesics (pain relief) or sedatives before oocyte retrieval. Practices may vary in other countries where analgesics or sedatives are commonly administered beforehand, which could impact patients' ability or willingness to complete surveys and may affect the accuracy of the data (e.g., Roest et al., 2019).

Ethical approval for this study was obtained from the University of Lübeck's Ethics Committee. Because complete anonymity and non-traceability of responses were essential to ensure unbiased data collection, obtaining formal written informed consent was not required. Eligible candidates had to demonstrate sufficient proficiency in the German language and have at least one partner living in Germany. A physician reviewed the medical records to confirm their eligibility based on their treatment status, language skills, and residence. These women then received a laminated, disinfectable information sheet with a QR code directing them to the online questionnaire. Patients were supposed to fill out the questionnaire in the waiting room between treatment steps. However, it is possible that some only accessed and completed the link at home by scanning the QR code. At the time of distribution, patients were typically in a waiting area with their partner, and were either awaiting the oocyte retrieval procedure (with an expected wait time of 30 to 90 minutes) or had already undergone the procedure and were in the mandatory postoperative observation period. Those who chose to participate could scan the QR code with their smartphones to access the survey platform. If necessary, a tablet or WLAN access was offered. Upon entering the questionnaire, participants were given more information about the data collection process. The questionnaire consisted of single- and multiple-choice questions, scales, and optional free-text fields for additional responses. Women were asked to answer for themselves and to provide proxy information on behalf of their current partner on topics such as education and employment, health, partnership, and family. Once completed, participants could submit the form directly through the platform. The medical team neither encouraged patients to complete the questionnaire nor inquired about their participation during the waiting period or prior to discharge, thus minimizing any perceived pressure to participate and preserving the voluntary nature of the study.

3.3. Feasibility of SOFIA-1

A primary objective of this study is to assess the feasibility of a multicenter investigation focusing on the socio-demographics and stress perceptions of partnered women undergoing IVF in Germany. We defined feasibility as the proportion of completed questionnaires out of all first oocyte retrievals at the two clinics, based on a protocol that was predefined and approved by the University of Lübeck's Ethics Committee. This measure captures response rates in a clinically relevant group and only includes fully completed surveys. Although other metrics exist, we selected this straightforward, reproducible approach to evaluate the potential for implementation in routine clinical survey studies.

Over a 13-month period, we successfully recruited 101 participants from the two clinics. Initially, we planned to stop collecting data either after surveying 100 respondents or after one year of distributing the questionnaire to potential participants. For a future multicenter study, it seems appropriate to limit the data collection period to six months or less. Reducing the time window minimizes confounding factors related to seasonal or external influences, thereby improving data comparability. It also ensures that patients are surveyed during a more consistent period, which reduces the impact of changing treatment conditions or

personal developments. A shorter study duration allows for better control over data collection, facilitating targeted management of response rates and more effective follow-ups. This, in turn, enhances data quality. Using a shorter collection timeframe in an IVF study can methodologically improve data accuracy, reduce bias, and enhance internal validity, all of which are vital for sensitive medical research (Edwards, 2010).

In terms of resources, the time and cost of preparing the survey and conducting the study were in line with our expectations. We had to purchase tablets, set up the online questionnaire, and provide on-site training for clinic staff, which had to be repeated frequently due to (unexpected) staff turnover. In addition, non-medical staff needed to be regularly updated on the study's progress to ensure that the questionnaire and related documents reached the appropriate target audience.

Regarding data collection, we observed different response rates at the two sites. From January to March 2024, the response rate was 38% (24/64 patients) in Lübeck and was 20% (13/65 patients) in Kiel. While we cannot fully explain this difference, variations in recruitment procedures, environment, or distribution of survey materials to patients may be relevant, as suggested in the literature (Dillman et al., 2014; Singer et al., 2000). Considering the sensitivity of the topic at hand and the average response rate of about 44% for online surveys in published research (Wu et al., 2022), these rates seem adequate. Willingness to participate may also depend on the timing of the survey. The survey was administered just before a medical procedure, a time when patients may be preoccupied. Additionally, privacy concerns, especially regarding sensitive issues such as reproduction or income, may discourage individuals from participating, even if the survey guarantees total anonymity. Another issue discussed in the literature is that smartphones and tablets have lower processing power, and respondents must operate on small touch screens, which can be perceived as inconvenient (Décieux & Sischka, 2024). Women awaiting their IVF treatment took an average of six minutes to complete the questionnaire. The questions with the highest rates of item non-response concerned income, employment, religiosity, and migration background. However, 87% of the questionnaires were completed in full.

4. Social Profile of Women and Couples Undergoing IVF Treatments and Perceived Stress

4.1. Socio-Demographic, Socioeconomic, and Treatment-Related Factors in the Context of IVF Treatments

In Table 1, we will describe our sample according to its socio-demographic, socioeconomic, and treatment-related characteristics. The mean age of the women undergoing IVF treatment was quite consistent with the most recent data available from the German IVF Registry, while the age of the men was slightly younger (Bartnitzky et al., 2024, p. 244). This is plausible because the IVF Registry collects data on treatment cycles, whereas our study focuses on first treatments at the selected fertility clinics. Thus, the women and their partners who had previously been treated at another fertility clinic were significantly older than the majority for whom this was their first treatment (81%). The women were mostly in their early 30s when they sought help and had a body mass index slightly above the normal weight range. About a quarter of the participants had a migrant background either through their own migration or that of their parents. More than half of the women, and slightly fewer of their partners, considered themselves religious to some extent, with fewer identifying as members of a predominantly Christian congregation. Consistent with research on intimate relationships (Burkart, 2018), the couples in our sample were homogamous in many respects, not only in terms of age, but also in terms of body mass index, migration history, and religiosity.

Table 1. Socio-demographic characteristics of the SOFIA-1 sample (mean or percentage, $n = 101$).

	Women	Partner
Mean age (SD)	35.2 (4.2)	36.9 (5.7)
Mean body mass index (SD)	27.0 (5.9)	26.9 (4.5)
Age group		
Up to 30	14.4%	9.7%
31–35	45.4%	39.8%
36–40	28.9%	25.8%
Older than 40	11.3%	24.7%
Migration background (own or parents)	25.8%	21.4%
Some level of self-assessed religiosity	54.1%	46.9%
Length of partnership		
Less than 5 years	28.7%	
5–9 years	37.2%	
10 years or more	34.1%	
Living together	96.8%	
Married couple	84.2%	
Biological child	15.8%	12.8%

The vast majority of our respondents were in long-term cohabiting partnerships and were married (84%). Interestingly, 16% of the women and 13% of their partners had at least one biological child. A closer look at the data shows that these children were primarily from previous relationships.

It is well established that the use of any form of medically assisted reproduction is highly socially selective both in Germany (Köppen et al., 2021; Passet-Wittig, 2024) and in other countries (Goisis et al., 2024). Social selectivity encompasses factors such as economic resources, education, and marital status. However, relatively little is known about the socioeconomic heterogeneity of those who rely on assisted reproduction. The participants in our sample tended to have more economic resources (Table 2), exceeding the levels generally reported for Schleswig-Holstein (Statistik Nord, n.d.). More than half of the women held an academic degree (technical college or university), while their male partners were slightly more likely to have a medium level of education. Almost all respondents and their partners were employed, mostly full-time. As expected, the partners exhibited a high degree of educational homogamy (Stauder & Kossow, 2021). Due to their elevated level of education and strong ties to the labor market, more than half of the couples reported a monthly net household income exceeding €5,000. Consistent with their economically privileged status, the percentage of women with private health insurance was slightly higher than the German average of around 10% (Verband der deutschen Ersatzkassen, 2025).

80% of the respondents were receiving treatment in Schleswig-Holstein and were living there, while the remainder were living in neighboring states. The majority of couples were living in small towns and rural areas. On average, it took them about an hour to get to the fertility clinic where they were being treated.

Table 2. Socioeconomic characteristics of the SOFIA-1 sample (n = 101).

	Women	Partner
Academic degree	50.6%	41.4%
Employed	96.6%	95.4%
Full-time employed	80.0%	84.3%
Monthly net household income		
less than €3,000		5.8%
€3,000—less than €5,000		41.9%
€5,000 or more		52.3%
Private health insurance	12.4%	6.8%
Main residence		
Schleswig-Holstein		79.6%
Mecklenburg-West Pomerania		8.2%
Hamburg		6.1%
Other		6.1%
Size of the place of residence		
Less than 20,000 inhabitants		50.6%
20,000—less than 100,000 inhabitants		24.7%
100,000 inhabitants or more		24.7%
Time needed to get to fertility clinic (one way)		
Less than 30 minutes		21.6%
30—less than 60 minutes		45.4%
60 minutes or more		33.0%

Since women are the recipients of IVF treatments, the treatment-related factors (Table 3) are presented only for women. Almost 81% of the women in our sample were undergoing IVF treatment for the first time, with three-quarters of them in Lübeck and a smaller proportion in Kiel. While nearly 90% of the respondents rated their physical health as above average, they rated their mental health somewhat less favorably. Physical and mental health assessments have distinct dimensions and are therefore not strongly correlated. Notably, more than 45% of respondents reported experiencing high psychological distress due to their unfulfilled desire to have a child. When asked about the reasons for not getting pregnant, stress was the most frequently mentioned factor, followed by too infrequent sexual intercourse and the absence of their partner. Open responses mentioning biomedical reasons were less frequent. Examples of these reasons include endometriosis, tubal factor infertility, poor sperm quality in the male partner, and pre-existing chronic conditions. Many of the women had previously tried various methods to conceive, including taking folic acid, monitoring their menstrual cycles, and measuring hormones in their urine. Nearly 43% of the respondents had been trying to get pregnant for a considerable period of time, between two and four years, and 29% had been trying for more than four years, before considering IVF treatment in Schleswig-Holstein. Women who had been trying to get pregnant for four years or longer were more likely to have previously sought help from another fertility clinic than women who had been trying for a shorter period. All of the women rated their relationship with their partner as very satisfying or at least satisfying.

Table 3. Treatment-related characteristics of the SOFIA-1 sample ($n = 101$).

	Women
Fertility clinic	
Lübeck	77.5%
Kiel	22.5%
First treatment in a fertility clinic	80.6%
Self-perceived good and very good physical health	89.3%
Self-perceived good and very good mental health	73.9%
Extent of psychological distress due to unfulfilled desire for a child	
Low	26.9%
Moderate	27.9%
High	45.2%
Subjectively perceived reasons for non-occurrence of pregnancy (multiple responses; only showing the most frequently mentioned)	
Stress	36.3%
Too infrequent sexual intercourse	16.5%
Partner's frequent absence	6.6%
Methods used to conceive in the past (multiple responses; only showing the most frequently mentioned)	
Folic acid	82.8%
Menstrual cycle monitoring	76.3%
Measuring hormones in urine	37.6%
Duration of trying to get pregnant	
Less than 2 years	28.7%
2—less than 4 years	42.6%
4 years or more	28.7%
Relationship satisfaction	
Satisfied	27.7%
Very satisfied	72.3%

4.2. Stress and Psychological Distress in the Context of IVF Treatments

In this section, we aim to disentangle factors related to two subjective dimensions that are relevant in the context of IVF treatment: perceiving stress as the main reason for not getting pregnant and experiencing high levels of psychological distress due to an unfulfilled desire to have a child. These two dimensions are distinct and not strongly correlated. Given the small sample size, we only present bivariate associations that are statistically significant at the 10% level.

Women's perceptions of stress as the primary reason for not getting pregnant can be best understood in the light of social-psychological attribution theory (Weiner, 1985). It explains how individuals interpret the causes of events, particularly failures or setbacks, and how these interpretations influence their emotions and behavior. Women undergoing infertility treatment or experiencing difficulty conceiving often engage in

causal attribution to make sense of their situation. This, in turn, shapes their emotional responses, coping mechanisms, and overall perception of stress. When stress is perceived as permanent and uncontrollable, it can exacerbate anxiety and distress, potentially further compromising fertility. Social influences, such as messages from doctors, the media, or family members, often reinforce the idea that stress causes infertility or, in the case of social support, counteract it.

According to existing research, increased social loneliness during the assisted reproduction process may be due to infertility-related stress and stigma (Köksal & Goisis, 2023). There is also evidence that perceived social stigma and the physical and time demands of assisted reproduction are associated with higher stress and depression symptoms, whereas emotional support from a partner is associated with lower perceived stress (Gupta et al., 2024). Onnen-Isemann (2000) found in her early qualitative study of couples undergoing reproductive medical treatment in Germany that the associated stress had an extreme impact on their quality of life. For the couples who were interviewed, life without biological children was unimaginable.

In our sample, a few factors were significantly related to women's perception of stress as the main reason for their inability to get pregnant (Figure 2). If the woman's partner already had a biological child, she was more likely to perceive that stress was an obstacle to conception. This finding aligns with the attribution theory, as the woman's partner having a child may have reinforced her feeling that she was solely responsible for the couple's difficulties in conceiving. A woman's partner having an academic degree was also associated with her perception of stress-related fertility problems. We cannot fully explain this association, but it may be due to our upwardly biased sample. Conversely, women who perceived that causes other than stress (e.g., external factors such as medical issues) were decisive for their fertility problems were more likely to rate their relationship satisfaction as very high. We interpret this association as an indication of perceived social support from the partner, which contributed to lower stress levels. Interestingly, the few factors that appear to be related to women's perception of stress as a barrier to pregnancy are characteristics of the partner or relationship, but not, for example, women's age, which might indicate a "ticking biological clock."

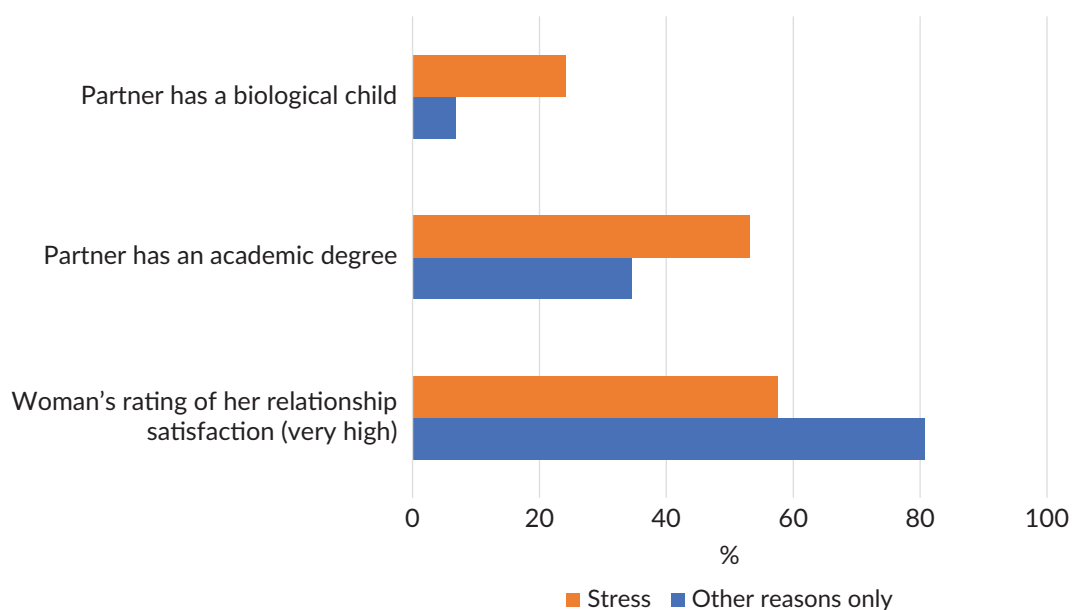


Figure 2. Association between selected factors and stress vs. other reasons as women's subjectively perceived main reason for the non-occurrence of pregnancy. Source: Data from the SOFIA-1 project survey.

More than 45% of female respondents reported experiencing high levels of psychological distress due to their unfulfilled desire for a child. The subjective experience of fertility problems is highly contextualized and profoundly shaped by the societal norms and cultural attitudes surrounding parenthood. In cultures where the concept of voluntary childlessness does not exist, the stigma and distress associated with infertility are likely to be greater than they are in Western societies. Women and couples who seek advanced medical treatments to address their fertility issues are often perceived as being more distressed than those who are more open to alternatives to biological parenthood (Greil et al., 2011). The level of psychological distress that women experience due to fertility problems is theoretically perceived at the intersection of gender, identity, and the body. Women's gender identity may be threatened by an inability to reproduce (Bell, 2019), as it may violate deeply held expectations of femininity and family life (Loftus & Andriot, 2012). The relationship between women's experience of fertility problems and elevated levels of psychological distress could theoretically be modified by alternative roles and resources. In this vein, McQuillan et al. (2003) found that in the US that infertile women who were involuntarily childless had the highest levels of psychological distress, regardless of the available resources. In rare cases, infertility can trigger existential distress, which is expressed as a total immersion in the process of becoming pregnant (Hoffmann, 2013). In Germany, nearly two-thirds of couples who underwent assisted reproduction therapy reported having no alternative vision for their family besides having a biological child. This lack of alternatives increased stress levels during treatment (Passet-Wittig & Schneider, 2020).

Not surprisingly, the length of time spent trying to become pregnant was positively associated with the level of distress experienced (Figure 3). Women who had been trying to conceive for at least two years were significantly more likely to report high rather than moderate or low levels of distress. To a somewhat lesser extent, this association also held for women who had previously been treated at another fertility center. It may seem counterintuitive that a positive association existed between very high levels of relationship satisfaction and elevated levels of psychological distress. The female respondents reported higher levels of relationship satisfaction when they also reported higher rather than lower levels of psychological distress. This may be because women felt particularly stressed by their inability to conceive when they had a highly satisfying partnership and perceived parenthood as important to their identity as a successful family member. One difficult-to-interpret finding is the relationship between the partner's religiosity and the woman's psychological distress due to fertility problems. Women whose partners were somewhat religious were more likely to report high rather than moderate or low levels of psychological distress. The small number of such cases did not allow for a more detailed analysis, but it is possible that perceived social pressure related to fertility varied by religious diversity as an expression of culture (Haug & Milewski, 2025; Milewski & Haug, 2020).

Figure 3 shows that some factors were associated with lower levels of psychological distress among women. These factors included self-perceived good or very good mental health, a high net monthly household income, and having a biological child. There was a strong relationship between women's perceptions of their mental health and their level of psychological distress due to unfulfilled fertility aspirations because the latter affected the former. Women in high-income households were more likely to report having relatively low rather than high levels of psychological distress. This may indicate the importance of economic resources in accessing or continuing medically assisted reproduction, which may have ultimately enabled the respondents to fulfill their fertility aspirations. Having a biological child while undergoing IVF was rare, affecting about 16% of the women in our sample (Table 1). When it did occur, it was associated with moderate or low rather than high levels of

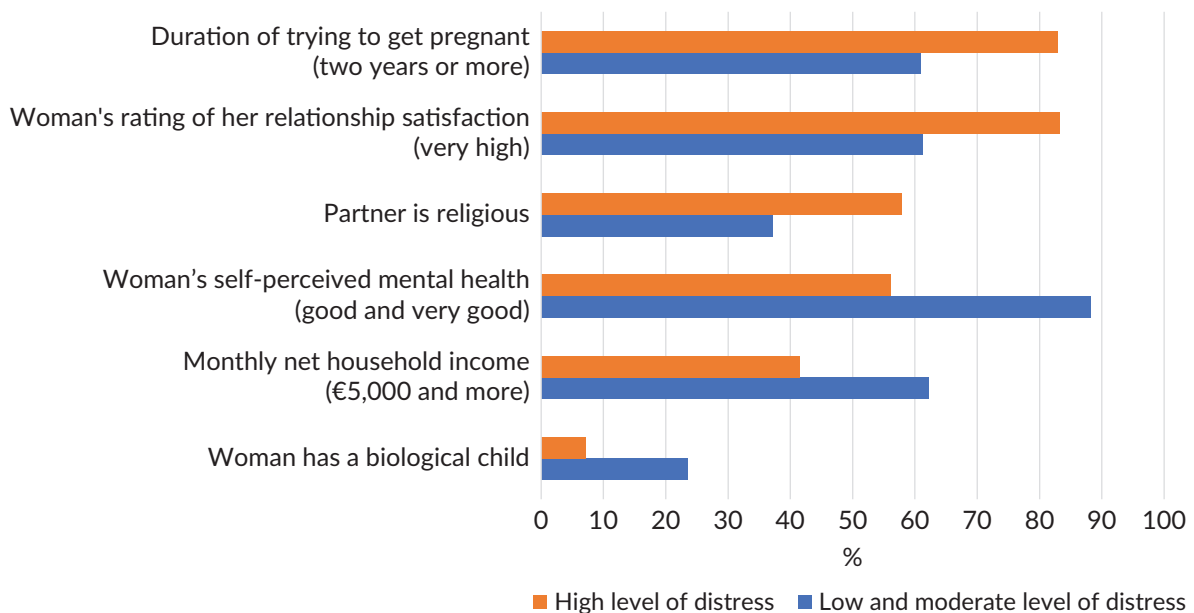


Figure 3. Association between selected factors and the extent of women's psychological distress due to an unfulfilled desire for a child. Source: Data from the SOFIA-1 project survey.

psychological distress. This finding can be best understood in light of identity theories, because women who were already mothers may have had more confidence than childless women in their ability to conceive and carry a pregnancy to term (Loftus & Namaste, 2011). Conversely, their identity as a biological mother may have protected these women from potential future failure, thus reducing their psychological distress (Neter & Goren, 2017). Taken together, individual, partner, and relationship characteristics were relevant factors associated with women's psychological distress due to unfulfilled fertility aspirations.

5. Conclusion

The SOFIA-1 study demonstrates the feasibility of collecting sensitive socio-demographic and psychosocial data from IVF patients through an anonymized, digitally administered survey embedded in the clinical setting. By focusing on women undergoing oocyte retrieval—a well-defined and standardized point in the IVF trajectory—this study ensured that the participants were surveyed at a comparable stage in their treatment journey. Using anonymous, voluntary participation without written informed consent is consistent with ethical standards and essential to fostering trust and protecting privacy. The high completion rate of questionnaires and acceptable response rates at two different sites indicate that this approach is not only logistically feasible, but also well accepted by patients. Thus, SOFIA-1 can serve as a methodological blueprint for future large-scale multicenter studies aimed at integrating socioeconomic and psychosocial dimensions into reproductive health research. Expanding this research across multiple locations and incorporating diverse patient populations would enhance the generalizability of the findings and allow for more robust conclusions regarding the factors influencing patient well-being. This is important because clinics vary in the amount and structure of the psychological support they offer. Gathering data from a wider range of settings may reveal whether these differences are linked to variations in patients' stress or unmet needs. Recognizing such patterns of diverse needs could provide valuable insights to improve psychosocial care and promote more equitable support practices across fertility clinics. However, we acknowledge that

developing a multicenter study design may require methodological adjustments, such as the tailored design method by Dillman et al. (2014), to improve response rates further.

In addition, this study sheds light on the socio-demographic factors and stress perceptions of women undergoing their first IVF treatment cycle at two fertility clinics in Schleswig-Holstein, Germany. It also identifies factors that influence how individuals perceive stress during this complex assisted reproduction journey. Our study provides initial evidence that many women experience significant psychological distress at the beginning of their IVF treatment, which likely increases over the course of treatment. For instance, we find that stress levels are elevated in women who have been trying to conceive for a longer period of time and in those who have previously been treated at another clinical center. Stress levels are likely to rise during treatment, as patients recognize the risks associated with fertility procedures and possible failure (Onnen-Isemann, 2000). Additionally, societal pressures surrounding biological parenthood, along with concerns about treatment costs, time commitment, and relationship strains, may further heighten stress. However, future research needs to assess the specific factors contributing to perceived stress in more detail.

Our research suggests that stressors are complex, involving individual, partner, and relationship characteristics. Existing tools that measure these stressors, such as broad assessments of stress and well-being, lack the specificity needed to fully address the IVF experience. Therefore, using a fertility-focused stress scale, such as the Copenhagen Multi-Centre Psychosocial Infertility research program (COMPI) questionnaire by Sobral et al. (2017), may provide a more nuanced perspective on how fertility issues impact daily life. This scale distinguishes between personal, marital, and social stress, offering a better framework for evaluating the psychological challenges of IVF. Future studies should adopt these specialized measures to enhance the accuracy, comparability, and applicability of stress evaluations in reproductive health research. Since stress perceptions are influenced not only by personal factors but also by partner and relationship characteristics, couples should be considered as a unit. Understanding how relationship dynamics influence stress levels can facilitate the development of more targeted interventions that address both partners' needs throughout the treatment process. Ideally, this would occur through ongoing, longitudinal follow-up with couples or individuals that enables us to better understand their reproductive journeys and how they cope with the possibility of not having a child after IVF treatment.

Our findings underscore the need for effective psychosocial support during IVF treatment. Previous studies (Thorn, 2020) have shown that IVF patients often experience significant emotional difficulties that can adversely affect their mental health and treatment outcomes. Our data emphasize the importance of incorporating psychosocial counseling and emotional support into fertility treatment programs to promote informed decision-making and emotional preparedness. Although health insurance companies may cover some IVF costs, patients often bear the emotional consequences of treatment. Gupta et al. (2024) emphasize the critical importance of social support. Their research shows that social networks can reduce stress and the risk of depression, especially for those who have undergone unsuccessful assisted reproduction. Offering specific support services, such as fertility counseling, can alleviate the emotional strain of IVF and enhance the overall patient experience.

Finally, as societal views of family formation shift, it is important to recognize that not everyone undergoing IVF treatment sees biological parenthood as the ultimate goal. According to scholars such as Passet-Wittig and Schneider (2020), a minority of individuals and couples are increasingly open to additional pathways to

parenthood, including adoption, foster care, or choosing a child-free lifestyle. Although IVF treatment remains a primary route to biological parenthood for many, it is crucial for fertility professionals to provide comprehensive counseling that addresses all options available to individuals who may not fit society's traditional reproductive expectations. This broader perspective on reproductive choice contributes to a more inclusive approach to reproductive health care that promotes personal agency and reduces societal pressures. Future research should consider the importance of questions about alternative paths to parenthood beyond biological ones to improve our understanding of the role of biological parenthood in the family formation process and its related consequences.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

Data from Official Statistics are available from the Federal Statistical Office of Germany (<https://www.destatis.de>). The SOFIA-1 study data are not publicly available because it is a pilot study for a larger multicenter study.

LLMs Disclosure

In preparing this manuscript, large language models (Grammarly, DeepL, and ChatGPT) were used for language and style editing to enhance clarity and coherence.

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