

Studi sperimentali

Fetal alcohol spectrum disorders awareness in health professionals: implications for psychiatry

La conoscenza della sindrome alcolica fetale negli operatori sanitari: implicazioni per la psichiatria

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SUMMARY. Fetal Alcohol Spectrum Disorders (FASD) are a plethora of malformative conditions leading to mental retardation that affect newborns and children who have been exposed to alcohol during pregnancy or breastfeeding. FASD is a relevant topic for public health in Europe: European area is first in ranking for alcohol use during pregnancy with a prevalence of 25.2%. Italy ranked third among European countries with higher prevalence of FASD (45.0 per 1000 population). Furthermore, FASD could still be underestimated because of numerous undiagnosed and misdiagnosed cases. Aims of the study were to briefly summarize existing evidences about FASD and its psychiatric aspects to assess knowledge, attitudes and practice towards alcohol drinking during pregnancy in an Italian sample of health care professionals in order to provide information about FASD prevention. An anonymous online questionnaire containing the AUDIT-C, T-ACE model and the Drinking Motive Questionnaire was sent to 400 Italian healthcare professionals and students. The survey included socio-demographic information, questions about drinking habits and about knowledge, attitude and practice towards alcohol assumption during pregnancy. Among 320 respondents, 96.3% were women. AUDIT-C revealed that 52.4% were low risk drinkers but 27.6% were hazardous drinkers. The 90.6% of participants denied to ever attended a course about the fetus damage induced by alcohol consumption during pregnancy but 91.3% were willing to participate to professional update initiatives on the topic. Only 19.1% of participants talk regularly about the deleterious effects for the fetus of prenatal alcohol drinking to women and only 51.1% advise the 'zero alcohol' policy. Around 41% of participants tolerates the assumption of low-alcohol beverages. No differences were found between no drinkers and low and hazardous drinkers. In conclusion, data show that only specific and continuing updating for health care professionals about drinking habits may have impactful actions to prevent gestational alcohol intake in order to prevent the main cause of mental retardation in western countries.

KEY WORDS: FASD, pregnancy, alcohol, health professionals.

RIASSUNTO. La sindrome alcolica fetale (FASD) indica una plethora di condizioni malformative che portano a ritardo mentale nei bambini e che colpisce neonati che sono stati esposti all'alcol durante la gravidanza o l'allattamento. La FASD è un argomento rilevante per la salute pubblica in Europa: infatti l'Europa è il primo continente per l'uso di alcol durante la gravidanza con una prevalenza del 25,2%. L'Italia è al terzo posto tra i Paesi europei, con una maggiore prevalenza di FASD (45,0 per 1000 abitanti). Inoltre, l'incidenza della FASD potrebbe ancora essere sottovalutata a causa di numerosi casi non diagnosticati. Lo scopo dello studio è di sintetizzare brevemente le evidenze esistenti sulla conoscenza della FASD e sui suoi aspetti psichiatrici per valutare le conoscenze, gli atteggiamenti e le pratiche nei confronti del consumo di alcolici durante la gravidanza in un campione italiano di operatori sanitari, al fine di fornire informazioni sulla prevenzione della FASD. Un questionario online anonimo, contenente i modelli AUDIT-C, T-ACE, e un questionario alimentare sono stati inviati a

400 professionisti e studenti di professioni sanitarie italiani. Il sondaggio includeva informazioni socio-demografiche, domande sulle abitudini di consumo e sulla conoscenza, l'atteggiamento e la pratica nei confronti dell'assunzione di alcol durante la gravidanza. Su 400 questionari spediti, 320 sono stati restituiti per l'analisi. Di questi 320 questionari, il 96,3% sono di donne. L'AUDIT-C ha rivelato che il 52,4% erano bevitori a basso rischio, ma il 27,6% erano bevitori a rischio. Il 90,6% dei partecipanti ha negato di aver mai frequentato un corso sul danno al feto indotto dal consumo di alcol durante la gravidanza, ma il 91,3% era disposto a partecipare a iniziative di aggiornamento professionale sull'argomento. Solo il 19,1% dei partecipanti informa regolarmente degli effetti deleteri per il feto di alcol prenatale e solo il 51,1% consiglia la politica di "alcol zero". Circa il 41% dei partecipanti tollera l'assunzione di bevande a basso contenuto di alcol. Nessuna differenza è stata trovata tra non bevitori e bevitori a basso e ad alto rischio. **Conclusioni.** I dati mostrano che solo aggiornamenti specifici e continuativi per gli operatori sanitari sulle abitudini alimentari possono avere un certo impatto per prevenire l'assunzione gestazionale di alcol, al fine di prevenire la principale causa di ritardo mentale nei bambini nei Paesi occidentali.

PAROLE CHIAVE: FASD, gravidanza, alcol, operatori sanitari.

INTRODUCTION

Alcohol plays a 'venomous' effect on pregnancy, causing miscarriage¹⁻³, teratogenesis⁴, intra uterine growth restriction^{5,6}, stillbirth^{3,7}, premature birth^{3,7}, neonatal and infantile sequelae, as deformities and disabilities, related to Fetal Alcoholic Spectrum Disorders (FASD)⁸⁻¹². Fetal Alcohol Syndrome (FAS) is a multifaceted malformative condition affecting newborns and children who have been exposed to alcohol during pregnancy or breastfeeding¹³⁻¹⁵. It has been proved as the most common cause of acquired mental retardation in childhood^{11,16-19} and it is totally avoidable by completely refrain from alcohol assumption while pregnant. According to the Italian guidelines²⁰ and the WHO guidelines for the identifications and management of substance use and substance use disorder in pregnancy²¹, the 'zero alcohol' rule is the safest advice every healthcare professional should provide to expectant women or to couples who are looking for a child^{8,11,18,22}. In fact, also paternal exposure to alcohol has been shown relevant in a mice model^{16,22-25}.

Alcohol assumption during pregnancy is a relevant topic for public health in Europe: European area is first in ranking for alcohol use during pregnancy with a prevalence of 25.2%¹⁰. Italy ranked third among European countries with higher prevalence of FASD (45.0 per 1000 population)²⁶. Although, such data could still be underestimating the problem because of numerous undiagnosed and misdiagnosed cases²⁷.

Diagnosis of FASD can be difficult because of the variety of pathological forms found in the spectrum. FASD includes: Fetal Alcohol Syndrome (FAS), partial FAS, Alcohol Related Neurodevelopmental Disorders (ARND) and Alcohol Related Birth Defects (ARBD)²⁸. Microcephaly has been shown as key sign in determining FASD disorders in preterm newborns¹⁵. Detection will be easier in schooling children and teenagers, in which dysmorphisms, growth defects, behavioral impairment and poor school performances will be more evident²⁷.

A complete, exhaustive and non-judgmental mother's clinical history is fundamental to identify people with increased vulnerability to alcohol²⁹. However, such data are difficult to obtain because of sense of guilt, shame and fear of stigma that women often experience when asked about the topic³⁰. Counselling professionals about their drinking habits during pregnancy should be part of healthcare professionals' interventions as primary prevention in order to spread correct information, detect risky behaviors and promote healthy lifestyle among pregnant women.

THE DIAGNOSIS OF FASD

Diagnosis of FASD should be based on a multidisciplinary approach to both mother and baby, considering three different aspects³¹⁻³⁴:

1. maternal risk factors;
2. morphological abnormalities;
3. neurological, psychological, intellectual and social impairment.

Table 1 shows diagnostic criteria of disorders found in FASD spectrum.

THE CLINICAL PICTURE OF FASD

Growth retardation

Post-natal growth retardation is common among people with FASD. It occurs because of alcohol negative effects on the fetus' somatic growth, especially when exposed during the 3rd trimester of gestation. Although, some children with FASD show a normal growth rate but they are more likely to develop learning and cognitive impairments later in life. Such clinical picture can be found frequently in children who were exposed to alcohol during intrauterine life, but not in the 3rd trimester.

Facial anomalies

Children with FAS show 3 specific facial abnormalities (Figure 1):

1. short palpebral fissures (<10th percentile);
2. elongated and flattened nasolabial philtrum;
3. thin upper lip.

They might present also minor dysmorphisms such as: epicanthus, hypertelorism, flat nasal root with short nose with antiverse nostrils, hypoplasia of the cheekbones, anomalies of positioning of ears with a 'railway track' appearance of the antihelix cartilage and micrognathia.

Structural congenital defects

These include anomalies of various organs such as:

- heart (25-50%): inter-atrial or inter-ventricular defects, conotruncal anomalies or large vessels;
- kidneys (4%): aplasia, hypoplasia, renal dysplasia, horsehoe kidneys, rhenouretral duplications;
- skeleton: with radio-ulnar synostosis, vertebral segmenta-

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Table 1. Diagnostic criteria of FASD.

	I FAS (All A-D criteria are required): with or without confirmation of maternal intake of alcohol.
A.	Presence of two or more facial abnormalities between: a. Short palpebral fissures (<10 th percentile) b. Thin Upper Lip (score 4 or 5) c. Long and flat philtrum (score 4 or 5)
B.	Pre-postnatal growth rate (height and/or weight <10 th percentile per age)
C.	Microcephaly or cerebral structural anomalies or recurrent non-febrile convulsions
D.	Neurobehavioral deficits (< or > of 3 years): • <3 years: mental retardation (>1.5 SD below average) • 3 years ➤ With Cognitive defect: 1. Global: general conceptual ability or verbal, spatial, performance IQ >1.5 SD below average. 2. At least 1 neuro-behavioral domain among executive functions, language, memory, visual-spatial ability: >1.5 SD below the average. ➤ With behavioral disorders, without cognitive defect: deficit in at least 1 domain between mood, regulation, attention, control of the pulses: >1.5 SD below the average.
	II Partial FASD Confirmation of maternal alcohol intake during pregnancy: A-B criteria required. Without confirmation, A-C criteria required.
A.	Presence of two or more of the facial anomalies (point A of complete FAS)
B.	Neurobehavioral deficits (point D of complete FAS)
C.	Pre-and/or postnatal growth retardation
	III ARND A and B criteria are required but diagnosis cannot be placed in children under 3 years of age.
A.	Confirmation of maternal intake of alcohol during pregnancy.
B.	Cognitive-behavioral abnormalities (point D of complete FAS).
	IV ARBD A and B criteria are required.
A.	Confirmation of maternal intake of alcohol during pregnancy
B.	Congenital structural defects (1 or more of the heart, kidneys, bones, ears, eyes and minor a

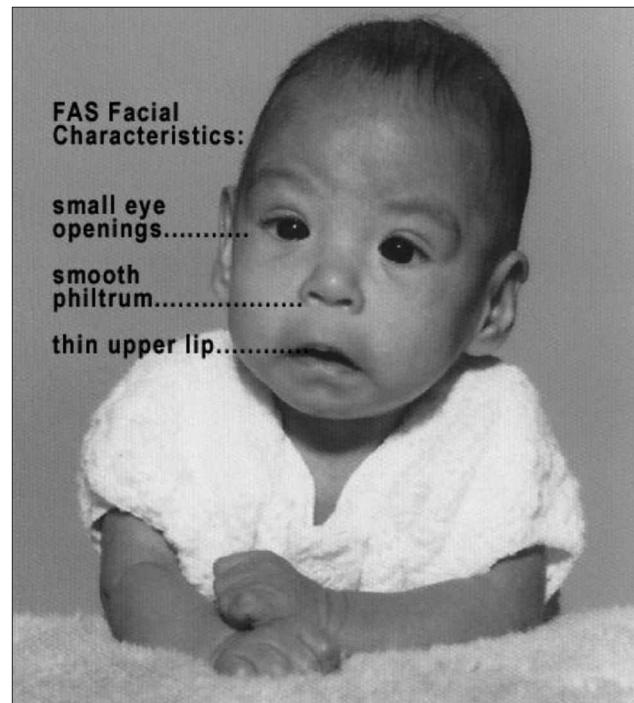


Figure 1. Typical facial expression of a FAS child. In particular, the picture evidences the thin upper lip, the elongated and flattened nasolabial filter and the short palpebral fissures.

ABNORMALITIES OF THE CENTRAL NERVOUS SYSTEM

It has been proved that alcohol exposure during pregnancy can cause short-term and long-term cognitive and behavioral impairments coming from both structural and functional central nervous system abnormalities. The main structural alteration of FASD is microcephaly, often associated with overall growth restriction¹⁵. MRI studies show an overall reduction in brain volume and a general disorganization of the central nervous system³⁵⁻³⁸. In the context of FASD, neurological and psychiatric impairments are caused by prenatal alcohol exposure which causes general damage to the central nervous system (CNS).

Neurological impairments

A determination of a neurological problem should be made by a trained physician, and must not be due to a postnatal insult, such as a high fever, concussion, traumatic brain injury, etc. Neurological problems are expressed as either hard signs, or diagnosable disorders, such as epilepsy or other seizure disorders, or soft signs. Soft signs are broader, non-specific neurological impairments, or symptoms, such as impaired fine motor skills, neurosensory hearing loss, poor gait, clumsiness, poor eye-hand coordination^{39,40}. Many soft signs have norm-referenced criteria, while others are determined through clinical judgment. ‘Clinical judgment’ is only as good as the clinician, and soft signs should be assessed by either a

- tion defects with cervical vertebrae fusion (50%), ankylosis of large joints, scoliosis (15%);
- *ears*: mixed (90%) or sensorineuronal (30%) hearing loss;
- *eyes*: microphthalmia, strabismus, palpebral ptosis and retinal vascular abnormalities with associated visual defect;
- *teeth*: frequent caries, ogival palate and Class III malocclusion with growth;
- *minor dysmorphic anomalies*: hypoplastic nails, brevity and clinodactyly of 5th finger, camptodactyly, hand-held ‘hockey stick’ and pectus excavatum/carinatum.

pediatric neurologist, a pediatric neuropsychologist, or both. Functional impairments are deficits, problems, delays, or abnormalities due to prenatal alcohol exposure (rather than hereditary causes or postnatal insults) in observable and measurable domains related to daily functioning, often referred to as developmental disabilities.

Psychiatric impairments

FASD is a significant issue for Public Health in Europe because of its implications over families, society and public finances. It has been proved that around 94% of people with FASD have mental health problems and in 23% of those cases mental illness requires hospitalization⁴¹⁻⁴³. Famy et al.⁴³ stated that among 25 alcohol exposed subjects included in their trial, 11 had an episode of major depression, 10 reported psychotic symptoms and 7 reported brief psychotic disorder. Among remaining individuals with psychosis, 1 subject was diagnosed with schizoaffective disorder, 1 with delusional disorder, and 1 with psychotic disorder. Bipolar I and anxiety disorders were diagnosed in 5 of the subjects each. Four subjects were diagnosed with posttraumatic stress disorder, 2 with panic disorder, 1 with generalized anxiety disorder, and 1 with claustrophobia. Eating disorders were identified in 4 subjects, 2 of which had binge eating, 1 had anorexia and 1 had bulimia.

Around 83% of adults with FASD suffers addiction issues and 79% have employment problems²⁷. Also, individuals with FAS have very high rates of suicidal and parasuicidal behaviors⁴⁴. Alcohol-exposed infants have been shown to be highly irritable⁴⁵ and to have altered sleeping patterns⁴⁶ and feeding difficulties⁴⁵. Significantly higher levels of both eating and sleeping disorders⁴⁷ in children exposed to alcohol during gestation when compared to non-exposed controls were described.

In boys over 12, it has been reported that 61% have negative school experiences, 60% have legal troubles and 49% display inappropriate sexual behavior⁴⁴. Adolescents and adults with FAS display unsensitivity to social conventions, lack of significant friendships, lack of diplomacy, and difficulty in cooperating with peers⁴⁸. Women with either FAS or other fetal alcohol effects often have difficulties in providing adequate maternal care to their children. In fact, a study conducted over 30 women with FASD showed that 36% of children had been taken under the social protective services' care⁴⁹. Some studies reported experiences of parents of children with FASD: parenting was seen as a lifetime commitment and the whole family feels isolated and overwhelmed because of FASD^{50,51}. People living with FASD often feel different from others⁵² and go through negative social experiences, like being bullied at school or marginalized, because of the implications of their condition over their memory, comprehension and abilities^{53,54}.

In general, FASD mental retardation is dramatically characterized by changes in learning disabilities, academic achievement, impulse control, social perception, communication, abstraction, math skills, short and long-memory, attention, judgment, executive functioning, cognition, social/adaptive skills, language, motor skills, activity levels, sensory processing, social communication, responding to common parenting practices, adaptive behavior and by increased hyperactivity⁵⁵.

ROLE OF HEALTHCARE PROFESSIONALS IN DIAGNOSIS AND PREVENTION OF FASD

Despite a large body of evidences about the negative effects of alcohol assumption during pregnancy have been extensively provided⁵⁶, a great amount of women, around 30/40% are still drinking during at least one trimester of pregnancy^{10-12,57}. This could represent a real 'call to action' for every healthcare professional who has position, education and accountability to counsel pregnant women about healthy lifestyles during pregnancy. Health care professionals should play a pivotal role in the primary prevention interventions against alcohol, smoking and drugs assumption during pregnancy⁵⁸⁻⁶⁰. For example, due to their millenary history, midwives are commonly seen like knowledgeable and reliable healthcare professionals, capable of giving wise advice. By the other hand, also Medical Doctors come to have different occasions of contact with patients affected with alcohol related disorders because of their different specialties. General practitioners, obstetrician-gynecologists and pediatricians are the ones who easily come to see women during their pregnancies. Around 66% of North American medical doctors state that alcohol assumption during pregnancy is harmful but 45.9% claims that there are still some uncertainties about alcohol effects on the fetus. Around 54% of Canadian healthcare professionals (pediatricians, psychiatrists, gynecologists and midwives) declared to be able to diagnose FASD⁶¹. Although, an interesting review summarizing 26 different studies, suggest doctors to be still influenced by their personal believes and attitudes towards alcohol assumption⁶².

Healthcare student's positions and believes about alcohol are still unclear and probably stereotyped⁶³. Although, specific clinical placements in alcohol rehab facilities were proved as effective in sensitizing students about the alcohol abuse disorder⁶⁴. Alongside with general practitioners and nurses, midwives are the frontline healthcare professionals who have the role, the possibility and the education to perform an influential counselling on women about healthy lifestyles⁶⁵⁻⁶⁸.

AIM OF THE STUDY

The main purpose of our study was to investigate knowledge, attitudes and practice towards alcohol damage during gestation in an Italian sample of health care professionals as midwives, medical doctors and healthcare students for proposing further tools of intervention to prevent the mental health disabilities associated with FASD.

MATERIALS AND METHODS

Subjects' recruitment

Between 2018 and 2019, 400 anonymous online questionnaires were sent via web to healthcare professionals and medical, nursing and midwifery students coming from different

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Italian centers, geographically distributed between Northern, Central and Southern areas. 320 questionnaires returned. Characteristics of subjects included in the study are shown in Table 2. All the participants were Italian and the mean age of the sample was 34.83 ± 12.55 years, ranging from 19 to 65 years old. The sample was almost entirely composed by female participants (96.3%). The healthcare professionals who majorly responded the questionnaire were midwives (n=262; 81.9%). The higher number of professionals was in the Northern Italy (55.9%).

This survey included socio-demographic information, questions about alcohol use and smoking habits and about knowledge, attitude and practice towards alcohol assumption and related risks during pregnancy. The used questionnaires were: Alcohol Use Disorders Identification Test-Consumption (AUDIT-C), T-ACE model and the Drinking Motive Questionnaire. An informed consent was signed by each participant who sent back the questionnaires, and all the study procedures were in accordance with the Helsinki Declaration of 1975, as revised in 1983, for human experimentation.

Questionnaires

AUDIT-C

Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) is a validated tool⁶⁹ to assess alcohol consumption in pregnant women through three short questions that estimate alcohol consumption in a standard, meaningful and non-judgmental manner. The optimal AUDIT-C thresholds for alcohol misuse in USA are ≥ 4 points for men and ≥ 3 points for women⁷⁰⁻⁷³.

T-ACE/TACER 3

The T ACE/TACER3 are screening tests for at risk drinking based on the CAGE questionnaire but modified to be used in obstetric gynecologic practices⁷⁴⁻⁷⁶. Further information about the test is available at the following address: https://pubs.niaaa.nih.gov/publications/arh25_3/204_209.htm.

Drinking Motives Questionnaire

Drinking Motives Questionnaire-Revised (DMQ-R)⁷⁷ is a self-administered questionnaire, with 12 items, reflecting the frequency of occurrence of each specific drinking motive, that evaluate four possible classes of drinking motives: internal positive reinforcement (Enhancement), external positive reinforcement (Social), internal negative reinforcement (Coping) and external negative reinforcement (Conformity).

Data analysis

Analysis of variance (ANOVA) and descriptive analyses were used to disclose drinking habits between hazardous and low drinkers also according to methods previously described⁷⁸⁻⁸¹. All statistical analyses were performed by using SPSS software (version 21; IBM SPSS Statistics, Chicago).

Table 2. Characteristics of Professionals involved in the survey, including smoking and drinking habits.

Characteristics	Number (%) or Range (Mean)
Age (years)	19-65 (34.83)
Nationality Italian	320 (100%)
Sex	
Male	12 (3.8%)
Female	308 (96.3%)
Midwives	262 (81.9%)
Employed	215 (67.2%)
Freelance	12 (3.8%)
Still studying	35 (10.9%)
Doctors	24 (7.5%)
Employed	8 (2.5%)
Freelance	0
Still studying	16 (5%)
Students	47 (14.7%)
Place of work	
Northern Italy	179 (55.9)
Central Italy	44 (13.8)
Southern Italy	97 (30.3)
Smoking habits	
No smokers	237 (74.1%)
Smokers	83 (25.9%)
Drinking habits	
No drinkers	64 (20%)
Low risk drinkers	167 (52.2%)
Hazardous drinkers	88 (27.5%)

RESULTS

Drinking habits

Drinking habits were assessed by the AUDIT-C (score from 0 to 6 in our sample) and revealed 20.1% of no drinkers, 52.4% of low risk drinkers and 27.6% of hazardous drinkers (Table 3). Concerning to binge drinking habits, the 72.7% reported to have never assumed more than 5 drinks in a single occasion, while the 27% did report binge drinking less than once in a month or at least once in a month. The 0.3% reported binge drinking every day. Although, no differences were found between women and men in alcohol consumption.

It was also asked what kind of alcoholic beverages they used to drink and in what locations: wine and beer were the most consumed alcoholic beverages (respectively 60% and 43.5%), followed by cocktails (29.7%), soft drinks (11.3%) and spirits (6.3%). The most common places to drink alcohol were Pubs (40.6%) and parties (37.2%), followed by Friends' House (32.5%), Home (25.3%), Disco (10%) and Restaurant (4.4%) (Table 3).

The most likely motivations to drink alcohol were investigated through the DMQ-R questions: the 33.9% used to drink to be sociable or to celebrate parties (Social), the 13.8% used to drink to forget about problems (Coping), the 35.7%

Table 3. Smoking dependence, Drinking risks, Alcoholic beverages, Drinking locations and Drinking motivations.

Smoking and Drinking risks	%	Alcoholic beverages	%	Drinking locations	%	Drinking motivations	%
Smokers		Wine	60	Pub	40.6	Enhancement	35.7
Very low dependence	77.1	Beer	43.5	Parties	37.2	Social	33.9
Low dependence	17.7	Cocktail	29.7	Friend's house	32.5	Coping	13.8
Medium dependence	7.2	Soft drinks	11.3	Home	25.3	Conformity	4.9
Drinkers		Spirits	6.3	Disco	10		
Low risk drinkers	58.3			Restaurant	4.4		
Men	52.1						
Women	25.0						
Hazardous drinkers							
Men	27.7						
Women							

used to drink to feel better or to be able to do things otherwise impossible (Enhancement), the 4.9% used to drink because other people do (Social Pressure or Conformity) (Table 3). ANOVA one way demonstrated that hazardous drinkers used to drink more for Enhancement ($F_{(1,180)}=10.401$; $p=.001$) and Coping ($F_{(1,180)}=6.108$; $p=.014$) motivations compared to low risk drinkers.

Knowledge, attitude and practice

Several questions investigated knowledge, attitudes and practice of those professionals towards alcohol assumption and FASD (Table 4). Most participants reported to have never attended a course about FASD (90.6%) but they are willing to participate to professional update initiatives on this topic (91.3%).

Talking about Practice, only 19.1% of participants talk regularly about FASD to women who come to their attention during their clinical practice and only 51.1% is advising the 'zero alcohol' policy. Around 41% of the participants reported to tolerate the assumption of beverages with low alcohol concentration. The output of the 8-questions questionnaire was analyzed on the base of AUDIT-C categories and no difference were found between no drinkers and low and hazardous drinkers in knowledge, attitude and practices.

DISCUSSION

Europe is the first in the ranking for alcohol use during pregnancy¹⁰ and Italy ranked third among European countries with higher prevalence of FASD^{26,34,82-85}. Thus, interventions against alcohol assumption during pregnancy are necessary more than ever to discourage women's unhealthy behavior during pregnancy. Healthcare professionals can play a

fundamental role in the prevention of risky behaviors by informing women about healthy lifestyle during gestation.

The present survey revealed that only 51% of Italian interviewed healthcare professionals is currently advising the 'zero alcohol' policy. Such data are frighteningly below the international mean percentages: around 61% in Denmark⁵⁸ and 98% in Australia⁶⁰. Furthermore, it has been shown that Canadian healthcare professionals (pediatricians, gynecologists and midwives) may diagnose FASD^{61,86}. Among the 217 healthcare professionals claiming to know FASD in our sample, only 52 refer to always talk about FASD with women; 83 refer to talk if some risk conditions are recognized, 70 refer to do it sometimes or never. In Norway, the information percentages were evidently higher: 98% of surveyed healthcare professionals ask women about their drinking habits⁸⁷.

Nevertheless, the system used for interviews did not enable the attempts of cheating, for example consulting online resources to answer the questions, still 10.6% of the answers about "knowledge" was incorrect. In our sample, 41.6% refer to tolerate the assumption of beverages with low alcohol concentration. So, even professionals who claim to know FASD are still not talking to women and giving incorrect advice. However, the 91.3% of surveyed professionals are willing to attend professional updates initiatives about FASD but, quite surprisingly, around 8% still thinks that such initiatives are poorly useful or do not see it as a priority for their clinical practice.

Only a few studies investigated the results of the Public Health Campaigns against alcohol and FASD: 6 studies reported an improvement in the prevention of FASD but the overall reduction of alcohol assumption in the general population was not significant⁸⁸. Some programs specifically directed to midwives were proved impactful over their knowledge and attitudes towards alcohol and FASD: in 2000 only 28% of Dutch midwives advised to completely avoid alcohol during pregnancy. This percentage increased at 61% in

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Table 4. Questions about knowledge, attitude and practice towards alcohol assumption during pregnancy.

Knowledge questions	Number (%)
Do you know FASD?	
No	14 (4.4)
Yes	217 (67.8)
Partially	89 (27.8)
How could you define FASD?	
“Syndrome that affects the offspring of alcoholic parents”	31 (9.7)
“Syndrome that affects the offspring of mothers who consumed alcohol during pregnancy”	286 (89.4)
“Syndrome that affects the offspring of alcoholic fathers”	2 (0.6)
“Syndrome that affects the offspring of men under the effects of alcoholic intoxication”	1 (0.3)
What are the sources of your information?	
Internet	65
University	219
Colleagues	42
Press	31
Courses/Congresses	72
Attitude questions	Number (%)
I think that informing women about FASD and its risks is:	
Always useful for every woman and so should be compulsory	262 (81.9)
Not very useful for the population and so shouldn't be compulsory	4 (1.3)
Useful only for women at risk	48 (15)
Probably useful for foreign women, because in Italy alcoholism is a rare condition for fertile women	0
Overall shortly useful considering the exiguity of cases reported	1 (0.3)
Have you ever attended a course about FASD?	
No	290 (90.6)
Yes	30 (9.4)
Do you think a course about FASD to be useful for your professional activity?	
Yes	292 (91.3)
No	2 (0.6)
Poorly useful	16 (5)
I'd rather do courses on more relevant topics	10 (3.1)
Practice questions	Number (%)
Do you talk to women who come to your attention about FASD and related risks?	
Yes, always	61 (19.1)
Yes, if she asks it	12 (3.8)
Yes, if there are some increased risk signals	118 (36.9)
Sometimes	62 (19.4)
Never	61 (19.1)
What would you advise concerning alcohol assumption during pregnancy?	
Do not drink any alcohol during pregnancy	164 (51.3)
Continue with the personal habits	0
It is possible to eventually drink beverages with low alcohol concentration	133 (41.6)
Spirits are absolutely forbidden	23 (7.2)

2009⁵⁸. Furthermore, between 2006 and 2009 Sweden observed that most of the midwives involved in educational programs lasting two or more days about alcohol and FASD used specific tools to deal with a correct information about the deleterious effects of alcohol consumption during pregnancy⁵⁹.

Although healthcare professionals are willing to provide an efficient educational intervention on the pregnant population against alcohol assumption⁸⁹, some studies demonstrated that their interventions were not efficient and poorly impactful^{90,91}. Some barriers for healthcare professionals to efficiently include alcohol screening in their clinical practice have been issued: shortened staff in midwifery units⁸⁷, lack of political and management support⁹², lack of theoretical knowledge⁹³, difficulties in using validate tools⁸⁷, lack of communicative skills⁹⁴, language and cultural barriers⁹⁴, personal discomfort and feelings about alcohol⁹⁵, women's fear of stigma or judgment³⁰. But nonetheless, a few positive effects on the prevention of FASD have been recently shown: the caseload midwifery model in Australia was able to prevent alcohol assumption during pregnancy thanks to a trusting relationship between women and health care professionals through pregnancy, labor, birth and postpartum⁹⁶.

Studies on the internet-based educational intervention on healthcare professionals demonstrated their efficacy⁶⁰. In fact, in Australia more than 3 thousand practitioners received educative material about alcohol and FASD through their email. After 3 months they were asked if they read or used the delivered material and if it helped to change their practice: 48.5% of them reported to had changed in their behavior towards alcohol assumption and 98.1% reported to advise the 'zero alcohol' policy⁶⁰. Indeed, zero alcohol-zero risk during pregnancy and lactation. No matter what you've heard, there's no proven safe amount of alcohol to drink during any stage of pregnancy as it can cause FASD. Studies suggest that even low to moderate alcohol use at any time during pregnancy may be associated with an increased risk of FASD^{97,98}. Due to its incredible flexibility with resources available from anywhere and at any time, E-learning allows to consult the materials even during weekends or whenever they have free time (www.elearningindustry.com). Australian Government Department of Health supported the opening of 'FASD Hub', an online free platform to provide information and materials about FASD to healthcare professionals, but also to families and people affected (available at www.fasdhub.org.au). A similar tool could be provided to Italian healthcare professionals whose activity can have a real impact on the prevention of FASD such as pediatricians, psychologists, psychiatrists, midwives, gynecologists, general practitioners and nurses. A possible solution to practical and logistic difficulties for all healthcare professionals in the application of the protocols preventing alcohol assumption during pregnancy could be forming experts and trained teams about the effects of alcohol consumption during pregnancy to spread information around FASD.

CONCLUSIONS

FASD is a totally preventable condition that has to burden effects not only on patients affected but also on their

families and society. Since the identification of FASD mounting evidence about the impact of maternal alcohol consumption during pregnancy has prompted increased attention to the link between gestational alcohol exposure and a constellation of developmental disabilities that are characterized by physical, cognitive and behavioral impairments⁹⁹. Longitudinal studies suggest that individuals with FASD are at a significantly increased risk for adverse long term outcomes, including mental health problems¹⁰⁰⁻¹⁰² and poor social adjustment⁹⁹. Research on the psychiatric disabilities suffered by individuals with FASD throughout development highlights the need for training of mental health professionals¹⁰³⁻¹⁰⁶ in the identification and the provision of specific treatments to address the unique features of this developmental disability since early identification and treatment have been demonstrated to be protective against more serious secondary disabilities^{99,107,108}. It is hoped that with greater awareness of the mental health problems experienced by individuals with FASD, these individuals can receive appropriate and early treatment resulting in more adaptive and rewarding lives⁹⁹.

As for mental health professionals, they are responsible for analyzing a patient's mental health status and providing the necessary treatment. They may admit patients to hospitals, order tests, prescribe medication or recommend therapy. Additionally, they hold regular discussions with patients to diagnose mental disorders or assess a patient's response to treatment. In particular for the prevention of FASD, mental health professionals could play also a crucial role by overcoming the myths and misconceptions about the risk of prenatal alcohol exposure by disseminating the facts. Furthermore, mental health professionals could educate medical and allied health practitioners, students, and others who influence the choices made by women of childbearing age is an essential aspect for prevention providing access to therapeutic services that could prevent current or future pregnancies from being affected by alcohol.

Healthcare professionals should take responsibility in spreading correct information, detecting signs of vulnerability and support women during pregnancy in order to prevent alcohol assumption. Healthcare professionals playing key roles during pregnancy have demonstrated their willingness to expand their practice through continuing professional development, and through specialist and advanced roles. We do believe healthcare professionals could have a crucial function in the prevention of alcohol consumption during pregnancy on order to counteract or reduce the main cause of mental retardation in western countries. Unfortunately, specific education is not enough to realize impactful actions on the society, but further Institutional and Political support is necessary to improve alcohol-associated effects on individuals' health in Italy.

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REFERENCES

1. Avalos LA, Roberts SCM, Kaskutas LA, Block G, Li DK. Volume and type of alcohol during early pregnancy and the risk of miscarriage. *Subst Use Misuse* 2014; 49: 1437-45.
2. Nybo Andersen AM, Kragh Andersen P, Feodor Nilsson S, Strandberg-Larsen K. Authors' reply: Risk factors for miscarriage from a prevention perspective: a nationwide follow-up study. *BJOG An Int J Obstet Gynaecol* 2014; 121: 1440.
3. Bailey BA, Sokol RJ. Prenatal alcohol exposure and miscarriage, stillbirth, preterm delivery, and sudden infant death syndrome. *Alcohol Res Heal* 2011; 34: 86-91.
4. Mandal C, Halder D, Jung KH, Chai YG. In utero alcohol exposure and the alteration of histone marks in the developing fetus: an epigenetic phenomenon of maternal drinking. *Int J Biol Sci* 2017; 13: 1100-8.
5. Lundsberg LS, Illuzzi JL, Belanger K, Triche EW, Bracken MB. Low-to-moderate prenatal alcohol consumption and the risk of selected birth outcomes: A prospective cohort study. *Ann Epidemiol* 2015; 25: 46-54.e3.
6. Gauthier TW, Brown LAS. In utero alcohol effects on foetal, neonatal and childhood lung disease. *Paediatr Respir Rev* 2017; 21: 34-7.
7. O'Leary C, Jacoby P, D'Antoine H, Bartu A, Bower C. Heavy prenatal alcohol exposure and increased risk of stillbirth. *BJOG An Int J Obstet Gynaecol* 2012; 119: 945-52.
8. Mamluk L, Edwards HB, Savović J, et al. Low alcohol consumption and pregnancy and childhood outcomes: time to change guidelines indicating apparently 'safe' levels of alcohol during pregnancy? A systematic review and meta-analyses. *BMJ Open* 2017; 7: e015410.
9. Ruisch IH, Dietrich A, Glennon JC, Buitelaar JK, Hoekstra PJ. Maternal substance use during pregnancy and offspring conduct problems: a meta-analysis. *Neurosci Biobehav Rev* 2018; 84: 325-36.
10. Popova S, Lange S, Probst C, Gmel G, Rehm J. Estimation of national, regional, and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic review and meta-analysis. *Lancet Glob Heal* 2017; 5: e290-9.
11. Ferraguti G, Ciolfi P, Carito V, et al. Ethylglucuronide in the urine as a marker of alcohol consumption during pregnancy: comparison with four alcohol screening questionnaires. *Toxicol Lett* 2017; 275: 49-56.
12. Ferraguti G, Merlino L, Battagliese G, et al. Fetus morphology changes by second-trimester ultrasound in pregnant women drinking alcohol. *Addict Biol* 2019 Feb 27.
13. Lemoine P, Harousseau H, Botreyru J, Menuet J. Les enfants des parents alcooliques: anomalies observées à propos de 127 cas. *Ouest Med* 1968; 8: 476-82.
14. Peardon E, Rhys-Jones B, Bower C, Elliott EJ. Systematic review of interventions for children with Fetal Alcohol Spectrum Disorders. *BMC Pediatr* 2009; 9: 35.
15. del Campo M, Jones K. A review of the physical features of the alcohol spectrum disorders. *Eur J Med Genet* 2017; 60: 55-64.
16. Fiore M, Laviola G, Aloe L, di Fausto V, Mancinelli R, Ceccanti M. Early exposure to ethanol but not red wine at the same alcohol concentration induces behavioral and brain neurotrophin alterations in young and adult mice. *Neurotoxicology* 2009; 30: 59-71.
17. Lange S, Rovet J, Rehm J, Popova S. Neurodevelopmental profile of Fetal Alcohol Spectrum Disorder: a systematic review. *BMC Psychol* 2017; 5: 22.
18. Coriale G, Fiorentino D, Lauro FDI, et al. Fetal Alcohol Spec-
- trum Disorder (FASD): neurobehavioral profile, indications for diagnosis and treatment. *Riv Psichiatr* 2013; 48: 359-69.
19. Quartini A, Pacitti F, Bersani G, Iannitelli A. From adolescent neurogenesis to schizophrenia: opportunities, challenges and promising interventions. *Biomed Rev* 2017; 28: 66-73.
20. Ceccanti M, Iannitelli A, Fiore M. Italian Guidelines for the treatment of alcohol dependence. *Riv Psichiatr* 2018; 53: 105-6.
21. Whittaker A. Review of Guidelines for the identification and management of substance use and substance use disorders in pregnancy. *Drug Alcohol Rev* 2015; 34: 340-1.
22. Ceccanti M, Coccurello R, Carito V, et al. Paternal alcohol exposure in mice alters brain NGF and BDNF and increases ethanol-elicited preference in male offspring. *Addict Biol* 2016; 21: 776-87.
23. Fiore M, Mancinelli R, Aloe L, et al. Hepatocyte growth factor, vascular endothelial growth factor, glial cell-derived neurotrophic factor and nerve growth factor are differentially affected by early chronic ethanol or red wine intake. *Toxicol Lett* 2009; 188: 208-13.
24. De Nicolò S, Carito V, Fiore M, Laviola G. Aberrant behavioral and neurobiologic profiles in rodents exposed to ethanol or red wine early in development. *Curr Dev Disord Reports* 2014; 1: 173-80.
25. Ceccanti M, Mancinelli R, Tirassa P, et al. Early exposure to ethanol or red wine and long-lasting effects in aged mice. A study on nerve growth factor, brain-derived neurotrophic factor, hepatocyte growth factor, and vascular endothelial growth factor. *Neurobiol Aging* 2012; 33: 359-67.
26. Lange S, Probst C, Gmel G, Rehm J, Burd L, Popova S. Global prevalence of fetal alcohol spectrum disorder among children and youth: a systematic review and meta-analysis. *JAMA Pediatr* 2017; 171: 948-56.
27. Carito V, Parlapiano G, Rasio D, et al. Fetal alcohol spectrum disorders in pediatrics. FASD and the pediatrician. *Biomed Rev* 2018; 29: 27-35.
28. May PA, Baete A, Russo J, et al. Prevalence and characteristics of Fetal Alcohol Spectrum Disorders. *Pediatrics* 2014; 134: 855-66.
29. Coriale G, Fiorentino D, Di Lauro F, Marchitelli R, Scalese B, Fiore M, et al. Fetal Alcohol Spectrum Disorder (FASD): neurobehavioral profile, indications for diagnosis and treatment. *Riv Psichiatr* 2013; 48: 359-69.
30. Chang G. Screening for alcohol and drug use during pregnancy. *Obstet Gynecol Clin North Am* 2014; 41: 205-12.
31. Fagerlund Å, Heikkilä S, Autti-Rämö I, et al. Brain metabolic alterations in adolescents and young adults with fetal alcohol spectrum disorders. *Alcohol Clin Exp Res* 2006; 30: 2097-104.
32. Elgen I, Bruaroy S, Laegreid LM. Lack of recognition and complexity of foetal alcohol neuroimpairments. *Acta Paediatr Int J Paediatr* 2007; 96: 237-41.
33. Gibson L, Porter M. Drinking or Smoking while breastfeeding and later cognition in children. *Pediatrics* 2018; 142: e20174266.
34. Fiorentino D, Coriale G, Spagnolo PA, et al. Fetal alcohol syndrome disorders: experience on the field. The Lazio study preliminary report. *Ann Ist Super Sanita* 2006; 42: 53-7.
35. Astley S, Olson H, Kerns K, Brooks A, Aylward E, Coggins T. Neuropsychological and behavioral outcomes from a comprehensive magnetic resonance study of children with fetal alcohol spectrum disorders. *Can J Clin Pharmacol* 2009; 16: e178-20.
36. Donald KA, Eastman E, Howells FM, et al. Neuroimaging effects of prenatal alcohol exposure on the developing human brain: A magnetic resonance imaging review. *Acta Neuropsychiatr* 2015; 27: 251-69.
37. Boronat S, Sánchez-Montañez A, Gómez-Barros N, et al. Correlation between morphological MRI findings and specific diagnostic categories in fetal alcohol spectrum disorders. *Eur J Med Genet* 2017; 60: 65-71.

38. Hedrickson T, Mueller B, Sowell E, Mattson SN, Coles CD, Kable J. Cortical gyration is abnormal in children with prenatal exposure to alcohol. *NueroImage Clin* 2017; 15: 391-400.
39. Chudley AE, Conry J, Cook JL, Loock C, Rosales T, LeBlanc N. Fetal alcohol spectrum disorder: Canadian guidelines for diagnosis. *CMAJ* 2005; 172: S1-21.
40. Chudley AE, Kilgour AR, Cranston M, Edwards M. Challenges of diagnosis in fetal alcohol syndrome and fetal alcohol spectrum disorder in the adult. *Am J Med Genet Part C Semin Med Genet* 2007; 145: 261-72.
41. O'Leary C, Leonard H, Bourke J, D'Antoine H, Bartu A, Bower C. Intellectual disability: population-based estimates of the proportion attributable to maternal alcohol use disorder during pregnancy. *Dev Med Child Neurol* 2013; 55: 271-7.
42. Kelly SJ, Day N, Streissguth AP. Effects of prenatal alcohol exposure on social behavior in humans and other species. *Neurotoxicol Teratol* 2000; 22: 143-9.
43. Famy C, Streissguth AP, Unis AS. Mental illness in adults with fetal alcohol syndrome or fetal alcohol effects. *Am J Psychiatry* 1998; 155: 552-4.
44. Streissguth A, Barr H, Kogan J, Bookstein F. "Understanding the Occurrence of Secondary Disabilities in Clients with Fetal Alcohol Syndrome (FAS) and Fetal Alcohol Effects (FAE)" Final Report to the Centers for Disease Control and Prevention (CDC). Tech Rep No. 96-06. Seattle: 1996.
45. Coles CD, Platzman KA. Behavioral development in children prenatally exposed to drugs and alcohol. *Int J Addict* 1993; 28: 1393-433.
46. Scher MS, Richardson GA, Coble PA, Day NL, Stoffer DS. The effects of prenatal alcohol and marijuana exposure: disturbances in neonatal sleep cycling and arousal. *Pediatr Res* 1988; 24: 101-5.
47. Steinhausen HC, Nestler V, Spohr HL. Development and psychopathology of children with the fetal alcohol syndrome. *J Dev Behav Pediatr* 1982; 3: 49-54.
48. Streissguth AP, Aase JM, Clarren SK, Randels SP, LaDue RA, Smith DF. Fetal Alcohol Syndrome in adolescents and adults. *JAMA J Am Med Assoc* 1991; 265: 1961.
49. Streissguth A. Challenge of Fetal Alcohol Syndrome. Washington, DC: University of Washington Press, 2011.
50. Sanders JL, Buck G. A long journey: biological and non-biological parents' experiences raising children with FASD. *J Popul Ther Clin Pharmacol* 2010; 17.
51. Mukherjee R, Wray E, Commers M, Hollins S, Curfs L. The impact of raising a child with FASD upon carers: findings from a mixed methodology study in the UK. *Adopt Foster* 2013; 37: 43-56.
52. Stade B, Beyene J, Buller K, et al. Feeling different: the experience of living with fetal alcohol spectrum disorder. *J Popul Ther Clin Pharmacol* 2011; 18: e475-85.
53. Salmon JV, Buettow SA. An exploration of the experiences and perspectives of New Zealanders with fetal alcohol spectrum disorder. *J Popul Ther Clin Pharmacol* 2012; 19: e41-50.
54. Domeij H, Fahlström G, Bertilsson G, et al. Experiences of living with fetal alcohol spectrum disorders: a systematic review and synthesis of qualitative data. *Dev Med Child Neurol* 2018; 60: 741-52.
55. Hoyme HE, Kalberg WO, Elliott AJ, et al. Updated clinical guidelines for diagnosing Fetal Alcohol Spectrum Disorders. *Pediatrics* 2016; 138: e20154256-e20154256.
56. American Addiction Centers. American Addiction Centers, 2019.
57. Colvin L, Payne J, Parsons D, Kurinczuk JJ, Bower C. Alcohol consumption during pregnancy in nonindigenous West Australian women. *Alcohol Clin Exp Res* 2007; 31: 276-84.
58. Kesmodel US, Kesmodel PS. Alcohol in pregnancy: attitudes, knowledge, and information practice among midwives in Denmark 2000 to 2009. *Alcohol Clin Exp Res* 2011; 35: 2226-30.
59. Skagerström J, Johansson AL, Holmqvist M, Envall EK, Nilsen P. Towards improved alcohol prevention in Swedish antenatal care? *Midwifery* 2012; 28: 314-20.
60. Payne JM, France KE, Henley N, et al. Paediatricians' knowledge, attitudes and practice following provision of educational resources about prevention of prenatal alcohol exposure and Fetal Alcohol Spectrum Disorder. *J Paediatr Child Health* 2011; 47: 704-10.
61. Tough S, Clarke M, Hicks M, Clarren S. Attitudes and approaches of Canadian providers to preconception counselling and the prevention of fetal alcohol spectrum disorders. *J FAS Int* 2005; 3: e3.
62. Bakhshi S, While AE. Health professionals' alcohol-related professional practices and the relationship between their personal alcohol attitudes and behavior and professional practices: a systematic review. *Int J Environ Res Public Health* 2013; 11: 218-48.
63. Coons KD, Watson SL, Yantzi NM, Lightfoot NE, Larocque S. Health care students' attitudes about alcohol consumption during pregnancy: responses to narrative vignettes. *Glob Qual Nurs Res* 2017; 4: 233339361774046.
64. Salamonson Y, Ramjan LM, Villarosa AR, Marjadi B. Does clinical placement in a community alcohol and other drugs rehabilitation centre influence students' career intention? *Int J Ment Health Nurs* 2018; 27: 794-803.
65. Carpenter B, Blackburn C, Egerton J. Fetal alcohol spectrum disorders: interdisciplinary perspectives. London: Routledge, 2013.
66. Payne JM, Watkins RE, Jones HM, et al. Midwives' knowledge, attitudes and practice about alcohol exposure and the risk of fetal alcohol spectrum disorder. *BMC Pregnancy Childbirth* 2014; 14: 377.
67. Ford C, Saville S. International drug policy – health before politics. *Drugs Alcohol Today* 2017; 17: 113-23.
68. Bersani G, Iannitelli A. [Legalization of cannabis: between political irresponsibility and loss of responsibility of psychiatrists]. *Riv Psichiatri* 2015; 50: 195-8.
69. Dawson DA, Grant BF, Stinson FS. The AUDIT-C: screening for alcohol use disorders and risk drinking in the presence of other psychiatric disorders. *Compr Psychiatry* 2005; 46: 405-16.
70. Bush K, Kivlahan DR, McDonell MB, Fiern SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. *Ambulatory Care Quality Improvement Project (ACQUIP)*. *Alcohol Use Disorders Identification Test. Arch Intern Med* 1998; 158: 1789-95.
71. Saunders JB, Aasland OG, Babor TF, De la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption-II. *Addiction* 1993; 88: 791-804.
72. Bradley KA, Debenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a brief screen for alcohol misuse in primary care. *Alcohol Clin Exp Res* 2007; 31: 1208-17.
73. Johnson JA, Lee A, Vinson D, Seale JP. Use of AUDIT-based measures to identify unhealthy alcohol use and alcohol dependence in primary care: a validation study. *Alcohol Clin Exp Res* 2013; 37: e253-9.
74. Sokol RJ, Martier SS, Ager JW. The T-ACE questions: practical prenatal detection of risk-drinking. *Am J Obstet Gynecol* 1989; 160: 863-70.
75. Chiodo LM, Delaney-Black V, Sokol RJ, Janisse J, Pardo Y, Hannigan JH. Increased cut-point of the TACER-3 screen reduces false positives without losing sensitivity in predicting risk alcohol drinking in pregnancy. *Alcohol Clin Exp Res* 2014; 38: 1401-8.
76. Chiodo LM, Sokol RJ, Delaney-Black V, Janisse J, Hannigan JH. Validity of the T-ACE in pregnancy in predicting child outcome and risk drinking. *Alcohol* 2010; 44: 595-603.

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77. Cooper ML. Motivations for alcohol use among adolescents: development and validation of a four-factor model. *Psychol Assess* 1994; 6: 117-28.
78. Amendola T, Fiore M, Aloe L. Postnatal changes in nerve growth factor and brain derived neurotrophic factor levels in the retina, visual cortex, and geniculate nucleus in rats with retinitis pigmentosa. *Neurosci Lett* 2003; 345: 37-40.
79. Manni L, Aloe L, Fiore M. Changes in cognition induced by social isolation in the mouse are restored by electro-acupuncture. *Physiol Behav* 2009; 98: 537-42.
80. Aloe L, Fiore M. TNF- α expressed in the brain of transgenic mice lowers central tyroxine hydroxylase immunoreactivity and alters grooming behavior. *Neurosci Lett* 1997; 238: 65-8.
81. Carito V, Ciafrè S, Tarani L, et al. TNF- α and IL-10 modulation induced by polyphenols extracted by olive pomace in a mouse model of paw inflammation. *Ann Ist Super Sanita* 2015; 51: 382-6.
82. Ceccanti M, Romeo M, Fiorentino D. [Alcohol and women: clinical aspects]. *Ann Ist Super Sanita* 2004; 40: 5-10.
83. Kodituwakk P, Coriale G, Fiorentino D, et al. Neurobehavioral characteristics of children with fetal alcohol spectrum disorders in communities from Italy: preliminary results. *Alcohol Clin Exp Res* 2006; 30: 1551-61.
84. May PA, Fiorentino D, Phillip Gossage J, Kalberg WO, Eugene Hoyne H, Robinson LK, et al. Epidemiology of FASD in a province in Italy: Prevalence and characteristics of children in a random sample of schools. *Alcohol Clin Exp Res* 2006; 30: 1562-75.
85. Aragón AS, Coriale G, Fiorentino D, et al. Neuropsychological characteristics of Italian children with fetal alcohol spectrum disorders. *Alcohol Clin Exp Res* 2008; 32: 1909-19.
86. Tough SC, Clarke M, Hicks M, Clarren S. Clinical practice characteristics and preconception counseling strategies of health care providers who recommend alcohol abstinence during pregnancy. *Alcohol Clin Exp Res* 2004; 28: 1724-31.
87. Wangberg SC. Norwegian midwives' use of screening for and brief interventions on alcohol use in pregnancy. *Sex Reprod Healthc* 2015; 6: 186-90.
88. Crawford-Williams F, Fielder A, Mikocka-Walus A, Esterman A. A critical review of public health interventions aimed at reducing alcohol consumption and/or increasing knowledge among pregnant women. *Drug Alcohol Rev* 2015; 34: 154-61.
89. Doi L, Jepson R, Cheyne H. A realist evaluation of an antenatal programme to change drinking behaviour of pregnant women. *Midwifery* 2015; 31: 965-72.
90. Baron R, Heesterbeek O, Manniën J, Hutton EK, Brug J, Westerman MJ. Exploring health education with midwives, as perceived by pregnant women in primary care: a qualitative study in the Netherlands. *Midwifery* 2017; 46: 37-44.
91. Jones SC, Telenta J, Shorten A, Johnson K. Midwives and pregnant women talk about alcohol: what advice do we give and what do they receive? *Midwifery* 2011; 27: 489-96.
92. Holmqvist M, Nilsen P. Approaches to assessment of alcohol intake during pregnancy in Swedish maternity care-a national-based investigation into midwives' alcohol-related education, knowledge and practice. *Midwifery* 2010; 26: 430-4.
93. Van der Wulp NY, Hoving C, De Vries H. A qualitative investigation of alcohol use advice during pregnancy: experiences of Dutch midwives, pregnant women and their partners. *Midwifery* 2013; 29: 89-98.
94. Petersen Williams P, Petersen Z, Sorsdahl K, Mathews C, Everett-Murphy K, Parry CD. Screening and brief interventions for alcohol and other drug use among pregnant women attending midwife Obstetric Units in Cape Town, South Africa: a qualitative study of the views of health care professionals. *J Midwifery Women's Heal* 2015; 60: 401-9.
95. Leroy-Creutz M, Fresson J, Bedel S, Miton A. Alcohol and pregnancy in Lorraine: study of professional practice and aid to detection. *Sante Publique (Paris)* 2015; 28: 797-808.
96. Reid N, Gamble J, Creedy DK, Finlay-Jones A. Benefits of caseload midwifery to prevent fetal alcohol spectrum disorder: a discussion paper. *Women Birth* 2019; 32: 3-5.
97. National Health and Medical Research Council. Australian Guidelines to Reduce Health Risks from Drinking Alcohol. *Aust Guidel to Reduce Heal Risks from Drink Alcohol* 2009: 1-179.
98. Williams JF, Smith VC. Fetal Alcohol Spectrum Disorders. *Pediatrics* 2015; 136: e1395-406.
99. O'Connor MJ, Paley B. Psychiatric conditions associated with prenatal alcohol exposure. *Dev Disabil Res Rev* 2009; 15: 225-34.
100. Coriale G, Battagliese G, Pisciotta F, et al. Behavioral responses in people affected by alcohol use disorder and psychiatric comorbidity: correlations with addiction severity. *Ann Ist Super Sanita* 2019; 55: 131-42.
101. Ceccanti M, Hamilton D, Coriale G, et al. Spatial learning in men undergoing alcohol detoxification. *Physiol Behav* 2015; 149: 324-30.
102. Ceccanti M, Coriale G, Hamilton DA, et al. Virtual Morris task responses in individuals in an abstinence phase from alcohol. *Can J Physiol Pharmacol* 2018; 96: 128-36.
103. Vitali M, Sorbo F, Mistretta M, et al. Dual diagnosis: an intriguing and actual nosographic issue too long neglected. *Riv Psichiatr* 2018; 53: 154-9.
104. Alessandrini G, Ciccarelli R, Battagliese G, et al. Treatment of alcohol dependence. *Alcohol and the young: social point of view*. *Riv Psichiatr* 2018; 53: 113-7.
105. Vitali M, Sorbo F, Mistretta M, et al. Drafting a dual diagnosis program: a tailored intervention for patients with complex clinical needs. *Riv Psichiatr* 2018; 53: 149-53.
106. Attilia F, Perciballi R, Rotondo C, et al. Alcohol withdrawal syndrome: diagnostic and therapeutic methods. *Riv Psichiatr* 2018; 53: 118-22.
107. O'Malley KD, Nanson J. Clinical implications of a link between fetal alcohol spectrum disorder and attention-deficit hyperactivity disorder. *Can J Psychiatry* 2002; 47: 349-54.
108. Green CR, Mihic AM, Nikkel SM, et al. Executive function deficits in children with fetal alcohol spectrum disorders (FASD) measured using the Cambridge Neuropsychological Tests Automated Battery (CANTAB). *J Child Psychol Psychiatry Allied Discip* 2009; 50: 688-97.