

Therapeutic termination of pregnancy and women's mental health: Determinants and consequences

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Abstract

The therapeutic termination of pregnancy (TToP) is an induced abortion following a diagnosis of medical necessity. TToP is applied to avoid the risk of substantial harm to the mother or in cases of fetal unviability. This type of induced abortion is provided after the second semester of gestation if fetal illness or the pregnancy cause physical danger or pathological mental distress to the mother. Socio-cultural and economic determinants could influence the desire for children and family planning in couples, as well as the use of effective contraception and the choice to perform an induced abortion. Also, pre-existing mental health problems could affect the decision between carrying on a problematic pregnancy or having TToP. Furthermore, the TToP is a reproductive event with an important traumatic burden, but also with an intrinsic therapeutic effect and it can produce different psychological and psychopathological effects on women and couples. The aim of this review is to evaluate what demographic, reproductive and psychopathological determinants are involved in the choice of undergoing a TToP in women. Also, we will examine both positive and negative consequences of this procedure on women's mental health, underlying which factors are related to a worse outcome in order to provide the best clinical support to vulnerable groups.

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Core Tip: The choice of having a therapeutic termination of pregnancy (TToP) is strictly personal and several demographic and reproductive factors may contribute. Women who have a TToP are more commonly affected by a previous mental disorder, which influences their mental outcomes after it. There is a higher prevalence of any axis I psychiatric disorder in women who choose for a TToP, but the correlation with personality disorders has been less examined. TToP seems to produce both positive and negative psychopathological effects on women and only a minority of women show psychiatric disorders after it, especially those with a previous psychiatric history.

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INTRODUCTION

The therapeutic termination of pregnancy (TToP) is an induced abortion following a diagnosis of medical necessity. TToP is carried out to avoid the risk of substantial harm to the mother or in cases of fetal unviability. The TToP, according to the Italian Law 194/78[1] and different legislations around the world[2], is provided after 90 d of gestation if fetal illness or the pregnancy may cause physical danger or pathological mental distress to the mother. Unlike voluntary termination of pregnancy (VToP), which is performed on women's request, TToP requires a clinical evaluation by a physician.

The choice of undergoing a termination of pregnancy (both voluntary and therapeutic) is strictly personal and complex for the woman and the couple since numerous factors are involved in the decision-making process.

Furthermore, TToP is an obstetric event with an important traumatic burden, but also with an intrinsic therapeutic effect. This review aims at evaluating the demographic, reproductive, and psychopathological determinants and the psychiatric consequences of TToP in women and couples.

DEMOGRAPHIC AND REPRODUCTIVE DETERMINANTS OF TTOP

Several socio-cultural and economic determinants influence the desire for children and family planning in couples, as well as the use of effective contraception or the choice to have abortion in case of unwanted pregnancy or maternal physical or pathological mental distress. Many studies do not discriminate between therapeutic and voluntary ToP when analyzing possible demographic and reproductive determinants, thus introducing a bias in understanding decisional pathway of TToP.

Maternal age

In Western countries[3,4] the rate of TToP is higher in women aged between 20 and 34 years old. That timeframe correspond to the period of greatest female fertility rate, when it is more likely a woman gets pregnant and may wish to have an abortion in case of newborn illness or unwanted childbearing.

Instead, the relative rate of TToP compared to the total number of pregnancies by age group appears to be doubled in women aged under 20 years and over 34 years[3, 4]. In fact, in extreme maternal ages, there's a lower female fertility rate, but also an increased risk of genetic fetal diseases or congenital malformations, which could explain the higher risk of TToP.

Different but not conflicting results were observed in developing countries, such as Ethiopia[5] or India[6].

In the Third World, maternal age at first pregnancy is significantly lower than in Western countries and most of the female population requiring abortion is under the age of 34 (89.5%)[5]. Furthermore, most of the voluntary terminations of pregnancy are performed in women aged 20-24(34%) and 15-19 (24%)[5,6].

Several studies[3,7,8] show that adolescent women have abortion later in pregnancy than other women: this could be due to late pregnancy discovery and existing social, economic, and legal difficulties linked to that group.

Marital status

In Western countries, the frequency of TToP is 3 times higher in women who are divorced than in unmarried and 5 times higher than in married or widowed[3,9].

The choice to undergo an abortion seems to be strictly conditioned by the absence of a partner, a close marital bond, or a supportive family unit, also because divorced or unmarried women seem to be more inclined to unwanted pregnancy, VToP and TToP [3,9].

The couple relationship is often an important decisional determinant of TToP in women; as demonstrated by Chibber *et al*[10] the three most common partner-related reasons for having a TToP are: (1) A poor relationship between the two members of the couple; (2) Male partners unable or unwilling to support a child; and (3) Partner's personal traits that make them unsuitable to be a father.

In developing countries, the majority of women who decide to have an induced abortion are married (46.4%) or single (41.6%)[5], probably because in many of these countries single-parent families and divorce are not culturally accepted, despite being legal.

Women's level of education

Several studies[3,7] from the Mediterranean area show a direct correlation between women's level of education and termination of pregnancy: women with a high level of education (secondary or university degree) show a rate of TToP 10-15 times higher than subjects without any school qualification.

However, in the Northern Europe[8,9] and Australia[11], higher rates of TToP were observed in women with a lower cultural level, which is more often associated with lower wages and a lower socio-economic level.

In developing countries, such as Ethiopia[5], the majority of abortions are performed on illiterate women (30%) or with education under 8 years (23%), while only 9% of TToP are performed on women with a diploma or university degree.

In India[6], instead, women with higher levels of education show a lower fertility index, because education strongly influences women's attitudes towards pregnancy and family size, leading to a decline in the desire of numerous offspring. At the same time, educated Indian women tend to avoid sterilization practices and have an increased risk of unwanted pregnancy for more liberal sexual behavior. Additionally, educated women are more likely to accept reproductive control and induced abortion than poorly educated or illiterate women.

Women's employment

The rate of female workforce affects the demand of induced abortion in a country, because working women, overall, have more control over their family planning and reproductive lives thanks to their economic contribution[6]. In fact, in Western countries, employed women have an absolute frequency of TToP almost two times higher than housewives and students. On the other hand, considering the relative frequency of induced abortion with respect to the fertility index, students show a double rate of abortion compared to both employed women and housewives[3,9,12]. This huge gap is due to the fact that female students do not have their own income and this leads them to decide they do not carry on an unwanted pregnancy.

Women with the lowest monthly income are those with the greatest use of abortion: in the United States[13] women with an income below 100% of the federal poverty level (FPL) have an abortion rate 5-6 times higher than women with a double income. A similar correlation was also observed in other European countries[7,9,14].

In developing countries[5,6], the use of abortion is greater in housewives (37%) or schoolgirls (27%), while only a minority of women requesting TToP are employed. Moreover, women with the lowest monthly income (< \$ 26.3 per month) are the majority of requesting induced abortion (78%). Importantly, in those countries the effect of female occupation on reproductive behavior depends on women's kind of job. Women employed in agricultural or industrial settings show a lower rate of induced

abortion, due to their possibility of carrying on pregnancy and raising children[6].

Number of children and family planning

There is a direct correlation between the number of children in the family and termination of pregnancy; women with several offspring (2 or more children) show an abortion rate 5 times higher than women who have no children or only one[3,12]. Furthermore, family planning (assessed as the woman's referral to a family planning clinic in the previous months) seems to be inversely related to the choice of having a TToP[12]. Uria and Mosquera[3] showed that 60% of women with an induced abortion did not refer to a family planning clinic in the previous 2 years. A similar rate of unplanned pregnancies ending in TToP or VToP was observed in developing countries [5].

Interestingly, the percentage of adolescent women who have an induced abortion without family planning rises to about 80% and this highlights the need for sex education programs to prevent unwanted pregnancy and other sexual issues in that fragile population[3].

Urbanization rate

In developing countries[5,6] and Australia[11], the frequency of TToP seems to be higher in urban than in rural areas, considering the widespread availability of health services in towns.

Possible reasons for correlation between urbanization rate and induced abortion are well explained by Bose *et al*[6] in their study from India. In India, urban residency appears to promote an anti-natal lifestyle and increased cost of having children. Children in urban areas are more difficult to supervise and are less economically productive than in rural places since they cannot be employed in agricultural work. This leads women from urban areas to wish for less children. Furthermore, the social norms that promote small family sizes and the government's family planning messages are more easily spread in cities thanks to a better access to the media (TV, radio). Thus, women living in large cities are more likely to perform a termination of pregnancy not only for their desire for smaller families but also for an increased knowledge and access to legal abortion services.

Immigration

Rasch *et al*[9] showed that immigrant women are a vulnerable group with an increased risk of unwanted pregnancy and induced abortion due to their social and economic condition. Nevertheless, in a recent reanalysis of data from Mortensen[15], authors showed that immigrant women had a 2 times increased risk of induced abortion compared to non-immigrant women with the same monthly income. In addition to these findings, the study by Pérez *et al*[16] has shown that, in Spain, termination of pregnancy is more common in areas with a huger concentration of immigrants from outside the European Union. The authors suggest that the status of "immigrant citizen" is an independent variable that must be taken into account in evaluation why a woman may choose for abortion[15].

Women's ethnic group

In the United States, women belonging to ethnic minorities may experience an increased need and reduced access to health services for induced abortion than white women, being thus exposed to negative medical and social consequences[13,17-21]. The disparities in abortion rates are well documented, with rates of 1.1% in non-Hispanic white women, 2.8% in Hispanic women, and 5% in black women. Furthermore, although pregnancy are unplanned in 51% of all American women, the percentage rises to 70% in African American women and 57% in Latin American ones, compared to 42% in white women[13,17]. Those differences are confirmed in multivariate analysis, net of age, and monthly income, suggesting that ethnicity is an independent risk factor for having a termination of pregnancy.

Data showed that Hispanic and Black women are also more likely to have termination of pregnancy at a later gestation age (from second trimester onwards) than white women. Authors justified[13,17] an increased abortion rate in ethnic minorities in the United States with lower socio-economic status, higher level of stress and precarious working/housing conditions, less common use of effective contraceptive devices, lack of health insurance coverage, and the absence, in many American countries, of accredited health care facilities for termination of pregnancy .

Although studies[17,19,20] have focused on African and Latin American women, a higher abortion rate has also been described in other minority ethnic groups such as

Indian Americans, Alaskan Natives, Asians, and Pacific Islanders[13].

Religious beliefs

A strong religious belief seems correlated to a lower access to medical abortion in the general population. For example, the study by Pérez *et al*[16] showed that, in Spain, regions where a large part of the population is a practicing Catholic have a reduced access to gynecological services for abortion. Likewise, a study from Iran demonstrated an increased recourse to abortion in women with lower levels of Islamic religiosity and spirituality[22].

The fear of being judged unworthy by their religious community, as described in Poland by Zaręba *et al*[23], often leads women with strong religious beliefs to have abortion in health centers far from their hometown and avoid to confess it to their ministers. However, an organized religious activity seems to allow women to carry on with pregnancy after the discovery of fetal malformations having a better psychological outcome, compared to those who decided to have a TToP[24].

Gender and intimate partner violence

Taft *et al*[11] showed that women who have experienced or are currently experiencing any form of gender-based violence (psychological, physical, or sexual) are at higher risk of TToP or VToP. Women with a recent episode of non-domestic gender violence reported a significant risk of having an induced abortion (OR = 1.46 for adolescent women and 1.85 for adults).

Women who reported at least one experience of intimate partner violence (IPV) in their life have a 3 times higher risk of having a termination of pregnancy. The risk for an induced abortion seems higher in women with a recent episode of physical or sexual violence perpetrated by their partner.

Since the association between any form of gender violence, miscarriage, and preterm birth[11,25-27], it is mandatory for clinicians to investigate such aspects in patients asking for induced abortion.

PSYCHOPATHOLOGICAL DETERMINANTS OF TTOP

Several studies explored possible adverse outcomes of abortion on women's mental health, but, astonishingly, pre-existing mental health problems are often underestimated or neglected.

To evaluate the psychopathological determinants of choosing a termination of pregnancy is fundamental from an epidemiological and health economic points of view. Furthermore, the presence of pre-existing mental health issues could affect post-abortion mental health outcomes of those women[28-30].

There are already proofs that women who have had a TToP or a VToP may have higher level of psychopathology before abortion compared to other women who have never undergone one. Women who have a termination of pregnancy showed higher incidence rates of appointments with a psychiatrist or their general practitioner for mental issues, before and after abortion, than women who gave birth[31,32]. Another research[33] found that among women with psychiatric disorders and abortion, the majority of mental disorders occurred before ToP rather than after.

Termination of pregnancy in the female psychiatric population

van Ditzhuijzen *et al*[34] showed that the prevalence of axis I mental disorders was significantly higher in women who had a TToP or VToP (68.3%) compared to those who had not (42.2%). Compared to women who gave birth, those with an abortion (both VToP and TToP) have, after controlling for demographic factors, a 3 times higher risk of psychiatric history for any mental disorder[34]. Furthermore, women who have a termination of pregnancy are more likely to have previous psychiatric history than the controls. Authors[34] suggest two possible explanations: (1) An increased number of unwanted pregnancies in women with a history of mental disorders compared to healthy controls. This population may be more prone to other risky behaviors, such as unsatisfactory relationships, misusing of contraceptive devices, and substance abuse; and (2) A more frequent desire for TToP and VToP in women with psychiatric disorders. That wish could be mediated by factors related to their mental disorders and personality traits, such as low self-esteem, a pessimistic view about their children life or doubts about their parenting skills, antisocial behavior, aggression, delinquency, or criminal behavior. Women with mental health issues could show a higher frequency of socio-cultural and economic factors related to the choice of having an induced

abortion, such as a low income or indigence.

Termination of pregnancy in women with anxiety disorders

According to several studies[33,34] women who have an abortion more frequently show a previous history of any anxiety disorder than women who give birth.

Analyzing different anxiety disorders, women who have a termination of pregnancy report a double history of panic disorder (OR = 2.06), social phobia (OR = 1.94), or specific phobia (OR = 2.30) compared to women who decide to give birth[34]. They also show a 1.5-1.9 times higher risk for agoraphobia and generalized anxiety disorder [33,34].

Several authors[33,35] attributed the correlation between anxiety disorders and increased use of termination of pregnancy to women's fear of gestation and childbirth (tocophobia), an aspect that has been described in women affected by anxiety, mood, and eating disorders.

According to Hofberg and Ward[35], although pregnancy is a normal and often desired condition, women may experience anxiety about physical and psychological consequences of pregnancy, sometimes with pathological connotations. Primary tocophobia[35], *i.e.*, not due to a previous negative gestational episode, appears to be due to 3 factors: (1) Social culture: It seems that the fear of gestation and childbirth can have an intergenerational transmission and, often, women's attitude towards pregnancy is strongly conditioned by the experiences reported by their mothers and grandmothers; (2) Pre-gestational anxiety disorders; and (3) Previous trauma: A history of childhood sexual abuse appears associated with aversion to gynecological examinations and obstetric care. Besides, the trauma of vaginal delivery (or even just contemplating it) can potentially cause the re-emergence of stressful emotions in women who have experienced a previous sexual abuse.

Termination of pregnancy in women with affective disorders

Mota *et al*[33] and van Ditzhuijzen *et al*[34] showed that women who have a termination of pregnancy show a 2 times higher risk of having a previous history of any mood disorder compared to those who give birth. In particular, those authors described a significantly increased history of major depression (OR = 1.51), dysthymia (OR = 1.79), and bipolar I disorder (OR = 2.8).

Furthermore, women with mood disorders who have abortion had more frequently a previous history of suicidal ideation (OR = 1.59) and attempted suicide (OR = 1.51) [34]. According to Mota *et al*[33], that evidence underlines that women with more severe forms of mood disorder are also those with the highest motivation to terminate pregnancy, probably because they feel incompetence towards motherhood duties. Several studies[36-38] highlighted more induced abortion in women with major depression and bipolar disorder under medications compared with women with the same disorder but drug-free when they have conceived. The greater access to TToP could be explained by the concern of teratogenic damage due to psychotropic drugs.

The request for abortion in women with affective disorders is higher, especially in those taking fluoxetine and mood stabilizers (especially sodium valproate). Concerns are linked to the evidence of increased risk of fetal malformations and obstetric complications in women who take those medications during pregnancy, but clinical experience with women who are affected by epilepsy suggests that these consequences are rare and manageable with adequate antenatal planning[39,40].

It is crucial to understand the reasons that push women to ask for abortion, to provide them information on the real teratogenic risk of their therapy or to suggest alternative strategies to abortion, such as a switch to safer drugs and careful antenatal care with ultrasound monitoring.

Termination of pregnancy in women with borderline personality disorders

Emotional and behavioral dysregulation experienced by patients with borderline personality disorders (BPD) may expose them at increased risk of unwanted pregnancy, compared to women without those symptoms[41]. Several studies[41,42] suggest that they may have earlier and unprotected intercourses than healthy women or women with different mental illnesses, due to their personality traits such as unstable attachment, impulsive behaviors, and compromised decision-making processes.

Furthermore, women with BPD show a greater predisposition to sexually transmitted infections (STDs) and associated consequences, such as pelvic inflammatory disease and infertility[41]. Other factors that can contribute to increase the risk of unwanted pregnancies and termination of pregnancy in those women are the higher prevalence of sexual abuse and comorbidity with substance use disorder (SUDs).

De Genna *et al*[42] found that the severity of BPD symptoms is directly correlated with the risk of having an unwanted pregnancy in adolescence, even controlling for socio-cultural determinants; in fact, in their sample, up to 18% of women affected by BPD becomes pregnant by the age of 16.

The effect of BPD severity on unwanted pregnancies and termination of pregnancy appears to vary depending on comorbidity with SUDs: women with severe symptoms but without a history of SUDs have more unwanted pregnancies with full-term births, while women who SUD have more induced abortion.

According to these authors, the risk of miscarriages, VToP and TToP in women with BPD would not be correlated with the severity of personality symptoms but, instead, it would be linked to demographic variables, such as low socioeconomic status, a young age when conceive, belonging to ethnic minorities or prostitution[42].

Termination of pregnancy in women with post-traumatic stress disorder

The relationship between termination of pregnancy and post-traumatic stress disorder (PTSD) seems bimodal. Even if PTSD has been widely analyzed as a possible consequence of the termination of pregnancy (see paragraph 4), it may also be a prior event and, accordingly, be a central determinant in the choice of having an abortion, especially in case of rape, IPV and separation of the couple.

Lundell *et al*[43] found that the prevalence of a previous traumatic event in the female population requiring termination of pregnancy was 43%: severe physical threats, severe psychological trauma and severe physical injury were the most reported traumatic experiences, while 12% of their sample experienced sexual assault or burglary.

Steinberg *et al*[44] showed a high frequency of childhood adversities or traumatic experiences with the current partner in a United States female population with medically assisted abortion. Authors reported that: (1) 50% of the sample claimed they suffered any childhood psychological abuse, 31.7% any childhood physical abuse, and 13% any childhood sexual abuse; (2) 25% of the sample reported episodes of domestic gender violence in the original family unit; (3) 34.6% of the sample declared they suffered any verbal violence, 7.4% any physical violence, and 4.8% any sexual violence by the current partner; and (4) 11.9% of the sample said they had been coerced into pregnancy and 7.4% had reported sabotage of their contraception devices by their current partner.

In a study by Mota *et al*[33] the prevalence of previous or current PTSD in women who had a termination of pregnancy was significantly increased compared to women who decided to give birth (OR = 1.91).

On the contrary, Wallin Lundell *et al*[43] showed a prevalence of PTSD in the female population requiring medically-assisted abortion around 7% and this value was not statistically different from that found in the general population. Although that finding, the authors described post-traumatic stress symptoms (PTSS) in 23% of women requesting a termination of pregnancy: It is possible that women with PTSS might be as susceptible as those with PTSD to traumatic consequences after an abortion and deserve appropriate treatment[43].

In general, these findings support the importance of investigating the presence of previous traumatic events and previous or current post-traumatic stress symptoms in women who have an induced abortion, also to limit the onset or the worsening of PTSD after ToP.

Termination of pregnancy in women with psychotic disorders

Deinstitutionalization and second-generation antipsychotics, with fewer endocrine side effects (*e.g.*, hyperprolactinemia and amenorrhea), allowed women with schizophrenia spectrum disorders to be more sexually active, with a subsequent increase of pregnancies in this population. However, research focusing on the reproductive health of women with schizophrenia is sparse, and many studies are limited by small sample sizes[45]. Overall, women with psychotic disorders are more likely to have worse family planning knowledge than healthy women as personal relationships is one of the treatment areas with the most unmet needs[46].

Women with schizophrenia have more sexual partners in their lives, more rarely use contraception, and, consequently, have a higher risk of unwanted pregnancies and induced abortion than the general female population[46].

Simoila *et al*[45], with a 15-year follow-up on the reproductive health of women with psychotic disorders in Finland, found that 30.4% of women with schizophrenia and 29.9% of women with schizoaffective disorder had at least one termination of pregnancy (VToP or TToP) during the study period.

Patients with psychotic disorders showed significantly fewer births than healthy controls (0.65 birth per woman in the study group *vs* 1.72 births per woman in the control group): Up to 50% of affected women did not give birth in the study period, against 12% of healthy women.

According to these evidence, some of the reasons that led women with psychotic disorders to ask for abortion were younger age at conception and a lower chance of having a permanent partner at the time of the termination of pregnancy.

Examining the specific reasons behind the choice of termination of pregnancy, Simoila *et al*[45] found that: (1) VToP upon social indications (*e.g.*, low socioeconomic status) was the most common, both in women with psychotic disorders and in the general female population, involving up to 94% of women in both groups; (2) TToP for maternal health problems was significantly more common among women with schizophrenia and schizoaffective disorder than in healthy controls (2.1% *vs* 0.4%), maybe for medical conditions related to the disease or antipsychotics intake. Conversely, TToP for fetus health issues was significantly more common among controls than patients (3.1% *vs* 1.3%). That finding is somewhat unexpected since maternal schizophrenia seems related to fetal abnormalities, such as low birth weight and cardiac malformations, probably due to a linkage disequilibrium in genes related to heart and brain development[46]. The authors question this finding is related to pharmacotherapy efficacy in reducing fetal abnormalities or to the younger age of pregnant women with psychotic disorders[45]; and (3) No significant differences were found in the frequency of termination of pregnancy for ethical indication (*e.g.*, rape, IPV) between women with psychotic disorders and the general population. This reason was rare in both groups and that result was also unexpected because several studies[47,48] reported that women with schizophrenia experience higher rates of sexual abuse and gender-based violence.

Termination of pregnancy in women with SUDs

Women who have abortion are twice likely to have a current substance use disorder (OR = 2.16) than women who give birth. In particular, they show a 2 times higher risk of reporting a history of alcohol or drug abuse (OR = 2.29), and 4-5 times of alcohol (OR = 4.21) or drug addiction (OR = 4.96)[34]. According to van Ditzhuijzen *et al*[34], women with SUDs are more vulnerable to unplanned pregnancy and induced abortion than the general population due to risky sexual behaviors, such as poor use of condoms or other types of contraceptives and a large number of sexual partners. The risk of abortion is even higher among injecting drug users due to worse health conditions and clinical comorbidities, such as hepatitis C, HIV, and other physical disorders that can force that woman to choose for the termination of pregnancy. Women with endovenous drug use may be more vulnerable to indigence and discrimination, socio-economic factors that are linked to termination of pregnancy[34].

Furthermore, Diehl *et al*[49] demonstrated that the risk of TToP and VToP is increased in women who smoke tobacco (OR = 1.6) and in women with alcohol dependence (OR = 2.4), with a positive correlation between the severity of addiction (assessed with different screening tests for drug, alcohol and tobacco addiction) and the risk of medically assisted abortion.

In all the studies[34,49-51] that evaluated the relationship between SUDs and induced abortion, the most used substances were, in order of frequency, alcohol and tobacco, cannabis, opioids, cocaine, and, to a lesser extent, stimulants such as amphetamines.

The women's fear of gestational and fetal consequences due to drugs (*e.g.*, intra-uterine growth restriction, higher risk of premature birth, miscarriages, and fetal abnormalities) can play a role in women's choice of termination of pregnancy. In fact, according to some authors[50,51], the recent policies of complete abstinence from drugs during pregnancy could lead to guilt feelings in women who used them during early gestation, that may lead them to decide to terminate the pregnancy even without evidence of any gestational or fetal consequence.

However, Roberts *et al*[51] showed that less than 5% of women who used alcohol, smoking, or other drugs in the first trimester of pregnancy considered substance use as the central determinant for VToP or TToP. Moderate alcohol consumption was not significantly associated with the decision to terminate the pregnancy, while 84% of women who recognized alcohol consumption as their reason to have an induced abortion were binge drinkers or patients who were previously diagnosed with SUD or alcohol-related physical problems.

It is therefore important to highlight that substance use, which is modest in the general healthy population, does not appear to be a determining factor in the choice of ToP in the majority of people, but is an important element in the decision-making

process of women with a SUD or with physical problems related to addiction[34,51].

Termination of pregnancy in women with childhood psychiatric disorders

A predictive association between a woman's childhood and adolescent mental health and her future choice to terminate a pregnancy, for social reasons and for maternal determinants, has been supposed.

A Finnish study[52] showed that there is an association between childhood and adolescent mental health and the risk of having a ToP when young (in women under 20 years) or having repeated induced abortions. Those evidence highlight the importance of implementing sex education for adolescents suffering from psychiatric and neuropsychiatric diseases, to limit their obstetric and reproductive issues.

van Ditzhuijzen *et al*[34] found that women with a history of any childhood impulse-control disorder show a higher rate of induced abortion than healthy women (OR = 4.35). In particular, the most common childhood impulse-control disorders in women who had TToP and VToP were respectively conduct disorder (OR = 1.72)[33], oppositional defiant disorder (OR = 1.67-2.99)[33,34], antisocial personality disorder (OR = 3.87) and conduct disorder (OR = 6.97)[34]. Moreover, women with a diagnosis of attention deficit hyperactivity disorder (ADHD) in childhood (especially patients with greater impulsiveness) showed a 3 times higher risk to have an induced abortion [34].

Several studies conducted in Northern Europe[52,53] support the existence of a link between a history of childhood conduct disorder in women and medically assisted abortion. According to those authors, girls with conduct disorders can be involved in risky impulsive sexual behaviors with a higher risk of unwanted pregnancy, sexually transmitted diseases, and adolescent sexual abuse. In particular, Lehti *et al*[52] observed that a poor school performance during primary and secondary school can be considered as an independent predictor of subsequent terminations of pregnancy in that population, according to the fact that a low level of education is an important determinant of TToP and VToP (as underlined in paragraph 2 "Demographic and reproductive determinants of termination of pregnancy").

Termination of pregnancy in women with eating disorders

Several studies[54-56] documented a correlation between a history of eating disorder and various gynecological comorbidities, such as impaired menstrual function, infertility, increased risk of unwanted pregnancy, gestational complications (*e.g.*, low birth weight, preterm birth, pregnancy bleeding, gestational diabetes, hyperemesis gravidarum) and a higher risk of oophorectomy and hysterectomy.

Bulik *et al*[55] showed that women with anorexia nervosa (AN) have a higher risk of teenage pregnancy and unwanted pregnancy (OR = 2.11) than women without any eating disorders, with more than 50% of subjects reporting unscheduled conception and a history of prior VToP. The risk of unwanted pregnancy and VToP seems higher in this population with a history of amenorrhea or oligomenorrhea in the year before conception, suggesting that menstrual irregularities may reduce patients' adherence to contraceptive use. Bulik *et al*[55] showed that, despite menstrual irregularities, women with AN and bulimia nervosa (BN) can still conceive and their gynecological comorbidities (infertility, amenorrhea) can give them a false sense of security in unprotected sexual intercourse. According to authors, a better sexual education for patients with eating disorders could make them more aware of the risk of pregnancy even during menstrual irregularities and thus reduce the use of medically assisted abortion.

O'Brien *et al*[54] noted an increased risk of miscarriage (OR = 1.19), VToP, and TToP (OR = 1.25) in patients with AN and BN, especially in women who had a later onset of the eating disorder (18-22 years old).

Similarly, Linna *et al*[56] showed a higher proportion of VToP and TToP in women with classical BN (OR = 1.85) and atypical BN (OR = 1.92) and in women with AN (approaching statistical significance in the latter, with OR = 1.62, $P = 0.06$). Women with binge-eating disorder (BED) did not show an increased risk of termination of pregnancy.

Termination of pregnancy in women with paraphilic disorders and sexually compulsive/behaviors

Due to cultural background and social stigma, women may have difficulties in identifying themselves as affected by compulsive sexual behaviors or sexual addiction. Furthermore, some people show a sexual pattern of "binge-starvation", characterized by the alternation of periods of extensive sexual activity ("sexual binging") and periods

of complete abstinence ("sexual anorexia") [57,58]. In the context of paraphilias and sexual compulsions, women are more inclined to sexual submission or victimization compared to their male counterparts, although sexual dominance behaviors in women are also increasing [58].

Fear of rejection and feelings of shame, associated with compulsive or addictive sexual behavior or uncontrolled paraphilias, prevent women from developing intimate relationships: in fact, it is common for women with dysfunctional sexual behavior to avoid affective attachment with their partners and more often build unstable families [57,58]. All these elements can contribute to the choice of women with paraphilic disorders and sexually addictive/compulsive behaviors to terminate a pregnancy.

Roller [57] investigated the consequences of these disorders on the reproductive health of women, such as: (1) A higher risk of sexually transmitted infections, cervical and vaginal cancer (linked to chronic HPV infection), pelvic inflammatory disease, infertility, and ectopic pregnancies; (2) A higher rate of miscarriage, due to major obstetric complications, but also to gynecological trauma determined by violent sexual practices, sometimes practiced even during gestation; and (3) A higher frequency of unwanted pregnancy (40%-70%), VToP and TToP (36%), and feelings of discomfort and inadequacy during gestation and motherhood (60%).

PSYCHOPATHOLOGICAL CONSEQUENCES OF TTOP

A medically induced abortion can have important consequences on the mental and reproductive health of women because termination of pregnancy is a traumatic event for parents.

Pregnant woman and the baby's father experience induced abortion differently, and woman reaction might also be influenced by her will to give birth and by the moment of the pregnancy when she has abortion.

Fergusson *et al* [59] showed that TToP has a greater traumatic burden and psychiatric morbidity compared to VToP or miscarriage, that normally occur at an earlier stage of the pregnancy.

According to authors [59-61], this finding could be explained with different reasons: (1) Taking place in the second trimester, TToP is performed with a surgical procedure, unlike the medical abortion for VToP or uncomplete miscarriages; (2) In case of TToP, parental desire for a child clashes with emerging medical issues and it is performed later during the gestation, when the couple gets already used to their parental role; (3) In the first trimester, women do not perceive fetal movements and the relationship with the baby is weaker than in later stages of gestation; and (4) After the TToP, parents can hold the child in their arms and can photograph him after the abortion procedure.

It is also important to highlight that TToP is performed with a therapeutic aim and it can also have positive outcomes, especially for those with high levels of distress due to the diagnosis of fetal malformation. It is always important to evaluate the context and the factors that lead a woman to ask for TToP to predict different outcomes she might experience.

Positive mental consequences of TToP

Despite several studies concerning the negative consequences of TToP, it is important to underline that TToP is a medical act performed with a therapeutic purpose.

In this regard, several authors measured a significant improvement after TToP of pre-abortion psychopathological distress, especially mood and anxiety symptoms [60, 62-64].

Interestingly, women's mood seems to improve significantly in the long-term after TToP: Major *et al* [65], measured depressive symptoms with the BDI in different moments before and after TToP and discovered that, immediately after TToP, women's average score was under the cut off for mild depression and their mood significantly improved 3 wk later. A similar positive pattern in anxiety symptoms after TToP has been shown by Cohen and Roth [64].

Depression and anxiety symptoms after TToP

Usually, after TToP women experienced a significant improvement in their mood compared to the period before the induced abortion, but in a minority of cases, women showed long-term depressive and anxiety symptoms and sense of guilt after the procedure [62,66,67].

Zolese and Blacker[68] found that the most common long-term consequences of TToP are depression and anxiety disorders, while psychosis is uncommon. These disorders cronicize in around 10% of women.

Di Febo *et al*[62] show that poor partner support and relational problems related to abortion are the most important risk factors connected with significantly worse mood outcomes after TToP. An increased risk of long-term depression and anxiety disorders was also observed in women with a previous psychiatric history, in young and pluriparous women with poor social support, and in those belonging to social or religious groups that do not accept abortion[66,67].

Furthermore, different authors[12,69] showed that women are more likely to be depressed before abortion than after it; as previously underlined, depression after TToP could highlight a pre-existing mood disorder.

These findings support the importance of the assessment of socio-cultural and psychopathological determinants in all women who have a TToP to predict possible depressive or anxiety consequences.

Post-abortive mania

Several reproductive events (menarche, menstruation, childbirth) are associated with increased mood alterations in women with bipolar disorder; however, little is known about the impact of termination of pregnancy on the course of bipolar disorder[70].

Mahe *et al*[70] described the case of a woman with a history of 5 full-term pregnancies and 2 abortions (1 VToP and 1 TToP) in which each reproductive event was followed by an episode of psychotic mania. There are currently no studies that systematically examined the relationship between abortion and mania among women with bipolar disorder, probably because post-abortion mania is much less common than post-abortion psychosis[70]. A Danish study reported a similar risk of re-hospitalization in women with bipolar disorder before and after medically induced abortion, a possible sign that this reproductive event would not be associated with a clinical worsening of the disease[31].

Mahe *et al*[70] described several clinical cases of post-abortion mania and, according to them, the post-abortion period could be at increased risk of converting bipolar II disorder to bipolar I, due to a worsening of manic symptoms in women who have TToP or VToP. Furthermore, the termination of pregnancy could constitute a trigger for manic episodes in healthy women with a predisposition for affective disorders[70].

Post-abortive psychosis

Brockington and Guedeney[71] reported at least 30 cases of psychotic episodes following abortion, including one historical case described by Esquirol in 1819. The episodes occurred in women with schizophrenia as well as in women who had never previously suffered from a psychotic disorder.

Post-abortion psychosis seems very rare: Brewer[72] found a 0.3/1000 hospitalization rate of post-abortion psychosis compared to 1.7/1000 post-partum psychosis after delivery.

The clinical presentation of post-abortion psychosis is similar to puerperal psychosis and the onset typically occurs within 2 wk after TToP. Individual predisposition and estrogenic fluctuations are supposed as the major causal factors in post-abortion psychosis and puerperal psychosis[73]. Guillaume *et al*[74] suggest that the risk of psychosis may be proportional to the degree of estradiol levels drop associated with the end of pregnancy (*e.g.*, following delivery, miscarriage, and induced abortion).

PTSS and PTSD after TToP

Retrospective studies[75,76] showed that TToP is a traumatic event that leads to severe post-traumatic stress responses and whose distress may be evident years later. A prospective study[76] showed that TToP for fetal abnormalities is associated with an increased risk of PTSD compared to VToP.

However, research regarding the relationship between TToP and PTSD development had controversial results. Geerinck-Vercammen and Kanhai[75] studied 89 couples at 6 wk and 6 mo after TToP and they concluded that PTSS were experienced at the time of abortion and in the following weeks, but they disappeared after 6 mo, but, this survey was based only on a semi-structured interview. By contrast, in a Dutch sample[76] women showed PTSS and depression even years after a TToP for fetal malformations.

Kersting *et al*[77] examined a sample of women who have had TToP, with different psychometric scales (MADRS, BDI, IES-R, SKID) over 14 wk and found that, despite the frequent development of intense PTSS in women 2 wk after the TToP (64.5% of the

sample), at 14 wk the prevalence of PTSD was much lower (22%). Accordingly, although post-traumatic symptoms can be very common in the short-term after TToP, only about 20% of women develop long-term PTSD.

SUDs after TToP

A connection between VToP and increased use of alcohol, tobacco, and illicit drugs is well described[78], but this relationship is rarely investigated in case of TToP.

Drower and Nash[79,80], in a 18 mo follow-up, showed a 2 times higher risk of alcohol, tobacco, or illicit drug abuse in women who had a TToP. In fact, women who have TToP are 1.5 times more likely to abuse tranquilizers compared to women who gave birth[79,80].

Determinants of psychopathological outcomes of TToP

Women who have an induced abortion (TToP and VToP), may have several factors linked to a higher risk of psychological distress in response[81].

Medical or genetic indication: Several studies[82,83] showed that the use of TToP for maternal or fetal health reasons (*e.g.*, malformations or genetic issues) increases the risk of negative psychological reactions compared to VToP performed on ethical or social indications (*e.g.*, rape, incest, low socio-economic status).

Socio-cultural and demographic factors: Women at greatest risk of negative psychological consequences are single, nulliparous, immigrant, or belonging to cultural minorities, young (< 30 years, especially adolescents)[81]. The relationship between strong religious feelings and psychological consequences is contradictory: Romans-Clarkson[81] pointed out that religious belief is not associated with increased guilt after TToP, but Payne *et al*[84] claimed that a negative religious or cultural attitude towards abortion is one of the major risk factors for adverse psychological outcomes.

Coercion of the procedure by partner or parents: All the legislations emphasize that the choice of TToP/VToP is personal[2], but women can be pushed to make a decision against their desire for their pregnancy, with an increased risk of negative psychological outcomes[81]. Women who have independently chosen for a termination of pregnancy show lower risk of negative psychological effects, even if adolescent[85].

Psychopathology and psychiatric history before the procedure: Women who experienced greater psychological distress before the abortion were more likely to have low self-esteem and a high sense of alienation after the procedure[86]. Moreover, women with an internal locus of control and high levels of resilience showed positive outcomes after TToP/VToP[87].

Presence of emotional support: The extent of emotional support a woman perceives during abortion is positively correlated with a good psychological response[81]. On the other hand, Major *et al*[65] found that if the partner is present during abortion, there is a higher risk of depressive symptoms and sense of guilt. Similarly, Robbins[88] found that single women who maintained a strong relationship with the father of the unborn, after abortion were much more at risk of negative psychopathological outcomes. Instead, Romans-Clarkson[81] showed a higher risk of a negative psychological outcome in women with absent or weak family bonds, fewer friends and excessive work pace, partner abandonment, and absence of family support for children care.

Presence of conscious fantasies about the fetus: the intensity of thoughts about the baby seems directly correlated with the risk of negative psychological consequences [81].

Illegal abortion: Diggory[89] suggested that illegal abortion is associated with depressive reactions and feelings of guilt after TToP and VToP.

Absence of contraception: Important sense of guilt and depressive reactions is described in women who do not use contraception[81]. Some authors highlighted the importance of providing adequate contraception education after an induced abortion, both to limit the future recourse to the procedure and their self-blame reactions[81].

CONCLUSION

Several studies evaluated which decisional factors (socio-demographic, reproductive,

psychopathological determinants, and fetal abnormalities) may lead women to induced abortion, but many studies do not discriminate between therapeutic and voluntary ToP, thus representing a possible bias in discriminating decisional determinants of TToP.

Women who have a TToP are usually over 35 years old[3,9], more often divorced or unmarried[3,9], with a high educational level[3,9], but low socio-economic status and a low monthly income. They usually have more children[3], live in large urban areas[11] and belong to ethnic minorities or are immigrants[17], do not have strong religious beliefs[16], and more often report any form of gender-based violence[27].

Women with TToP and VToP show common reasons for their decision, mostly linked to personal and social difficulties that may prevent adequate child care. That evidence stresses the importance of social assistance to support women with those factors.

Women who choose TToP are more commonly affected by a previous mental disorder[28,31,33], that probably influences their mental outcomes afterward.

Results by van Ditzhuijzen *et al*[34] and Mota *et al*[33] showed higher prevalence of any axis I psychiatric disorder in those women, with increased rates of anxiety and mood disorders[33,34], SUDs[34], impulse control disorders[34], ADHD[34], PTSD[33, 43], psychotic disorders[45], eating disorders[54], sexually compulsive/addictive behaviors and paraphilias[57].

Interestingly, current knowledge does not discriminate any specific major psychiatric disorder as more relevant in the decision to have abortion.

The correlation between a higher rate of TToP and personality disorders is less investigated and data are limited to women with antisocial personality disorder[34] and borderline personality disorder (BPD). De Genna *et al*[42] explained the link between BPD and TToP with worse reproductive wellness, a huge number of unplanned and early pregnancies (< 25 years), sexual-transmitted infections, unsafe sexual intercourse, and history of childhood trauma and sexual abuse. Women with some personality disorders are more keen to unwanted pregnancies and those affected by such disorders are rising more and more in the general and clinical population. Accordingly, an in depth analysis in those populations should be encouraged to identify specificities and offer better support.

Interestingly, TToP produces both positive and negative psychopathological effects in women.

Evidence[60,62,64] showed that women with a TToP experience a significant improvement in the psychological distress, mood, and anxiety symptoms they felt before. In fact, even if TToP involves strong negative feelings like guilt and sadness, the difficulties of raising a child with illness seems even worse for some women. Those women deserve support and respect in a very delicate moment that implicates ambivalent feelings and sufferance.

Furthermore, Zolse and Blacker[68] demonstrated that only a minority (10%) of women have psychological or psychiatric disorders after a TToP and several authors [67,68] found that negative psychic outcomes after TToP are more frequent in women with previous psychiatric history (*e.g.*, depression, anxiety disorders, mania, psychosis, and SUDs)[33,70,79]. Therefore, in most cases psychiatric consequences of induced abortion are an exacerbation of pre-existing conditions and they are not an onset of psychopathology.

Nevertheless, concerning outcomes of TTOP are demonstrated by a higher rate of post-traumatic symptoms, especially in the short-term, with a persistent post-traumatic stress disorder in about 22% of the women[77].

In conclusion, we emphasize the importance of providing psychological and psychiatric support to all women who want a TToP, to predict and limit adverse outcomes on their mental and reproductive health. Moreover, further studies are needed to assess the mental history of the male partners and their possible outcomes after a TToP.

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