



Women's experiences of infertility after the Holocaust

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ABSTRACT

Nuremberg trial evidence demonstrated that Nazis sought methods of mass sterilization of Jewish women. Immediately upon arrival at the concentration camps, over 98% of women stopped menstruating. There has been minimal investigation as to the cause(s) of amenorrhea, beyond malnutrition and trauma. The major objectives of this article are to 1) provide an alternate hypothesis to explain women's amenorrhea, i.e., surreptitious administration of exogenous hormones to women; 2) detail survivors' reproductive histories so as to demonstrate long-term sequelae, especially pregnancy losses; 3) provide women's subjective narratives of the short- and long-term experience of reproductive losses; 4) link women's amenorrhea, subsequent primary and secondary infertility and the evidence for the hypothesized causal mechanism, i.e., the administration of sex steroids which might have led to both immediate and long-term reproductive impacts. We conducted telephone interviews from 2018 to 2021 with Holocaust survivors internationally in 4 languages. We collected 93 testimonies from female Holocaust survivors (average age 92.5) or offspring who could provide complete reproductive histories for survivors. The interviews focused on reproductive histories, including amenorrhea beginning in 1942–45, subsequent attempts to conceive, numbers of pregnancies, miscarriages and stillbirths. Ninety-eight percent of women interviewed were unable to conceive or carry to term their desired number of children. Of 197 confirmed pregnancies, at least 48 (24.4%) ended in miscarriages, 13 (6.6%) in stillbirths and 136 (69.0%) in live births. The true number of pregnancy losses is likely much higher. Only 15/93 (16.1%) of women were able to carry more than two babies to term, despite most wanting more children desperately. Amenorrhea among Jewish women arriving at concentration camps was too uniform and sudden to be effected only by trauma and/or malnutrition. Survivors' narratives and historical evidence suggest the role of exogenous hormones, administered without women's knowledge to induce amenorrhea as well as subsequent primary and secondary infertility.

It has long been known that immediately after women's arrival at the concentration camps, most conspicuously Auschwitz, 98–99% of them ceased to menstruate (Pasternak and Brooks, 2007). The common assumption has been that the cause of this nearly universal amenorrhea was either psychogenic or malnutrition. In fact, these assumptions have been so widespread that they have not been questioned. They are quite reasonable propositions. For hundreds, if not thousands of years, it has been observed that stress can induce menstrual cycle irregularities. As we now know, the pathway for this type of amenorrhea would involve the adrenal-hypothalamic-pituitary axis. Arrival at a death camp is not merely "stressful" – it is the epitome of trauma. As for malnutrition, it too, has been widely associated with menstrual disruption. This cause of amenorrhea has been documented among women suffering famine, scarcities during other wars and women who deliberately reduce their

caloric intake to dangerous levels, including dancers, gymnasts and anorexics. As such, one can understand how and why these associations and assumptions have been taken as fact over the last 75 years.

One purpose of this paper is to provide another working hypothesis as to the cause of amenorrhea in the concentration camps. It is not intended to discount the possible roles of trauma and starvation as contributing factors to amenorrhea during the Holocaust. There is little question as to whether malnutrition and/or trauma can lead to amenorrhea and there is some debate in the literature as to the relative contribution of each factor (Hill, 2004; Russell, 1972; Stein and Susser, 1975). The purpose is, however, to suggest that exogenous hormones, administered without women's knowledge or informed consent, during the Holocaust, might have been used both to induce amenorrhea and possibly to impair future fertility.

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A second purpose of this article is to document women's own experiences of the disruption in their menstrual and reproductive histories in the camps during the Holocaust and thereafter. There are tens of thousands of oral histories of Jews' experiences during the Holocaust and over 50,000 have been collected by the University of Southern California Shoah Foundation alone (<https://sfi.usc.edu/collecting>) (USC Shoah Foundation, 2022). But as discussed below, women's own narratives of the cognitive, affective and physical experiences of suddenly ceasing their menses are largely absent from existing documentation. Their attributions as to what led to the amenorrhea and its meaning for them, both at the time and its long-term impact, are also missing. As such, a major component of this article is to present findings from new interviews with female survivors of the Holocaust.

A third purpose of this paper is to document the long-term impact of whatever led to the well-known amenorrhea during the Holocaust on female survivors. The desire to renew life shortly after the end of the war was evident in the mini-baby boom that began within a few years after liberation and was reported widely (Bass, 1947; Drew, 1961; Pasternak, 2006; Pasternak and Brooks, 2007). Beyond that, concentration camp survivors – who were not yet even called “survivors” – learned quickly that the world was not open to hearing about their experiences. The news of survivors' literally creating life anew fit well with the message communicated by existing Jewish communities in the early years of the post-war narrative: The Jewish spirit was indomitable and that notwithstanding what men and women had experienced during the war, they were survivors on every level and ready to begin and reproduce Jewish life/lives anew. There was a reluctance to hear the survivors' own narratives of suffering and victimization internationally as well as in North American (Abramson and Lynch, 2019) or Israeli (Keynan, 2018) communities. There is, indeed, considerable documentation of survivors having had children after the war – but not of how many children they wanted or how many pregnancies were lost; the three are not at all the same, as documented below.

Finally, women's experiences in the camps, the long-term impact(s) on their subsequent reproductive histories and the possibility that these effects may have been produced by surreptitious administration of exogenous hormones, will be linked together.

1. Trauma and malnutrition as contributing factors – but maybe not the only ones

Some of the evidence that trauma and malnutrition alone are unlikely to have been the only contributing factors to the sudden development of amenorrhea during the Holocaust unfortunately comes from the study of other atrocities and instances of malnutrition. There has been considerable evidence as to the amenorrhea following such trauma as the bombings of Hiroshima and Nagasaki, with the incidence ranging from 16% to 51% (Khuri and Gehi, 1981; Oughterson et al., 1951). Tragically, if severe trauma alone were sufficient to produce amenorrhea in women, it would not likely be compatible with the “successful” use of torture, separation from family, sexual assault and the resulting deliberate, unwanted impregnation of female captives as a tactic of war (Ai et al., 2002; Amone-P'Olak, 2005; Human Rights Watch, 1997; Human Rights Watch, 2003; Jennings, 1990; Jong et al., 2000; Mullins, 2009; Takai, 2011; UNICEF, 1998). Perhaps the best known recent example of this is the plight of female captives forcibly impregnated by Boko Haram. Only once the captives were impregnated would the rapes cease (Oriola, 2017.) By contrast, as documented by Pasternak and Brooks (2007, p. 216) in their research on Jewish women during the Holocaust, “Cessation of menses as a result of acute stress is well known, but the uniformity of occurrence in these women, occurring in over 99% and so soon after incarceration, seems exceptional.”

Similarly, if malnutrition alone were the culprit, then the onset of amenorrhea would neither be as sudden nor as uniform in timing as was observed among and reported widely by survivors, during and after the Holocaust (cf., compared to survivors of other famines, Ashton et al.,

1984; Curlin et al., 1976; Hill, 2004; Stein and Susser, 1975; Stein et al., 1975) nor does famine alone produce long-term impact on future reproductive capacity (Stein and Lumey, 2000; Yarde et al., 2013). Among women who deliberately restrict their caloric intake radically, for example, gymnasts, ballerinas and anorexics, intentional malnutrition does induce amenorrhea eventually, but it does not do so immediately (Cohen et al., 1982; Gindoff et al., 1989; Verri et al., 1998).

Although the combination of malnutrition and severe war trauma is well known to cause the cessation of menstruation, the variability in timing even among other prisoners during World War II (Elias et al., 2007; Gindoff et al., 1989; Sydenham, 1946) stands in stark contrast with the uniformity of timing found among Jewish women shortly after their arrival in the concentration camps.

There are isolated studies investigating the long-term effects of the Holocaust on women's menstrual cycles and number of children after the war, notably Pasternak and Brooks (2007) but their research focussed only on Hungarian survivors of Auschwitz. This is noteworthy given that in comparison to other countries, the Jews of Hungary remained “at home” longest, that is, until April 1944, with deportations to the camps beginning in May 1944. This is in contrast with, for example, Polish Jews, who began to be evacuated from their homes into sealed ghettos in September 1939, with tens of thousands dying of starvation even before being deported to the death camps beginning in 1942. What may seem like a research limitation (in Pasternak and Brooks, 2007) may actually serve to illuminate the uniformity/universality in women's amenorrhea despite differences in BMI upon entering the camps. It is the juxtaposition of the data across survivors from different countries and their experiences, especially of differences in malnutrition and prolonged, highly intense trauma, which is revealing.

2. An alternative hypothesis? Surreptitious attempts at mass sterilization

On what basis would one suggest that there might have been an attempt to sterilize Jewish women en masse during the Holocaust? It is well known that the eugenics program of the Nazis knew no bounds. From the inception of the Nazi regime, one of its central tenets was the notion of Aryan racial superiority. The idea that Jewish and Aryan individuals might have sex and reproduce was deemed *Rassenschande*, i.e., race defilement and was codified as criminal by the Nuremberg Laws of September 15, 1935. By the early years of World War II, the strategies of The Final Solution were formulated to ensure that no Jewish adult or child would survive their implementation and completion. What evidence suggests that sterilization was considered when gas chambers were surely efficient?

Documentation was introduced during the Nuremberg trials that Nazi officials were seeking a method of mass sterilization of the Jewish people that would prove fast, effective and cheap concurrently with their attempts to exterminate Jews in the camps. There is considerable evidence of medical experiments at Auschwitz, most notoriously overseen by Josef Mengele. But less well known perhaps is the experimental sterilization of Jewish women at Auschwitz and Ravensbrück with the hope of finding a more expedient mass method. They employed non-surgical methods such as high doses of radiation and the injection of caustic substances into women's reproductive organs (Trials of War Criminals Before the Nuernberg Military Tribunals - Washington, U.S Govt. Print. Off., 1949–1953a; 1953b, Vol 1, p. 730). These methods, while effective, were not as rapid and could not be practised as widely as had been hoped. As indicated in a letter from SS-Oberfuehrer Gund to Reichsfuehrer-SS Himmler, August 24, 1942:

... the present director of the District Office for Racial Policy, Gauhauptstellenleiter Dr. Fehringer, has examined the question of sterilization and found that the methods so far available, castration and sterilization, are not sufficient in themselves to meet expectations.

Consequently, the obvious question occurred to him whether impotence and sterility in [sic] could not be produced in men and women by the administration of medicine or injections (Trials of War Criminals Before the Nuernberg Military Tribunals - Washington, U.S Govt. Print. Off., 1949–1953a, 1953b, Vol. I, p. 717)

In October 1941 correspondence introduced at trial in Nuremberg, Nazi physician Adolf Pokorny writes in a letter to Himmler:

“If, on the basis of this research, it were possible to *produce a drug which after a relatively short time, effects an imperceptible sterilization on human beings*, then we would have a powerful weapon at our disposal... (Nazi Conspiracy and Aggression - Washington, U.S Govt. Print. Off., 1946, Supp. A, p. 1279)

Furthermore, the Memorandum of SS-Obersturmbannfuhrer Brandt on discussion July 7, 1942 with Himmler, Gebhart, Gluecks, and Clauberg [i.e., the correspondence documenting the meeting in “Führer Headquarters” between (Rudolf) Brandt, SS Obersturmbannfuhrer and Himmler indicates]:

“Topic of discussion was the sterilization of Jewesses. The Reichsfuhrer SS has promised SS-Brigadefuhrer Professor Clauberg that the Auschwitz concentration camp will be at his disposal for his experiments on human beings and animals. By means of some fundamental experiments a method should be found *which would lead to sterilization of persons without their knowledge*. The Reich Leader SS wanted to get another report as soon as the result of these experiments was known, so that the sterilization of Jewesses could then be carried out in actuality.” (Trials of War Criminals Before the Nuernberg Military Tribunals - Washington, U.S Govt. Print. Off., 1949–1953a, 1953b, Vol. I, p. 728).

Brandt adds that Himmler had instructed them to keep this plan secret and to pledge not to keep further written records. This pledge of secrecy is corroborated in Nuremberg documentation of the correspondence of Pokorny to Himmler (Document No-035 Office of US Chief of Counsel). Thus, there is unquestionably evidence that the upper echelon of Nazi leadership was motivated to find efficient ways of sterilizing Jews en masse without their knowledge, let alone their consent, during the Holocaust.

Why was there no investigation after this documentation was introduced during the “Doctors’ Trial” at Nuremberg (1946–47) as to whether the Nazis actually produced and administered substances, intended to induce infertility, to Jewish women in the camps? Several possibilities come to mind: In 1945, the possibility of controlling women’s reproductive cycles surreptitiously, whether temporarily by inducing amenorrhea or creating a more enduring impact on fertility, might have seemed too far-fetched to the uninitiated for further investigation. Indeed, although Pokorny was implicated in the correspondence above, he was found not guilty by the American tribunal during the Nuremberg trials (p. 11,527) because it was believed that his “research” on reproductive control of Jewish women had hit a dead end. (For information on the history of women’s reproductive health care in the mid-20th century and specifically, the bifurcation between scientific research – much of it pharmacological – and clinical care, much of it aimed at treating hysteria – please see Drew, 1961; Eisenberg, 2010; Khuri and Gehi, 1981; Santow, 2001; Seaman, 2003; and Schoenfeld et al., 1990.)

Furthermore, birth control pills were not introduced until 1960. It may not have occurred to the prosecutors at war trials that exogenous hormones were already in existence; they had, in fact, been synthesized first by German scientists who were members of the Nazi party (e.g., chemist Adolf Butenandt, gynecologist Carl Clauberg) and manufactured by German pharmaceutical company Schering before and during the war (Kaupen-Haas, 1988; Lifton, 1986; Schieder and Trunk, 2004; Trunk, 2006; Weindling, 2014). Perhaps the prosecutors in 1947 were not aware of women’s cessation of menstruation immediately upon

entering the camps. Women certainly discussed it with each other and speculated as to what might have caused them all to stop menstruating virtually simultaneously upon arrival in the camps (please see below). Sex researchers have long known that enquiring, even within medical examinations, about matters that pertain to sexuality remains the last taboo (Gordon, 2021; Moser, 2022, in press), even in Holocaust research (cf., Chalmers, 2015).

By the late 1940s and into the 1950s and 60s, accounts were beginning to emerge in the medical literature of women’s amenorrhea in the camps (Bass, 1947; Drew, 1961; Horvath et al., 1948; Martius, 1946). At that time, their cessation of menstruation was attributed by the scholarly experts to psychogenic factors (i.e. hysteria, trauma) and malnutrition. However, no one ever asked the survivors.

3. Procedures

The semi-structured interview protocol used in this study enquired as to the chronology of survivors’ experiences during the war in a manner parallel to those described in the major Holocaust oral history projects (e.g., USC Shoah Foundation, 2021). These questions included demographic information, such as name and place of birth, history of family of origin, date of first evacuation from home, date of deportation to each of the camps, date of liberation, subsequent marriage and children, etc. Unlike most other studies, they also included: menstrual history, before, during and after the war; difficulties or lack thereof in conception; number of pregnancies, miscarriages and stillbirths (i.e., spontaneous termination of pregnancy after 20 weeks gestation), before, during and after the war; date of wedding(s); date of first and subsequent pregnancies; use of contraception; number of desired children; number of live children; medical attention/intervention for amenorrhea/menstrual problems, conception, primary infertility and/or secondary infertility; to what they attributed amenorrhea during the war; and to what they (or their physicians as applicable) attributed subsequent reproductive difficulties. In keeping with current best practices (Hill, 2004, pp. 20–21), “Full birth histories, whereby a woman is asked for the date of birth of each live-born child (and age at death if he or she has died) is the method of choice for fertility surveys today and is used by all Demographic and Health Surveys (DHS).”

4. Women’s experiences of amenorrhea during the Holocaust and long-term impact

A compelling case for another, previously unaccounted factor, emerges in the accounts of female survivors themselves. Women’s accounts of their menstrual disruption appear alongside their descriptions of long-term repercussions in individual memoirs but have not been studied systematically. In oral history archives documenting the history of Jews during the Holocaust, women’s descriptions of their menstrual and reproductive histories prior to, during and subsequent to the Holocaust are sporadic. In addition, the indexing of search terms such as “menstruation” and “periods” does not capture the frequency with which women raised the subject during their oral testimonies. For example, a search of “menstruation” in the USHMM database brings 124 citations and “amenorrhea” brings up only 17 citations. By contrast, in this study, many interviewees volunteered that they had previously provided testimony for one or more of the major Holocaust oral history projects. They asked repeatedly, “I was interviewed by the Shoah Foundation, the Washington Holocaust Museum and the Montreal Holocaust Museum. Why didn’t they ask about menstruation?” Indeed, a cross-check of their interviews in the other archives upholds their contention that this topic was not elicited or covered in their prior testimonies. On those occasions where these interviewees had attempted to bring up their reproductive histories in previous oral testimony projects, their interviews were not indexed under “amenorrhea”, “menstruation” or “infertility”.

5. Participants

To that end, upon receiving approval from the University of Ottawa Research Ethics Board, female survivors of Auschwitz were recruited for interviews about their reproductive histories. Particular attention was focused on avoiding possible re-traumatizing of victims. There is a large literature on the relationships among trauma, memory and the Holocaust (Bohleber, 2007; Carey, 2017; Knopp, 2017; LaCapra, 2001; Laub and Auerhahn, 2017; Tota and Hagen, 2015; van der Kolk, 2014). Our interviews included the participants' entire life narrative, including their experiences during the war. However, the main focus of the interviews was on reproductive histories prior to and after the war as opposed to the *primary* focus being on events which occurred during the war. Nonetheless, the authors used a trauma-informed approach in conducting the interviews. For example, no survivors were contacted for participation in this study. Instead, recruitment blurbs were written in English, Hebrew and Yiddish in newspapers and websites targeted to Jewish readers (e.g., the Canadian Jewish News), Jewish women (e.g., Lillith, JOFA Journal), Holocaust survivors and their families (e.g., GSI [Generations of the Shoah International]) and older general readers (e.g., the Senior Times). Survivors were also recruited via word-of-mouth generated by presentations to Jewish groups (e.g., Limmud conferences). Recruitment blurbs in English, Hebrew and Yiddish (whenever possible in large font) were also circulated via social service agencies which assist Holocaust survivor communities internationally (e.g., Amchah in Israel). Within 24 h of the first appearance of the recruitment notices, survivors of other concentration camps began to contact the researchers to volunteer for interviews and a snowball sample grew. Survivors passed our contact information to others in their social networks who were free to initiate contact if they wished. Interviewees reported that even though they had not been incarcerated in Auschwitz, but rather Ravensbrück, Theresienstadt, Bergen Belsen or even such slave labour camps as Skarzysko-Kamienna, they had ceased menstruation upon arrival in the first camp and asked to be included in the research. As such, we broadened inclusion criteria to female survivors of any of the camps and those of any of their children who were able to provide complete testimonies as to their mothers' reproductive histories.

One hundred and nineteen interviews were conducted between 2018 and 2021 using trauma-informed interviewing practice. Sixty-four testimonies were provided by survivors, who were interviewed by the first author in English, French, Hebrew and Yiddish. Survivors were interviewed as to their own menstrual and reproductive histories. The average age of the survivors interviewed was 92.5 at the time of the interviews (range 87–99). The range of ages at which the survivors entered the camps was 9–49, with an average of 19.6 years of age. Only 5 women were 30 years of age or older when they first entered the camps. Where applicable, survivors also provided testimonies as to sisters who had survived the Holocaust but had since died. Twenty-nine testimonies were provided and retained from other family members including one widower and by those rare daughters and sons of survivors who were well-enough informed as to their mothers' gynecological histories to offer comprehensive documentation as to the survivor's experience. This resulted in a total of 93 complete testimonies. Additional testimonies were offered by 26 offspring who volunteered to be interviewed for this study; their testimonies were excluded because participants were unable to answer questions about the survivor's sexual and reproductive history with sufficient specificity. That is, 26 incomplete records were excluded from analysis.

6. Reproductive history: amenorrhea upon arriving in the camps

All but two women developed amenorrhea immediately upon arriving at the camps. The only women who did not stop menstruating attributed it to detecting something added to the soup on some occasions

and refused to eat on those occasions. Two other women reported detecting a white powder in the "disgusting" and "foul-smelling" brown liquid that participants referred to as either "soup" or "coffee" at Auschwitz but were too hungry to discard the soup.

Similarly, one woman who had been in hiding throughout the war and was never in the camps never stopped menstruating; she wanted to tell her story for contrast with that of her sisters, who had been in concentration camps, developed amenorrhea and subsequently became infertile. Correspondingly, one woman reported that while she stopped menstruating in the camps and developed secondary infertility thereafter, 2 of her sisters were in hiding and did not stop menstruating during the war nor have difficulties with conception or miscarriages thereafter.

All other women stopped menstruating upon arrival at the first camp – not while in the ghettos. These camps included Auschwitz, Ravensbrück, Bergen Belsen, Theresienstadt and 7 stopped menstruating in slave labour camps, e.g. Gross-Rosen, Plaszow, Weidenburg and Skarzysko-Kamienna. Ninety of the women eventually resumed their menses, the large majority after seeking medical help. Three women never menstruated again after the war, despite receiving medical help.

7. To what did these women attribute their amenorrhea?

A few women (15/93) identified precisely what led to their amenorrhea in Auschwitz and for most (as described below), subsequent difficulties with fertility. Most women were haunted by never knowing what caused them to suddenly stop menstruating and later, the long-term effects on their fertility/infertility.

One survivor reported having been sterilized in Auschwitz by radiation. Two were singled out and sterilized in Auschwitz by surgery on their reproductive organs in Nazi experiments. One woman indicated she had been sterilized in Auschwitz by injections into reproductive organs 5 times via her vagina "and not by Mengele." One was menstruating on the day of her arrival in Auschwitz and was forced to swallow a pill daily. Other survivors corroborated such accounts and reported observing that women who had their periods upon arrival at Auschwitz were pulled out of line for pills or injections, leading the women to stop menstruating. Ten who did not have their periods at the time reported receiving injections upon arrival at Auschwitz, some into their left arms, others into left breasts.

The vast majority (78/93) of women interviewed had no idea as to what had happened to them but had wondered about it for decades. As described in the interviews below, they attributed it to a chemical in their rations. Three reported they could sometimes actually see bits of a white powder that had not fully dissolved in the aforementioned "repulsive" liquid that participants referred to as either "soup" or "coffee". Survivors had heard a variety of rumours as to the nature, composition and purpose of this chemical (e.g., commonly "brome" or "bromide" intended to induce amenorrhea) but knew enough to doubt their veracity.

This is consistent with the report of a survivor from Belgium, Lilly Malnik, who worked in the kitchens at Auschwitz for approximately five months, from her incarceration in 1944 until being forced into a death march in January 1945. She described packets of "grain-like, very, very light pink chemicals" with the texture of "wet, kosher salt" that were brought into the kitchen at Auschwitz once daily under armed guard (Personal Communication, Lilly Malnik, June 2, 2022) and dissolved into the rations so that "women don't get their periods." She describes, "It looked like wet sand." Each day, the kitchen staff was forced by a female guard who would watch over Malnik's shoulder, to add one packet of this substance into the vats of "soup" which was more like frozen rutabaga and potatoes than soup." This "soup" was distributed to the female inmates only — not to the men and was never consumed by the guards.

This report is also corroborated by the findings of Jofen (1969) who searched for and interviewed kitchen staff at Auschwitz who had been

instructed to put a chemical additive in women’s soups from containers labeled “I.G. Farben.” (I.G. Farben was a major industrial German conglomerate with strong Nazi allegiance and multiple subsidiaries. I.G. Farben owned the pharmaceutical/chemical company responsible for the manufacture of Zyklon B, i.e., the chemical used in gas chambers.) Jofen (1969, p.58) surmised that the chemical was a hormone designed to create amenorrhea and infertility in the women, as per the intentions articulated in the correspondence above between Nazi leaders and which came to light during the Nuremberg trials. Jofen (1969, p.68) cites documentation (prosecution exhibit 1458) regarding the preparation of rations in Auschwitz, introduced during the Nuremberg trials but which was ignored at the time (Document NI-11139, dated November 14, 1942) and in July 1943, concerning Sachsenhausen and states, “I.G. would bring in or produce their own food when workers were brought in from the outside but would use the food of the concentration camp when inmates of the camps were involved.” This arrangement would enable Nazi camp administration to target prisoners while protecting themselves and other, external workers from the impact of the chemicals added to their captives’ rations.

8. Reproductive history: long-term impact on fertility/infertility and secondary infertility

For each testimony, participants were asked about number of live births and pregnancy losses. It is notable that of the four women who had given birth in the years 1935–1940 and whose children were killed in the camps, three had difficulty conceiving after the war, even though they were still in their 20s and 30s. The total number of live births for 93 women since 1945 was 136. Twenty women were unable to carry any children to term. The majority of women had 1-2 children, with twelve women having 3 children and three women having 4 children. None of the women had more than 4 live births. Only three of the 93 women were able to have as many children as she wanted; these were the two women who had detected the presence of chemicals in their rations and refused to consume them and the sole woman who had been in hiding. The rest, most from religiously observant families who had lost most of their large families during the Holocaust, had fervently wanted more children than they were able to conceive and/or carry to term. The number of births since 1945 for the complete sample is distributed as indicated in Table 1:

Of the total number of pregnancies, there were 136 live births out of a total of 197 pregnancies. This is a rate of 1.46 live births per female survivor in this sample during the “Baby Boom” era in the Western world. This compares to a rate of 2.6 for American Jews in 1950, 2.89 for American Jews in 1955 and 2.71 for American Jews in 1960 (Della-Pergola, 1980). The number of pregnancy losses among these 93 women was at least 61 and apparently, considerably higher. The number of pregnancy losses that were identified as “miscarriages” was 48. The number of pregnancy losses that were referred to as “stillbirths” was 13. There were, however, two language barriers which suggest the actual numbers of both miscarriages and especially stillbirths were considerably higher: First, many native English-speaking persons cannot define accurately the difference between a miscarriage (i.e., pregnancy loss before 20 weeks) and a stillbirth (i.e., pregnancy loss after 20 weeks gestation) (c.f., Hoyert and Gregory, 2016; Statistics Canada, 2021). For non-native English speakers (e.g., native Yiddish speakers) this

distinction may have been even less clear. It is uncertain how many of the “miscarriages” they referred to were, in fact taking place during the latter half of pregnancy. Some women talked about having had a series of “miscarriages” which occurred in their seventh or eighth month, thus their physicians’ instructions that they be hospitalized on bedrest in any future pregnancies during the third trimester thereafter or their urgency to travel overseas in case of “another premature birth” for subsequent pregnancies. (Although incubators and other elements of prenatal/postnatal care might have been widely available to some in Europe by the 1950s [Arabin et al., 1999; Baker, 2000; Philip, 2005; Reedy, 2011], Jewish survivors were understandably wary as to the quality of medical care available to them in post-war Germany; just because the war had ended did not mean that antisemitism had subsided.) Thus, even in self-reports, the total number of pregnancy losses may be accurate but the number reported as “miscarriages” versus “stillbirths” considerably less so.

Second, of the participants who provided testimony that their surviving sisters had some number of miscarriages, it is difficult to ascertain how many of these would be more accurately characterized as stillbirths. Even more murky is how to count the number of pregnancy losses when a participant reported that her sister or mother had “many, many” miscarriages during, for example, a 10-year interval between the dates of births of two living children (e.g., 1951–1961). We could, in theory, estimate these as not less than 3 pregnancy losses but cannot accurately assess the total number. Thus, the numbers reported here and in Table 2 are only raw, reported pregnancy losses.

The most conservative data of miscarriage reported among these survivors of 48/197 (24.4% of pregnancies) is relatively high as compared to the rates of recognized miscarriage of 12–15.3% reported in review articles in the literature (Delabaere et al., 2014; Quenby et al., 2021). Furthermore, even with conservative reporting, the rate of stillbirths of 13/197 or 6.6% observed in this sample contrasts markedly with a range of 1/72 pregnancies ending in stillbirth after 28 weeks of pregnancy worldwide from 2000 to 2019 (as cited and defined by UNICEF, 2020) and 1/160 pregnancies from 20 weeks of gestation onwards ending in stillbirth in the U.S. in 2014 (Hoyert and Gregory, 2016) or a rate of 1/118 stillbirths in 2019–20 in Canada (Statistics Canada, 2021). By comparison, over the same timeframe, estimates suggest that the rate of miscarriage in the United States and Canada in the 1950s ranged from approximately 14-15% for recognized pregnancies (Shapiro et al., 1965; Warburton and Fraser, 1964) to a high estimate of 24% (French and Bierman, 1962) and that the rate of stillbirths in the United States in 1950 was approximately 2% (Dunn, 1953). These findings suggest that beyond the immediate onset of amenorrhea in the camps, there was a continuing, long-term adverse impact on survivors’ fertility which has hitherto gone unrecognized.

Furthermore, had every instance of participants’ reporting “many, many miscarriages” been estimated and counted as just 2 additional pregnancy losses, that would have increased the rate of pregnancy loss (i.e., resulted in 83 pregnancy losses out of a total of 219 pregnancies or 38%. This would be estimated to entail 66 miscarriages, i.e., 30.0% of 219 pregnancies and 17 stillbirths or 7.6% of 219 pregnancies).

In addition, there were high rates of secondary infertility in this group, with women attempting to conceive for prolonged periods after a first pregnancy, whether it ended in miscarriage, stillbirth or live birth before the next live birth. Most of the women had long stretches between pregnancies to term, with six women having 10–16 years from initial

Table 1
Number of live births reported by 93 women after 1945.

Number of live births among women after the war	N (%)
0 live births	20/93 (21.5%)
1 live birth	28/93 (30.1%)
2 live births	30/93 (32.3%)
3 live births	12/93 (12.9%)
4 live births	3/93 (3.2%)

Table 2
Women’s reports of pregnancies, live births and pregnancy losses.

Total Number of Pregnancies	N = 197 (%)
Pregnancy Losses	61 (31.0%)
Miscarriages	48 (24.4%)
Stillbirths	13 (6.6%)
Live births	136 (69.0%)

pregnancies to next live birth. In other words, their children were typically far apart in age.

Two women reported they had been on forced death marches from Auschwitz to their next camps in January 1945 and sustained frostbite to their breasts, leaving them unable to breastfeed.

At the time of the interviews, 8 of the women had buried their children, 5 in early childhood, 3 because of adult cancers.

9. Giving voice to Women's experiences: narratives of survivors

The following are highlights of eight representative testimonies of survivors' experiences of their reproductive histories. Interviews were conducted by telephone between 2018 and 2021. No details have been changed but identifying data have been removed.

1. One participant was a 92-year-old survivor who had been born in Lodz, Poland in 1926. She was evacuated to the Lodz Ghetto in 1940 and spent almost 4 years in there. She had her first period there at age 13. Her parents and 4 siblings survived throughout their time in the Lodz Ghetto. However, she was the only one of her family of origin and her 30 extended family members to survive Auschwitz. "I never even had a chance to say goodbye." She arrived in Auschwitz during the summer of 1944. She developed amenorrhea immediately upon arrival and attributes this to the "soup" given at "lunch" while they worked at Auschwitz and thereafter at Gross-Rosen. By April 1945, she was so ill with Typhus as to be unconscious on the day of liberation in Bergen Belsen. She remained there thereafter when it became a displaced persons camp. She remembered vividly the excitement of all the other girls when the first among them at Bergen Belsen got her period. It enabled her and the others who had felt for so long, "I'm not a woman anymore" to believe that one day, they too, might resume menstruation. Two years later, she began to menstruate and immigrated to the new state of Israel. In 1950, she married but was unable to conceive. After four years of attempting desperately to conceive, she moved to the United States in hopes of finding better gynecological care. In 1954, she finally conceived and carried the baby to term. She and her husband wanted more children terribly but could not have any more. She believed it was, "something in the food or drinks in the camps." She applied for compensation but did not receive any.
2. The next interviewee was born in Romania in 1926 and had six siblings. She began to menstruate at puberty, before the war. In the spring of 1944, she and her family of origin were sent to Auschwitz. She was 17 years old at the time. She spent 8 months at Auschwitz and never menstruated there. After the war, the amenorrhea continued. She consulted two physicians who helped her to resume her menses but told her she "would never be able to have children." Her periods were extremely heavy and remained "very irregular and painful" thereafter. Nonetheless, she married in 1952 and immediately began trying to get pregnant. After numerous attempts, her first child was finally born in 1956 but died in infancy of brain cancer. Her next pregnancy ended in miscarriage. In 1959, finally another child was born. Despite seeing various medical specialists, "I couldn't have any other children." Although she received the monthly restitution for slave labour as her "pension", she was never able to receive compensation for her reproductive difficulties. She attributed her reproductive difficulties to "something in the food ... There were always rumours about something in the food."
3. An interview was conducted with the son of two survivors, both from Poland, each parent born in the early 1920s. Like so many others, he began the interview saying, "I am an only child." His mother was born into a religiously observant family of seven siblings in a town near Lodz. She married during the war while in the Lodz ghetto, spent several years there, continued to menstruate and gave birth to her first son there. Her husband and baby were killed at Auschwitz. His mother was deported during the final liquidation of the Lodz ghetto in 1944 and developed amenorrhea upon arriving at Auschwitz. His father had a wife and two small children who similarly were killed in the camps. His parents met and married (a second marriage for each) in 1945 and had three "late miscarriages" and thereafter, difficulties conceiving entirely. His mother sought medical attention in order to attempt to conceive and to carry a child to term. When she finally conceived again in her early 30s, her physicians in Germany insisted on complete bedrest to carry the baby [i.e., the interviewee] to term. Despite medical efforts, she was unable to conceive, thereafter. She came to the United States in search of better medical care but, "There were no more children after me." Although his mother collected a "pension" from the Nazis for slave labour, she applied for but did not receive compensation for her reproductive problems.
4. Another participant provided testimony on behalf of her mother, who was born in the early 1920s in Poland. From 1942 to 1945, she was in the Plaszow slave labour camp. Her menstrual cycle had been regular before the war. She stopped menstruating in Plaszow: "They all did." The interviewee reported that her parents met and married in 1945. His first wife and children had been killed at Auschwitz. She conceived immediately but was unable to carry to term. "My mother was pregnant each year for five years. She had one miscarriage in the first trimester, one miscarriage [sic] in the second trimester, and three miscarriages [sic] in the third trimester." (As indicated above, although participants often referred to "miscarriages" which took place in the final trimester of pregnancy, these are more accurately termed as stillbirths.) In desperation, her parents travelled to the United States during her sixth pregnancy. They had heard that in the United States, there would be incubators to keep severely premature babies alive. As such, when the interviewee was born at 28 weeks gestation, she did survive, although with disabilities. Two years later, a second child was born at term and healthy. Despite further attempts at pregnancies, none ensued. Her mother applied to the German government for reparations on account of infertility. However, the process of applying for restitution required medical and psychiatric examinations. She was deemed psychotic and treated accordingly, receiving electroconvulsive treatment. She was refused compensation.
5. Another daughter of a survivor reports that her mother had been born in Miskolc, Hungary in 1927. Like the other Hungarians, she had been "at home" until 1944. She and her family were deported to Parschnitz, a sub-camp of Gross-Rosen in the spring of 1944, when she was 17 years old. She and her two surviving sisters had had regular periods before the war but stopped upon arrival in the camp, ostensibly due to "bromide in the food or water". She remained there for 9 months as a slave labourer in German munitions until liberation. After liberation she was hospitalized for three months and was told that she would never be able to have children. She and her sisters had tremendous difficulty with menstruation after the war. Nonetheless, all three married, without having resumed their periods, in late 1945. "My mother had several miscarriages before she became pregnant with me. She was told it was a 'miracle' that she got pregnant at all." Having already suffered a series of miscarriages between 1945 and 1950, she was told to be on bedrest throughout any pregnancies thereafter. "She was hospitalized for the last two-three months of her pregnancy to carry me to term. I was born at less than 5 lb. in 1950. And I am an only child." Notwithstanding continuing efforts, there were no further pregnancies. Like her mother, her two aunts wanted large families but each was able to have only one child. Two of the three surviving sisters died of rare types of lymphoma in their 50s.
6. A sixth participant was a survivor born in Lodz, Poland, in 1922. She was 96 years old at the time of the interview. She was among the earliest to enter the Lodz ghetto and was, "on the last transport out of Lodz to Auschwitz, just before Rumkowski." (Rumkowski was a leader in the ghetto, said to have been deported at the final liquidation of the Lodz Ghetto in August 1944.) She had menstruated

throughout her time in the ghetto but stopped menstruating immediately upon arrival at Auschwitz. Like the rest of the participants, she attributed the amenorrhea to something “put in the soup” but added, “There’s no way to know what it was. We all heard that it was ‘brome’ but none of us believed it.” She began to menstruate again in late 1945 and married immediately thereafter. She tried to conceive for three years unsuccessfully. She sought medical intervention and was finally able to conceive in 1948. Although most of her family was killed in Auschwitz, one sister, also survived. Each of them was able to have only one child after the war, despite considerable medical attention and attempts. “We wanted more... We tried.” Although she was active in Holocaust education and her story was documented by various archival sites, no one ever asked about her reproductive history. She questioned, “Why didn’t anybody ask me about this before? I wish they had ...”

7. Another survivor was born in April 1929 near Budapest, Hungary. She had been, “safe from the war” until 1944. In May, just before her 15th birthday, she and her family were evacuated to Auschwitz. At Auschwitz, she went through what she described as “routine processing”: This involved having her possessions and clothes taken, being shaven both head and pubic hair and receiving an injection, into her left breast, just before being deloused. After her incarceration in Auschwitz, she was later transferred to Dachau and eventually liberated from Bergen-Belsen in April 1945. She married in 1946 and had three pregnancies which ended in stillbirths until her first child was born in 1953. She tried desperately to have more children as soon as possible. She was unable to carry to term successfully again until 1964, thus her children were 11.5 years apart in age. Her younger sister never menstruated again after the “shot”. Her oldest sister had 9 pregnancies but never had a baby. She adopted two children.
8. An eighth participant was born in 1928 in Debresin, Hungary in a family of seven children. Her periods were regular before the war which entered her life in 1944. She reports that she stopped menstruating immediately upon arrival at Auschwitz in July 1944. “Although the consensus after the war was that it had been ‘a shock to the system’ my sisters and I concluded that they were putting something in the turnip soup.” She reports that they wondered about what substance, “but that would be a guessing game... Pure speculation.” They did not believe that amenorrhea was caused by malnutrition. “We could see when we arrived that we weren’t starving like the women from Poland ... They told us all that it was ‘bromide’... And of course, we didn’t believe anything they told us.” She was liberated in April 1945 from her third camp, Bergen-Belsen. Most of her family had been killed and she desperately wanted children of her own. She married at the age of 32 and had difficulty conceiving but eventually gave birth to a daughter. “I couldn’t have another.” Eventually, she adopted a second child. Two of her sisters survived but were unable to have any children.

10. Just how does information hide in plain sight?

Beginning in 1952, as part of German government reparations, Holocaust survivors were examined by physicians to assess the extent of medical damage they had undergone so as to ascertain the amount of “compensation” they were owed. However, the early timing of the assessments in the 1950s did not allow for medical conditions that might become manifest thereafter (Kiviat, 1999). For example, the possibility that women in their 20s and early 30s had already had one or two pregnancies by the time of the assessments in the 1950s could not account for *subsequent* reproductive problems. Thus, the time frame of the assessments would have prevented a cohesive record of women’s lifetime reproductive histories from being recorded and a pattern discovered. Each participant was asked about whether she had applied for and had received compensation. Many went as far as applying and being examined by physicians as required as part of the application process;

few had been granted compensation. But even fewer of the participants had been examined late enough into their reproductive histories to be able to report the unusual numbers of miscarriages and stillbirths which became apparent retrospectively. One woman who had lost four pregnancies and had two live births applied for and received compensation but “never received medical compensation” because she could not prove that she had “been the direct victim of medical experiments”. Thus, the opportunity to identify the pattern observed in the interviews conducted in this study would not have been apparent in the 1950s.

Another likely factor is the privacy surrounding women’s sexuality and reproduction. In many communities, it is the norm for women not to reveal their pregnancies, unless and until she is observably pregnant, that is, until the fetus is likely viable. This is certainly the case among traditional Jewish couples. For example, among the interviewees were two survivors from Moravia who had been best friends for 90 years. They had been close prior to the war, were evacuated from their homes near Prague together, then deported to Auschwitz where they stopped menstruating immediately, then in January 1945 were on a death march together, were liberated thereafter together and eventually became neighbours in Montreal. Both had read copies of the *Senior Times*, an English language circular in a Montreal suburb where they read about this study. It was the recruitment blurb which led them to discuss their reproductive histories for the first time. The first woman had said that she had envied the other, whom she had assumed must have lost faith in God after Auschwitz because she had never had children. The first woman had married in 1946 and had struggled to conceive repeatedly followed by a series of miscarriages until she finally carried to term in 1959; thereafter, she was never able to conceive, again. Her friend responded to the assumption by finally disclosing that she, in turn, had envied her friend’s giving birth, never knowing it had been preceded by numerous miscarriages. Although she resumed her menses after the war, she tried desperately but was never able to conceive at all. She attempted medical intervention in the 1950s in Montreal but her physician eventually told her to give up and that she would never be able to conceive. Each was stunned by the realization that after a lifetime of friendship and shared experiences, this topic had remained off-limits and thus each had made erroneous assumptions about the other’s choices.

Some of the daughters or other female family members who helped the 90+ year old interviewees to place a long-distance phone call or complete informed consent forms seemed incredulous at the questions asked of the survivor, let alone her answers. For example, when asked, “When did you stop menstruating?” many of the survivors answered that they ceased menstruating immediately after arrival at the [first] camp, “the same as all the other women.” The daughters would occasionally interrupt at that point to question her mother’s account, specifically, to ask how she could possibly know when and whether other women had their periods. Inevitably, each woman would reply that under their smocks/dresses/uniforms, none of them had underwear, (which was often a source of discomfort and embarrassment after using the latrines). If any of them had menstruated, it would have been visible on the women’s legs to everyone. The daughters were shocked. This obvious and well-documented information was hardly a secret – but it was not common knowledge among these offspring. In a similar fashion, as women described being shaven, their daughters were often incredulous that upon arrival, women had not only their heads shaven but also their vulvas, and often brutally so. Most pertinently for this study, upon being asked how many pregnancies they had had, the daughters would sometimes be surprised at and disputed their mothers’ reports. For example, “Mom, I think you’re a little confused ... I am your oldest child and I was born in 1956. There was only [name of younger sibling] after me. You *didn’t* have *five* pregnancies.” To which the mother would respond, “I married your father in 1946. What did you think we did for 10 years? Practised abstinence? Used birth control? Didn’t want children? We wanted children desperately! And so I suffered three miscarriages before we had you.” The daughter would then say, “You never

told me.” To which the survivor would reply, “You never asked.”

11. How might amenorrhea have been induced with uniform rapidity?

The immediate cessation of menstruation for months at a time is effected commonly and rapidly today through the use of exogenous hormones prescribed for hormonal contraception. These can be administered via injection (e.g., 150 mg. Depo Provera [Pfizer, 2022]) or via oral contraceptives taken daily for months on end (e.g., Seasonique) rather than, for example, 21 days “on” and 7 days “off” or on placebo, which results in a withdrawal bleed every 28 days. Hormonal contraceptives were first introduced in 1960. Were exogenous hormones even in existence during World War II? Nazi pharmacologist and Schering-funded chemist Adolf Butenandt was awarded a Nobel Prize in chemistry in 1939 for his work synthesizing sex steroids but refused to actually receive the prize in deference to Hitler’s wishes and to Nazi policy (Kaupen-Haas, 1988). Exogenous sex steroids were first synthesized and manufactured in 1933 by Schering in Berlin and were available as over-the-counter drugs for the treatment of infertility in Germany. This is intriguing given that in sponsoring Butenandt’s research, Schering’s goal had been to identify a way of using synthetic hormones as a form of birth control (Seaman, 2003).

Did the production of synthetic estrogens and progestins continue during the war when German factories prioritized the war effort? Documents we obtained in 2020 through the Schering archives indicate that in 1943–45, they continually produced and stocked 4 kilos each of Progynon, Proluton and “Progesterone”, ostensibly for the treatment of infertility among the wives of Nazis. However, such large quantities of sex steroids would have exceeded dramatically the needs of German women seeking infertility treatment. It seems striking that the manufacture of large amounts of exogenous hormones would have been considered a priority during the scarcities of wartime when plainly, their alleged purpose could have easily been filled with much smaller quantities. In addition, as described above, the gynecologist Clauberg and chemist Goebel were seconded from Schering to Auschwitz and Clauberg also to Ravensbrück (Kaupen-Haas, 1988). We also attempted to visit the Organon pharmaceutical archives, which although in the Netherlands, were under German control during the occupation of the war and were known to have produced sex steroids for Schering under occupation. However, Organon, a manufacturer of exogenous female sex hormones, refused us access.

12. How might a more enduring impact on fertility have been effected?

This is more difficult to ascertain than how an immediate cessation of menstruation was brought about. In humans, there are critical periods for development and maturation. One such period for sexual and reproductive development occurs at puberty/adolescence. Research with female monkeys (Cappelletti et al., 2015) suggests that if exogenous progestins are administered during adolescence, the resulting changes to the structure of the uterus may enable mature females to conceive later on but render their uteruses incapable of carrying the fetus to term. As described by Cappelletti and colleagues, “It is possible that exposure to MPA during early adolescence, a critical period of uterine development, permanently altered the structure of the uterus and increased the likelihood of stillbirth in adulthood in the adolescent-treated females” (Cappelletti et al., 2015, p. 503). Although experimentation on humans would be unethical, observational research on women seems to indicate that the same pattern holds true: Gray and colleagues indicate, “Unexplained high rates of peri-implantation embryonic loss in humans” may result from previous exposure to exogenous hormones during reproductive development (Gray et al., 2001, p.1311). They add, “Such organizationally induced alterations in human endometrial gland formation and function may lead to infertility and

early pregnancy loss” (Gray et al., 2001, p.1319). In other words, if exogenous hormones are introduced during vulnerable periods of female reproductive development, the impact might become apparent much later in primary or secondary infertility in the mature adult. The impact of administering “cross-sex” hormones in critical periods of adolescent development on future fertility is well enough-established that there is considerable attention to freezing of sperm samples and ova before trans youth complete transition, as recommended in the *World Professional Association for Transgender Health, Standards of Care, Version 7, 2012*.

By contrast, to return to the accepted hypotheses that trauma and starvation might be the sole culprits, in an extensive review of the international literature on the impact of humanitarian crises, Hill (2004, p.5) states, “There is no compelling evidence that malnutrition and stress has a substantial effect on risks of spontaneous pregnancy loss.”

13. Discussion and conclusion

For decades it has been known that over 98% of Auschwitz survivors experienced amenorrhea immediately upon arrival. Researchers quickly settled for obvious and perhaps convenient explanations of trauma and malnutrition; these explanations, while relevant, do not suffice when compared to the outcomes in all too many comparison groups, that is, the survivors of other atrocities over the last 80 years. Once Holocaust survivors began to give birth after the war, the world was prepared to investigate no further. But 98% of survivors interviewed in this study did not have as many children as they wanted due to primary or secondary infertility rather than use of contraception. Their rates of live births to “miscarriages” and “stillbirths” are conspicuous indeed. It is particularly striking given the number of survivors interviewed who came from religiously observant homes and large families. These women had lost not only their parents and grandparents but most of their siblings and extended families. So many reported that they wanted desperately to repopulate the Jewish world in the aftermath of the Holocaust: “It’s what I lived for – to re-create the Jewish people.” They were devastated and mourned not only for the past but for the future.

The majority applied for compensation for their reproductive losses. Although some received restitution for slave labour, not one was “compensated” for the loss of reproductive choice and control in the camps, let alone the heartache in the years that followed of never having the families of their dreams.

Can we prove which chemicals were given to women to induce both amenorrhea instantaneously and create long-term gynecologic sequelae? As indicated in the Nuremberg documents, Nazi leadership implored those tasked with implementing their mission to “sterilize Jewesses” surreptitiously to stop keeping written records. It appears they obeyed orders. Although questions remain unanswered, the kinds of reproductive histories described by these survivors suggest the strong possibility of an alternative hypothesis to only malnutrition and trauma: the deliberate introduction of exogenous sex steroids designed to affect women’s immediate and future reproductive capacities. Were such products available? They were being manufactured in Berlin and perhaps elsewhere despite – or because of – Nazi wartime priorities in quantities conspicuously large enough to create the intended effect.

The major limitation of this study, of necessity, is the small sample size. Most of the cohort of survivors – and obviously, those who were killed during the war – are dead. Secondly, whereas it would have been desirable to find evidence of what chemicals, in what dosages, were distributed to women in their rations or via injection, that documentation is not available to us. Thirdly, given language barriers, there is no way of knowing how many of the “miscarriages” were actually stillbirths. Nor is there an accurate way to tally “many, many miscarriages”, thus, the frequencies reported here are surely too low. Only minimum tallies are certain but these likely do not reflect accurately the total numbers of miscarriages, let alone stillbirths. In addition, no data were collected surrounding non-Jewish inmates (e.g., the Roma) or attempts to sterilize men.

One may well wonder, if the possibilities studied here were realistic, why wouldn't they have been uncovered long ago? There is much we have selectively turned away from investigating and knowing. These women's stories provide a glimpse of what we should have discovered decades ago. Even in scientific research, we steer away from looking at women's experience of their sexuality and their choices about reproduction – as well as the consequences of taking away reproductive control and freedom. We rejoice with new mothers and their babies but are reluctant to hear experiences of devastation and grief over losses that can never be replaced or restored. This study represents an initial, albeit late attempt, to assemble fragments of scientific knowledge and 93 women's stories to create a cohesive narrative. At this juncture, we are left with more questions than answers. It is incumbent on medical researchers, other scientists and historians to continue the search for the answers deserved by each of the women interviewed in this study.

Author statement

Peggy J. Kleinplatz: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Project administration, Funding acquisition. **Paul Weindling:** Conceptualization, Writing – review & editing, Funding acquisition.

Data availability

The data that has been used is confidential.

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