Efficacy of brief intervention for alcohol consumption during pregnancy in Argentinean women: a randomized controlled trial

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Abstract

Introduction: Although Brief Intervention (BI) has proven to reduce alcohol consumption during pregnancy in high income countries, there is no evidence from the Southern Cone of America. Thus, we conducted a study to assess BI efficacy among Argentinean pregnant women. **Method and Materials**: We collected data on pregnant women receiving prenatal care at the public health system in Mar del Plata, Argentina. Women with less than 26 weeks of gestation (n = 486) were randomized to brief advice (BA) or BI. Three months later they were re-assessed; women with more than 26 weeks of gestation constituted a screening only control group (SC) (n=154). Self-reported quantity and frequency of alcohol consumption, frequency of binge drinking, and related problems after three months were used as outcomes. We performed generalized estimating equations and clinical significance analyses. Also, we obtained newborn health indicators from the city's health system database to use as objective outcomes. Women who did not participate in any of the three former conditions were randomly selected to constitute a non-screening control group (NSC) (n=150). We compared objective outcomes among BI, BA, and NSC groups using the Wilcoxon rank test. **Results**: In comparison with SC, BI and BA reduced alcohol consumption, without differences between the latter two. Newborns of women who received BI and BA had better health indicators compared with the NSC group. **Conclusions**: performing either a BI or BA reduces alcohol consumption among Argentinean pregnant women and might lead to healthier newborns.

Keywords: alcohol, pregnant women, brief intervention, Argentina

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Preventing prenatal alcohol exposure poses a major challenge to public health across the world (World Health Organization [WHO], 2014). Alcohol use during pregnancy can lead to a series of alcohol-related problems for the pregnant woman and the fetus (Oei, 2020). Those consequences are a hundred percent preventable if no alcohol is consumed during pregnancy (Charness et al., 2016). Among them, miscarriage (Henriksen et al., 2004), low birth weight, preterm birth (Patra et al., 2011), and a wide range of physical, cognitive, neurological, and behavioral characteristics encompassed in Fetal Alcohol Spectrum Disorder (FASD) (Oei, 2020). Also, recent studies detected functional biomarkers among newborns of mothers who consumed alcohol during pregnancy. For example, Anunziata et al. (2020) found that newborns of mothers who drank showed respiratory depression and facial reactions when the babies were olfactory stimulated with ethanol.

The prevalence of alcohol consumption during pregnancy varies across countries. Among North American countries, it is estimated that between 10 to 15 % of pregnant women drink (Popova et al., 2017), while countries from South America show a higher prevalence. For example, 75% of the pregnant women in Argentina reported consuming alcohol during pregnancy (Lopez et al., 2015), while 63% reported doing so in Uruguay (Míguez et al., 2009) and 57% in Chile (Aros et al., 2006). Furthermore, prenatal drinking constitutes an even more significant challenge in Latin-American countries than others, where the lack of government-specific guidelines makes addressing alcohol consumption in pregnant women more difficult (WHO, 2014).

Brief Intervention (BI) is the most commonly used tool to reduce alcohol consumption among pregnant women, and WHO has recommended BI as a cost-effective strategy (WHO, 2014). However, efficacy studies are scarce (Erng et al., 2020). In addition, evidence of

efficacy is mainly limited to high-income countries, and it is necessary to develop cultural adaptations of BI in low and middle-income countries (Lichtenberger et al., 2016), considering that countries like Argentina, for example, has very different pattern of consumption than that in other countries where this research has been based. Argentina has a Mediterranean-style drinking culture characterized by high per capita consumption (Savic et al., 2016) and the integration of alcohol into social life, which is highly acceptable and encourages consumption. A recent study shows that Argentinean women who drink during pregnancy perceived more acceptability from their family and friends than those who abstained (Lichtenberger, et al 2020).

BI is a time-limited motivational intervention. It has been defined as *opportunistic* (Babor et al., 2007), as its recipients have not yet reported an alcohol problem, but are identified as consuming in ways that involve a certain risk. BI can be performed by professionals from different disciplines or by non-specialized personnel after training (Babor et al., 2017). Most effective BIs usually include 1) feedback aimed at increasing awareness of the negative consequences of alcohol consumption, 2) advice focused on identifying risky situations and promoting actions aimed at reducing consumption, and 3) assistance in formulating goals for reducing alcohol consumption (Cremonte et al., 2013). With pregnant women BI aims to identify drinking and motivate women to achieve abstinence (Graves et al., 2020).

Even though many women stop or reduce their alcohol consumption during pregnancy for different reasons, such as being concerned for the wellbeing of their babies or for religious beliefs (Martinelli et al., 2019), pregnant or reproductive-age women who receive BI have been found to achieve and maintain abstinence more successfully than those from control groups (Martino et al., 2018; Nilsen, 2009). However, reductions in drinking have also been detected among control groups (Marais et al., 2011; Nilsen, 2009; Sheenan et al., 2014). The

effect on outcomes among control groups is a recognized phenomenon in the BI field, explained mainly by regression to the mean or instrumental bias such as screening reactivity (Gual et al., 2016). For this reason, and to help explain conflicting evidence, control groups that do not receive any screening have been recently recommended (Jecks et al., 2018). Also suggested is the use of objective outcome measures along with the traditional self-reported consumption instruments (Glass et al., 2017). Pregnancy studies carried out in the US have employed newborn health indicators as objective outcome data, suggesting that BI has a positive impact on newborn weight and length, while decreasing fetal death and increasing full-term births (Armstrong et al., 2009; O'Connor & Whaley, 2007; Tzilos et al., 2011).

We conducted a study to assess BI efficacy among Argentinean pregnant women. Toward this aim, we used a subjective outcome measure (self-reported alcohol consumption and related problems) and an objective outcome measure (newborns health indicators). We hypothesized that BI would be effective in a cultural context where drinking during pregnancy is higher than that found in studies from other countries, while addressing some of the previous concerns raised such as the lack of non-screening control groups and the use of non-objective outcome measures.

Method

Self-report of alcohol consumption and related problems

Participants and Procedure

The study sample was all pregnant women receiving prenatal care in the public health system in Mar del Plata, Argentina, from April to September 2016. 893 women were invited to participate, of which 8 refused to take part in the study and 3 were excluded as they were in alcohol or other drug treatment. The remaining participants were screened for their alcohol consumption with the Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001): 219 women were excluded from the sample as they did not report any alcohol

consumption during the last 12 months and 23 women were referred to specialized treatment for presenting indicators of an Alcohol Use Disorder (AUD). A total of 640 women met the inclusion criteria and were given full and detailed information about the study in a written information sheet. Parents' or legal guardians' representation was not required, as no participant was under 13 years of age, the legal age to consent treatment in Argentina (National Law 26.529 about Patient Rights, 2009). If a participant showed a low literacy level, the researcher read the information sheet to the patient. Women who gave their verbal informed consent were given the information sheet and screened for alcohol consumption through a self-report questionnaire (described in the measure section). The procedure and project materials were assessed and approved by the City Mental Health Department and an Ethical Committee. The trial was not pre-registered in a public repository. The registration of trials is not an extended practice for psychological interventions in Argentina. Also, institutions that finance as well as those where the studies are carried out, do not require registration.

Inclusion criteria were a) being currently pregnant, b) informed consent after reading or listening to the information sheet, and c) consuming alcohol in the past 12 months.

Exclusion criteria were a) no alcohol consumption last 12 months, b) being under treatment for alcohol or other substances use, c) being identified through the AUDIT as presenting alcohol use disorders (AUD) (these participants were encouraged to seek specialized treatment) and d) being cognitively unable to understand the questionnaire.

Although studies of the efficacy of BI typically include only women who drink during pregnancy, or those who drink at high-risk levels, we decided to also include those who reported abstinence since recognition of pregnancy but did report drinking in the last year for two reasons. First, some women may not have consumed alcohol by the time of the interview because of reasons other than protecting themselves and their babies, for example, because

they felt nauseated during the first months of pregnancy or they had not had the social opportunity to drink. Second, since alcohol consumption during pregnancy is normalized in the region, some women may not have had information about its negative consequences and thus present an excellent opportunity for encouraging the maintenance of abstinence.

Brief advice (BA) and brief intervention (BI) groups

Women up to 26 weeks of gestation were randomized into either the BA or BI group. The 26th week of gestation was used as a cut-off point to administer follow-up assessments 12 weeks later for those in the BA or BI conditions, while women were still pregnant (a normal pregnancy lasts between 38 to 42 weeks).

We invited women to participate when they were in the prenatal health care waiting room. The professionally trained study personnel who recruited the participants also provided screening and delivered the BI or BA. Also, participants were blinded to the condition they received. We began randomization raffling the first participant to BI or BA and continued with a one-by-one procedure. For example, if the first participant raffled BI, the next received BA, and so on. If a participant refused to continue participating, the data were regarded as lost. All participants received clear advice on alcohol abstinence (about 5 minutes). After screening, BA participants received a brochure with information on the risks of prenatal alcohol exposure, while BI participants received the BI interview (about 15 minutes). If a participant showed a low literacy level, the researcher read the whole brochure.

Participants in the BI and BA were re-contacted and assessed by phone within three months of the first interview. Telephone communication was attempted five times over two weeks. During the telephone interview, quantity, and frequency of consumption along with the AUDIT for the last three months were assessed. To minimize potential biases those

conducting the telephone interviews were blind as to the participant's condition. The three-month re-contact rate was 56%, with no difference between the BI and BA condition.

Screening Control Group

Women with more than 26 weeks of gestation were included as a *screening only control group* (SC). Since women in this group did not receive any kind of intervention, their data reflect alcohol consumption at a more advanced stage of the pregnancy for those who received regular care in primary health centers. They were assessed only once about alcohol consumption before and after pregnancy recognition (see *measures* for more information). At the time of the assessment they were around 6-7 months of pregnancy. Data from SC assessment, and the BI and BA follow-up could be compared because the period of pregnancy between them matches.

For ethical reasons SC participants received the same brochure as BA participants and, therefore, could not be assessed in the newborn study.

Figure 1 shows a flowchart with groups' distribution and the studies' designs.

[Figure 1 about here]

Measures

Screening measures

Alcohol consumption in the previous 12 months: Women were asked about the frequency of alcohol consumption in the past 12 months before the interview. Those women who reported even one drink during this time were included.

Alcohol Use Disorder: The Alcohol Use Disorder Identification Test (AUDIT) (Babor et al., 2001) was used to assess consumption and related problems for the period following pregnancy recognition. Women who scored ≥4 were considered as having a probable AUD

and excluded from the study. The AUDIT has demonstrated adequate psychometric properties in pregnant Argentinean women, α = 0.93, Sensitivity = 87%, Specificity = 86% (López et al., 2017).

Baseline Assessment

For BI and BA groups baseline assessment included:

Basic demographic information: age, marital status, educational level, occupation, gestational weeks, number of children, and socioeconomic status.

Quantity of consumption before and after pregnancy recognition: Quantity of consumption was estimated in standard units (SU, 1 unit = 11g) of absolute alcohol consumed in a typical day of drinking (Cremonte et al., 2010). Specifically, for the quantity of consumption before pregnancy recognition, the question was: *During the past twelve months, how many drinks did you have on a typical day that you drink?* In the case of the quantity of consumption after pregnancy recognition, the question was: *Since you found out you are pregnant, how many drinks do you have on a typical day that you drink?*

Frequency of consumption before and after pregnancy recognition: Frequency of consumption was estimated by asking the patient how often she drank alcohol in the past 12 months and after pregnancy recognition, elicited from the following response categories: *Never, Once a month, 2-4 times a month, 2-3 times a week, and 4 or more times a week.*

Frequency of Binge drinking before and after pregnancy recognition: Binge drinking was considered consuming 4 or more drinks on an occasion in the past 12 months and after pregnancy recognition. Response categories were: *Never, Less than once a month, Monthly, Weekly, and Daily.*

Alcohol-related problems before and after pregnancy recognition: Alcohol-related problems were assessed from the last 7 questions of the AUDIT as a quantitative variable on a scale of 0 to 28 points. These questions include information on how often in the past 12 months and after pregnancy recognition participants had experienced one of the following problems related to alcohol consumption: not being able to stop drink once they had started, failing to do what was expected from them, needing a drink in the morning, feeling guilty after drinking, being unable to remember what happened during drinking, injuring themselves or others because of their drinking and having received a suggestion to cut down drinking by family, friends, doctors or others. Response categories were: *Never, Less than once a month, Monthly, Weekly, and Daily.*

For the SC group, the baseline assessment included *Basic demographic information*, *Quantity of consumption, Frequency of consumption, Frequency of Binge drinking and Alcohol-related problems before pregnancy recognition,* using the same measures described for BI and BA.

Follow-Up Assessment

For the BI and BA groups the follow-up included *Quantity and Frequency of alcohol consumption, Frequency of binge drinking, and Alcohol-related problems during the past 3 months* using the same measures described for the baseline assessment.

Late pregnancy evaluation

There was no follow-up assessment for the SC group. Instead, participants received a late pregnancy evaluation about *Quantity and Frequency of alcohol consumption, Binge drinking frequency, and Alcohol-related problems after pregnancy recognition* when they were more than 26 weeks of pregnancy, using the same measures described for the baseline assessment. As noted above, since the SC group was assessed when they were around 6-7 months

pregnant, their evaluation comprised the same pregnancy period as the follow-up assessment of the BI and BA groups. Also, SC participants represent alcohol consumption among women who received regular care at the health centers.

Interventions

Brief Interventions (BI): For those women who reported drinking after pregnancy recognition, the BI aim was to encourage abstinence, while for those who did not drink after pregnancy recognition but reported consumption in the previous 12 months, the BI aim was to maintain abstinence.

The BI was a brief motivational interview (Miller & Rollnick, 2012) with a duration of 15 minutes. The active ingredients of efficacy reported in Gaume et al. (2014) were included. We provided: feedback on screening results along with clear advice of abstinence, information on the consequences of prenatal alcohol exposure, a menu of strategies and options to achieve abstinence, and reasons for ceasing consumption. At the end of BI, self-efficacy was encouraged. Also, we gave our contact information (e-mail) in case they need more information or have questions.

Brief advice (BA): BA patients were given clear advice on alcohol abstinence which lasted about 5 minutes and given a brochure containing advice on abstinence and information about the consequences of prenatal alcohol exposure.

All BI and BA interviews were performed in the city health centers' in areas of the waiting room, which afforded sufficient privacy. Six professional psychologists, trained in recognizing alcohol consumption problems, providing a BI, and applying the study protocol, carried out the interviews. Training consisted of eight theoretical hours and one week of

practice where the psychologist provided the intervention accompanied by a supervisor (an investigator of the project).

Preliminary analyses

To determine if the randomization procedure had produced equivalent groups, we performed X^2 and Kruskal-Wallis tests on participants' characteristics. Table 1 summarizes the descriptive data by condition. The three groups only differed in the number of children; therefore it was included as a covariate in the models.

[Table 1 about here]

Data analysis

First, we performed descriptive analyses on the three groups for the outcome variables: quantity and frequency of alcohol consumption, frequency of binge drinking, and alcohol-related problems. To estimate the efficacy of BI, we used inferential statistics to compare 1) BI vs BA accounting for outcomes before and after pregnancy recognition and follow-up; 2) BI and BA vs SC for outcomes before pregnancy recognition and follow-up (for BI and BA) or late pregnancy evaluation (for SC). We used generalized estimating equations (GEE), examining the effect of BI and BA as well as change over time. An interaction term intervention*time was included, as well as the number of children, as a control. We did not perform these and subsequent analyses on alcohol-related problems, as no variability was found across groups at the follow-up (see Table 2). For quantity of alcohol consumption negative binomial Poisson regressions were performed, while for frequency of drinking and

frequency of binge drinking ordinal regressions were modeled. We used R 4.0.3 and SPSS version 15.

As this type of study generally involves changes that might not reach statistical significance but may be clinically significant, relative risk (RR), absolute risk reduction (ARR), and number needed to treat (NNT) were estimated between the BI and BA conditions. We computed the intervention as non-effective when women increased or maintained their scores on outcomes measures between the assessment after pregnancy recognition and the three-month follow-up assessment after BI or BA. In addition, since we used an intention-to-treat approach, those interventions that were performed but follow-up could not be achieved were also considered as non-effective. Because it is thought that un-reachable patients have worse outcomes, this method reduces biases in assessing the efficacy of the intervention, providing more conservative estimates while treating the participants according to the randomization (McCoy, 2017).

Objective newborn health indicators

Newborn health indicators (NHI) were obtained from the city's health system database containing information about all births between January and March 2017. They included birth weight in kilograms and gestational age at birth in weeks, outcomes that are affected by alcohol consumption during pregnancy (Patra et al., 2011). We were able to identify 30% of those women in the BI and BA groups by their ID.

From the same database we also obtained the NHI from newborns whose mothers did not participate in any of the previous groups (BI, BA or SC, see Figure 1). The newborn non-screened control (NSC) group participants (n=150) were randomly selected from the data base among those women who had given birth during March 2017 (n = 462). This date was chosen to ensure every woman from the BI, BA and SC groups had already delivered, and therefore

the data used for NSC group were from women who received no intervention other than the regular health care.

Data analysis

Newborns health indicators among BI, BA, and NSC groups were described and compared against each group using the Wilcoxon rank test and Cliff's delta as a measure of effect size. For analyses, the R Project for Statistical Computing was used in version 4.0.3.

Results

Self-report of alcohol consumption and related problems

The descriptive statistics of outcome variables (quantity and frequency of alcohol consumption, frequency of binge drinking, and alcohol-related problems) are presented in Table 2. The proportion of women who stopped drinking was increasingly higher in each period (BPR, APR and follow-up). Almost none of the pregnant women binged during pregnancy, and none presented alcohol-related problems. The quantity of alcohol consumption decreased by more than two standard units after pregnancy recognition for the BI and BA conditions and more than one standard unit for the SC condition. The greatest reduction in alcohol-related problems was in the BI group.

[Table 2 about here]

The GEE models are presented in Table 3. When comparing BI and BA conditions, the only significant predictor was time for almost all the outcomes. That is, regardless of the condition, there was a reduction of quantity and frequency of alcohol consumption and frequency of binge drinking due to the passage of time during pregnancy. The number of children also predicted a reduction in frequency of binge drinking during pregnancy. In contrast,

when comparing BI and BA conditions to SC, almost all the alcohol consumption outcomes were predicted by condition, time, interaction intervention*time, and the number of children. This indicates that women who received either BI or BA had greater decreases in quantity and frequency of alcohol consumption, as well as in frequency of binge drinking at the follow-up assessment. The only non-significant interaction was between time*BI intervention.

[Table 3 about here]

The Relative risk (RR), absolute risk reduction (ARR), and number needed to treat (NNT) results are presented in Table 4. The results of RR show no differences between BI and BA. However, the ARR indicated a small but favorable effect of BI against BA, especially for quantity and frequency outcomes. That is, pregnant women who received BI had a 4% reduction in the likelihood of increasing the quantity of drinks consumed per occasion and a 5% reduction in the likelihood of increasing the frequency of consumption, compared with the BA group. Also, according to NNT analysis, to benefit one pregnant woman it is necessary to treat 22 to reduce the quantity of consumption and 20 to reduce the frequency of consumption with BI instead of BA. For binge drinking and alcohol-related problems, NNT was more than 50 (Table 4).

[Table 4 about here]

Objective newborn health indicators

According to descriptive analyses (not shown in tables), the average birth weight by group was *M*=3349.81 (*DS*=542.428) for BI, *M*=3387.29 (*SD*=551.410) for BA, and *M*=3181.25 (*SD*=592.652) for non-screened controls (NSC). Moreover, the average gestational age by group was *M*=38.86 (*SD*=1.43) for BI, *M*=38 (*SD*=1.24) for BA, and *M*=37.85 (*SD*=3.59) for NSC. Statistically significant differences in birth weight and

gestational age at birth were found between the BI and NSC groups and between the BA and NSC groups (see Table 5). No statistically significant differences in birth weight and gestational age at birth were found between newborns of women in the BI group compared to those in the BA group.

[Table 5 about here]

Discussion

Our study aimed to determine BI efficacy in promoting alcohol abstinence during pregnancy or maintaining it among those who did not consume alcohol after the pregnancy among Argentinean women. We evaluated self-reported alcohol consumption (quantity and frequency of alcohol consumption and frequency of binge drinking) and alcohol-related problems three months following the intervention. We also evaluated the objective outcomes of newborn health indicators (weight and gestational age at birth).

The results indicate that women in the BI and BA groups reduced alcohol consumption outcomes three months later compared with those in the SC group. Such decrease agrees with that found in similar studies conducted in high-income countries (Chang et al., 2005; Handmaker et al., 1999; Marais et al., 2011; O'Connor & Whaley, 2007; Sheehan et al., 2014), and in a single study examining BI in Latin American pregnant women (Aliane, 2013).

On the one hand, this finding shows that receiving either a BI or BA is more beneficial than receiving the regular care provided by the prenatal health care centers. On the other hand, it is interesting to note that women who were in BI and BA group were enrolled in the study when they were about 3-4 months of pregnancy and women in SC group when they were

about 5-6 months of pregnancy. Therefore, results suggest that it is better to receive screening and advice about alcohol earlier in pregnancy than at a later stage.

According to GEE analysis, there were no statistical differences between BI and BA. However, the clinical significance analysis shows a favorable risk reduction of quantity and frequency of consumption among BI participants. Additionally, the number of women necessary to treat to have a beneficial outcome is low. However, the effect demonstrated in favor of BI compared to BA is small.

The lack of differences between BI and BA could be explained by two factors. First, there is evidence in the alcohol field that shows assessment reactivity, which results in a reduction of harmful alcohol outcomes when participants are asked about their alcohol habits (Meier et al., 2017). Previous studies among pregnant women have demonstrated reductions in alcohol consumption among both BI and control groups (de Paula Gebara et al., 2013; Nilsen, 2009). Also, screening measures such as the AUDIT have been considered to act as an intervention itself (Nilsen et al., 2008). Secondly, in our study participants who were in the BA condition received a clear abstinence message in the form of a brochure personally handed out, in a context where such information is not easily available to them. Previous studies have shown that in Argentina only 10% of women in prenatal care received clear advice on alcohol abstinence (López, 2013). It is possible that in our context, pregnant women drink alcohol due to a lack of information about the risks involved. That is why for most women screening and a clear abstinence message could be enough to motivate behavioral change and discourage consumption. However, futures studies should investigate which pregnant women can benefit from BA and under which circumstances it might be necessary to perform a BI.

The second part of our study included an objective outcome measure, stressed by experts as a necessity in resolving the conflicting evidence from many BI studies (Glass et al.,

2017). We have thus assessed newborns' health indicators from mothers in BI and BA conditions, alongside those mothers who did not receive screening or any intervention (NSC). Birth weight and gestational age were significantly higher among those newborns whose mothers received either the BI or BA compared to the NSC. Although there are only a few studies in pregnant women that used objective outcome measures together with self-reported consumption, their results are similar to ours. Babies whose mothers received an intervention similar to BI have better birth weight (Armstrong et al., 2009; O'Connor & Whaley, 2007; Tzilos et al., 2011) and gestational age (Armstrong et al., 2009) than babies from screening only groups.

Our results must be considered in light of some limitations. First, only 56% of the participants could be reached for follow-up in the first part of our study, a higher rate than most studies (Joseph & Basu, 2017). Retention is a recognized problem of RCTs and strategies regarding this have been studied (Gillies et al., 2021). Our study did not include an economic compensation for participation, which may increase retention. Also, follow-up contacts were made only by phone. Participants may not have answered since they not recognized the phone number, thus including online forms sent by e-mail or text messaging could improve follow-up rates. Second, due to ethical reasons, it was not possible to randomly assign the four conditions which we include here (BI, BA, SC, and NSC), and which might have introduced a seasonal bias. However, if results were thus affected, it was probably in the direction of underestimating the interventions' effect, since participants in the screening only control group were evaluated during the winter months while those in BA and BI groups were assessed during spring, when consumption may increase due to seasonal factors. Third, we delivered BI or BA among women up to 26 weeks pregnant. This may be different from most studies among high-income countries which usually use a shorter range of gestation. We

considered this necessary because in Argentina most women acknowledge their pregnancy late.

Regarding measurements, we considered alcohol consumption before and after pregnancy recognition, instead of pregnancy conception. Although pregnancy recognition could vary among women, data about pregnancy conception was not available. Moreover, we evaluated as efficacy whether women who did not consume alcohol after recognizing the pregnancy maintained their abstinence. It is necessary to take this into account because it is possible that some of these women would had maintained abstinence without any intervention. Also, possible recall bias might have occurred, as there was a longer time lapse in assessment for SC participants compared to those in the BI and BA groups. Furthermore, results about newborns health indicators should be interpreted with care considering that these data were only obtained on 30% of newborns delivered by women in the BI and BA groups. Although some biases may be introduced from low follow-up rates and resulting sample sizes, the use of an objective outcome is still a novelty and other similar studies should be done to confirm the effects of BI and BA on newborn health indicators.

Finally, although our sample was representative of all women receiving antenatal care in the public health system in an Argentinean city, results should not be extended to other populations without further considerations. Future studies should assess efficacy of BI among pregnant women in private care, where a higher educational level and perhaps more information about the risk of prenatal alcohol exposure may produce different findings.

Despite limitations our results point to the efficacy of screening and delivering either BA with a clear abstinence message or a BI among pregnant Argentinean women. Importantly, while many studies have evaluated the efficacy of BI early in pregnancy, findings from this study suggest that BI may be effective as late as the third trimester of pregnancy, during which time the fetus is gaining weight.

Considering the results of this study, implementation of BI or BA in routine antenatal care is an opportunity that is missed. For example, many women detected with possible AUD by prenatal alcohol screening may not otherwise be detected by the health care system. BI has the advantage of identifying and addressing risky consumption in a circumscribed amount of time, and its characteristics encompass a referral to treatment, reducing stigmatization. Despite the advantages of BI, BA is an even shorter tool than BI and also demonstrated effectiveness. Lack of time and resources in prenatal care should not be considered a barrier to implementing an intervention. Also, it is necessary to develop guidelines for addressing alcohol consumption during pregnancy, providing the requisite support for physicians and other health care professionals in conducting brief interventions in prenatal settings.

Our results contribute to leveling the evidence disparity between the northern and southern hemisphere and suggest that providing BA or BI could lead to healthier babies. Since epigenetic studies have shown that negative consequences of alcohol exposure during pregnancy could be transmitted through three generations (Mead & Sarkar, 2014), these kind of interventions would have positive effects not only for the pregnant woman and her newborn but also for future generations.

The authors report no conflict of interest

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Table 1

Baseline sociodemographic characteristics of pregnant women by condition, N=640

	Brief intervention N=252	Brief advice N=234	Screening control group N=154	X^2	*p*
Marital status %				9.73	.285
Married/Civil union	77.4	81.2	80.5		
Separated/Divorced	1.6	1.7	3.2		
Single	21	17.1	16.2		
Educational Level %				13.21	.510
Primary	19.1	17.6	15.7		
High School	70.2	69.7	67.3		
High Education	10.8	12.8	17		
Occupation %				22.1	.077
Employed	10.7	11.7	8.2		
Underemployed	10.7	19.1	10.9		
Unemployed	26.3	18.2	23.8		
Housekeeper	40.7	41.3	46.9		
Student	9.9	9.1	9.5		
Other	1.6	0.4	0.7		
Age M (SD)	24.25(6.03)	24.84(6.21)	25.12(6.13)	2.68	.262
Gestational week M (SD)[a]	15.51(6.66)	15.21(6.20)	30.55(2.8)	.315	.575
Number of children M (SD)	.96(1.27)	1.11(1.85)	1.22(1.31)	6.53	.038
Socioeconomic Status M (SD)[b]	17(2.54)	17.26(2.15)	17.32(2.36)	2.01	.366

Note: a Comparison between Brief intervention and Brief advice

[b] According to the GRAFFAR scale (Castellano & Mendez, 1994).

Table 2.

Descriptive information on alcohol consumption outcomes by group, pregnant women, Argentina

Variables	Brief intervention			Brief advice			Screening control group	
	BPR	APR	Follow-Up	BPR	APR	Follow-Up	BPR	Late pregnancy evaluation
Quantity M(DS)	2.69(3.03)	.27(.58)	.13(.64)	2.82(2.74)	.28(.6)	.15(.42)	2.16(1.42)	.44(.7)
Frequency %								
Never	--	79	92	--	79	88	--	67
Once a month	51	17	6	49	18	9	56	29
2-4 times a month	43	4	2	45	3	3	40	4
2-3 times a week	2	--	--	1	--	--	3	--
4 or more times a week	4	--	--	5	--	--	1	--
Binge drinking %								
Never	62	100	99	53	100	100	66	99
Less than once a month	21	--	1	23	--	--	20	1
Monthly	10	--	1	13	--	--	9	--
Weekly	6	--	--	9	--	--	5	--
Daily	1	--	--	2	--	--	--	--
Alcohol-related problems M(DS)	1.04(2.77)	.11(.73)	0(0)	.88(2.29)	.03(.39)	0(0)	.44(1.62)	0(0)

Note: BPR= Before pregnancy recognition, APR= After pregnancy recognition.

Table 3

GEE models for alcohol consumption outcomes, pregnant women, Argentina

Predictors	Quantity			Frequency			Binge drinking		
	Wald X^2	B(SE)	CI 95%	Wald X^2	B(SE)	CI 95%	Wald X^2	B(SE)	CI 95%
Model 1. BI vs BA									
Intervention (ref: BA)	.455	.17(.26)	-.33 to.67	.003	.02(.28)	-.53 to.56	2.07	-.92(64)	-.2.18 to.33
Time	157.5**	-1.65(.13)	-1.91to -1.39	124.37**	-1.67(.15)	-1.38 to -1.96	49.54**	-3.36(.48)	-4.29 to -2.42
Intervention*Time	.60	-.16(.20)	-.55 to .24	.001	.01(.19)	-.36 to .37	.71	-.5(.59)	-.66 to 1.65
Number of children	.219	-.02(.04)	-.09 to .05	.841	.04(.04)	-.04 to .12	9.14**	-.25(.08)	-.41 to -.09
Model 2. BI, BA vs SC									
Intervention BI (ref: SC)	63.37**	1.93(.24)	1.45 to 2.4	101.07**	3.93(.39)	3.16 to 4.7	15.6**	1.85(.47)	.93 to 2.77
Intervention BA (ref: SC)	86.25**	1.76(.19)	1.39 to 2.13	121.21**	1.76(.19)	3.09 to 4.43	20.74**	2.76(.61)	1.57 to 3.95
Time	79.68**	-.66(.07)	-.81 to -.52	110.47**	-.87(.08)	-1.03 to -.71	37.7**	-1.30(.21)	-1.72 to -.89
Intervention BI*Time	16.56**	-.88(.21)	-1.31 to -.46	35.19**	-1.57(.26)	-1.31 to -.46	2.41	-.65(.42)	-1.47 to .17
Intervention BA*Time	22.29**	-.72(.15)	-1.01 to -.42	39.83**	-1.3(.21)	-1.01 to -.42	3.91*	-1.12(.57)	-2.24 to -.01
Number of children	4.49*	-.07(.03)	-.14 to -.01	6.97**	-.15(.06)	-.26 to -.04	12.14**	-.26(.07)	-.40 to -.11

Note: BI= Brief intervention, BA= Brief advice, SC=Screening control group, CI= Confidence interval.
** $p<.01$
* $p<.05$

Table 4.

Clinical significance analyses for alcohol-related outcomes among pregnant women receiving BI vs BA, Argentina (N=640)

	Quantity	Frequency	Binge drinking	Alcohol-related problems
RR (CI 95%)	0 .91 (0 .76 to 1 .09)	0 .9 (0 .75 to 1 .08)	0 .98 (0 .81-1 .19)	0 .96 (0 .79-1 .17)
ARR (CI 95%)	4 .65% (-3 .98% to 13 .37%)	5 .09% (-3.53% to 13 .82%)	0 .97% (-7.68% a 9 .63%)	1 .74% (-6.9% a 10 .4%)
NNT (CI 95%)	22 (7 to -25)	20 (7 to -28)	103 (10 to -13)	58 (10 to -14)

Note. CI= confidence interval, BI= Brief intervention, BA= Brief advice.

Table 5.
Comparison of newborns' health indicators whose mothers received BI, BA or NSC, Argentina (n=295)

Groups	Variables	W	Cliff's delta
BI vs BA			
	Weight at birth	2606	--
	Gestational age at birth	2510	--
BI vs NSC			
	Weight at birth	6917*	.20
	Gestational age at birth	7160**	.24
BA vs NSC			
	Weight at birth	6072*	.19
	Gestational age at birth	6488.5**	.27

Note. BI = brief intervention; BA= brief advice; NSC= non screening control; *$p < .05$ *$p < .01$ **

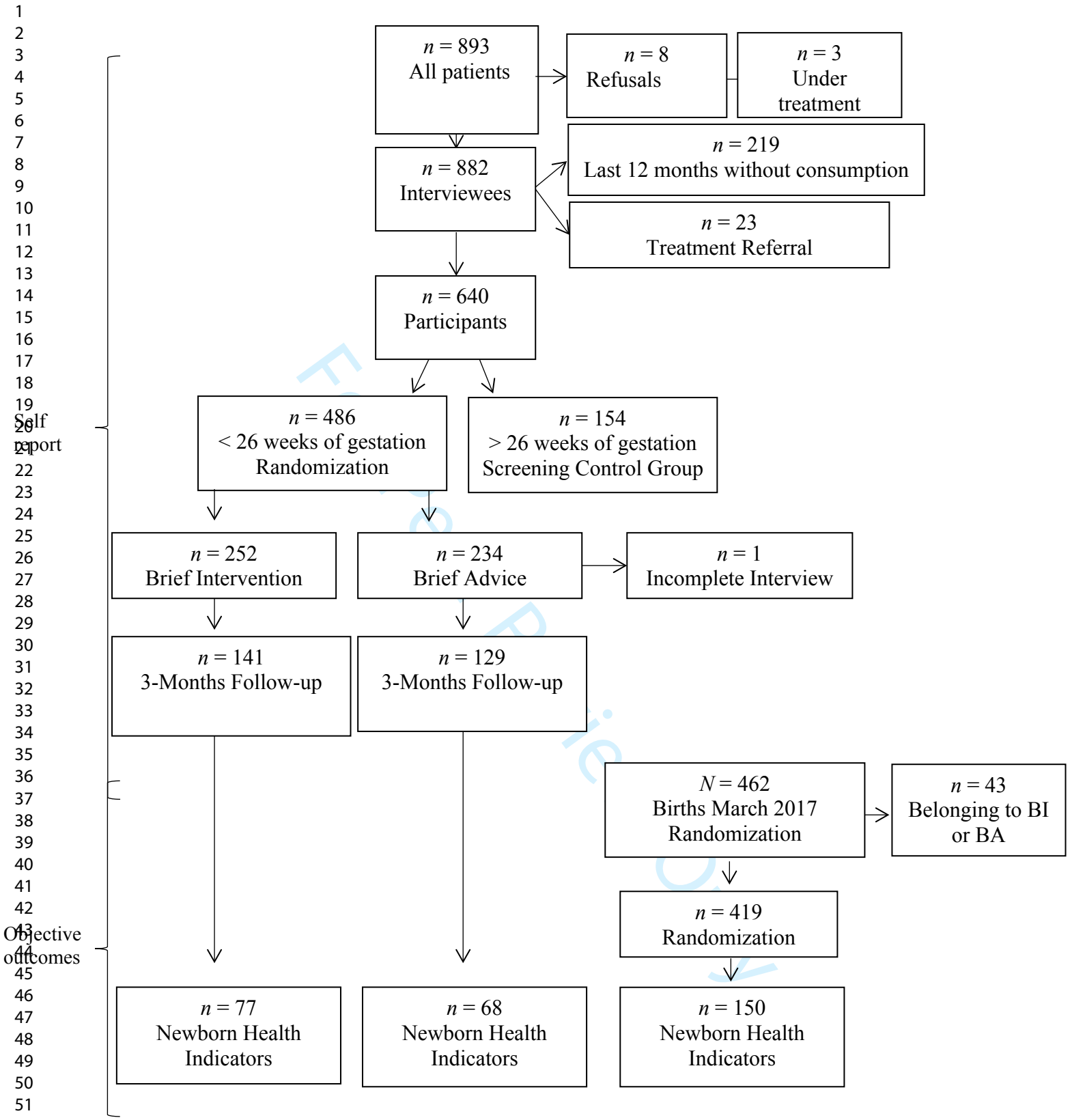

Figure 1. Participants flow chart