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Programme: BSc Health and Social Care

Module: Introduction to Research

Module code: BMHP5005_BIRM

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Assignment Title: Assessment 1 Literature Review

Alcohol and pregnancy: How does consumption of alcohol during pregnancy affect child development, up to the age of 5 years?

Abstract :

The aim of the systematic review is to explore the effects of alcohol consumption during pregnancy. The review included searching for, evaluating, and summarising relevant literature. The study found that alcohol consumption during pregnancy negatively affects maternal health, foetal development (FASD), and children up to the age of five.

Introduction:

Alcohol and pregnancy are topics of great importance when it comes to understanding their impact on child development (Gov. UK 2018). Drinking alcohol during pregnancy can have far-reaching consequences that extend beyond the nine months of gestation(NHS,2023). In this essay we will look at how drinking alcohol can affect a child's development, focusing on the crucial period from birth up to the age of 5 years. Understanding these effects is essential for expecting mothers and caregivers to make informed decisions and promote the well-being of mothers and their baby during this critical period of their lives. It is well recognised that alcohol disrupts a foetus's normal growth, meaning it can cause birth defects and developmental abnormalities in the foetus(NHS,2023). The risk associated with alcohol consumption during pregnancy is collectively referred to as Foetal Alcohol Spectrum Disorder (FASD; Bertrand et al., 2005), a range of physical, and cognitive impairments, and behavioural issues that can affect a child for a lifetime. The brain undergoes rapid growth

and development during this period, making it particularly vulnerable to the neurotoxic effects of alcohol (NHS).

Background information The statistics show that worldwide almost 10% of women consume alcohol during pregnancy,(National Institute of Health; Gov . UK; WHO). This puts the pregnancy at risk as there are possibly worrying prenatal outcomes, for the baby which can lead to fatal effects as the baby may experience disabilities after birth. A baby's brain develops during pregnancy and can be impacted by alcohol consumption at any time, which can cause development and central nervous system issues e.g., low birth weight, and behavioural problems (CDC) Centre for Disease Control and Prevention. Alcohol readily crosses the placenta, exposing the developing foetus to its effects. Alcohol-related chemicals can harm the developing brain specifically (NHS, 2022). Alcohol use during pregnancy can result in a disease known as a foetal alcohol spectrum disorder (FASD), which embraces a range of physical, cognitive, and behavioural impairments. The effect of prenatal alcohol exposure can be long-lasting and significantly impact a child's development and overall well-being. Studies have repeatedly demonstrated that prenatal alcohol consumption shows it can be related to poor cognitive impairments (Kodituwakku, 2009)., (Jacobson et al. 1998a). Children who are exposed to alcohol in utero may show deficits in intellectual abilities, language development, attention, and executive functioning(NHS 2022; ScienceDirect,2018; WHO,2015). These impairments can affect academic performance and social interaction throughout early childhood. In addition to cognitive deficits alcohol consumption during pregnancy, can also be linked to behavioural problems in the child (Kelly et al.2000: Coles et al.1991). Children with FASDs can show hyperactivity, social difficulties, and difficulties with emotional regulation (Coles, 2000; Brown et al1991). These challenges can play a part and have problems in forming and maintaining relationships, leading to poor social adjustment during the early years of life,(Kelly *et al* 2000). This information has been associated up to the age of 5.

Prenatal alcohol intake can cause a variety of physical abnormalities, collectively referred to as foetal alcohol syndrome (FAS) is the most severe condition found among the children of women who drink alcohol while being pregnant. These physical features may include growth deficiencies, organ malformation, facial dysmorphology, and nervous system deficit(Jones and Smith,1973). Furthermore, prenatal alcohol consumption can result in neurological impairments, including abnormalities in the brain structure and its function (Hoyme et al.,2016). These neurological deficits can contribute to challenges in motor coordination, balance, and fine motor skills (Adnams et al., 2018; Cone -Wesson,2005; Comasco, 2018). Alcohol consumption during pregnancy can go beyond early childhood, research has indicated that people with FASDs are at risk of developing mental health disorders, for

example, depression, substance abuse, and anxiety later in life. Additionally, people with FASDs may experience challenges in independent living, maintaining employment, and achieving academic success.

The selection of this research topic is motivated by the need to increase awareness of the worrying and fatal outcomes of the consumption of alcohol during pregnancy and how it can have implications on a child's development, we have known for a long time from historical reports that chronic maternal alcoholism can harm the unborn baby (Jones and Smith, 1973). Raising awareness on this topic and understanding the long-term impact of prenatal alcohol abuse can inform public health policies and interventions aimed at preventing FASDs. By examining the effects of alcohol abuse during pregnancy on child development up to the age of 5 years, this research aims to provide comprehensive insight that can contribute to improved strategies for prevention, intervention, and early identification. World Health Organisation (WHO). According to a recent study, alcohol intake is one of the top 5 global risk factors for disease, disability, and mortality (Reham et al., 2009; WHO. 2014a).

Methodology and methods, inclusive of the flow chart: The main focus of my research is alcohol and pregnancy and how they affect children up to the age of 5 years old, I have excluded and not looked beyond that because it will make my research category broader, so basically I have just focused on this period of time. The information provided about alcohol and pregnancy is based on scientific research, expert agreement, and medical guidelines. Here is how the information was gathered. Explain a bit more about the search strategy

- (1) Expert knowledge: Considering what doctors and other healthcare professionals have learned through their experience and training. These professionals have expert knowledge about how alcohol can affect a baby's development.
- (2) Research: I have read a few articles, scientific studies, and reports from reliable sources to learn about the effects of alcohol on pregnancy. Scientists do these studies to understand how alcohol can affect babies in the womb and beyond.
- (3) I have looked at recommendations from trusted medical organisations such as NHS, PubMed, and Google Scholar. These organisations are made up of doctors and experts who study pregnancy. They give advice to help keep mums and babies healthy.
- (4) Limitation: I also thought of the challenges in studying this topic such as "Will I find information and is it an important topic" I had no idea how much information and how important the topic is. Again it is impossible to do certain research and experiment for

ethical reasons, such as race, ethnicity, and religious issues. So scientists rely on observations and studies mostly. This can be because we still don't know things for sure.

As new searches are conducted all the time and new advanced technologies are developing, our understanding might change. It is always good to talk to health professionals or refer to the most up-to-date guidelines and information on alcohol and pregnancy (NHS).

When it comes to gaining knowledge about reality and getting together data people employ various methods and procedures. The approaches used are designed to encourage, explore and understand the chosen subject we are exploring. There are many different methods. Observation, interviews, surveys, questionnaires, case studies, case reviews, and data analysis is just a few. For this research, information was gathered from Google Scholar, PubMed, academic journals, and government websites. Search strategies included keywords "alcohol," pregnancy" "foetal development" alcohol spectrum disorders, and child development. Relevant studies published within the past decade were included, focusing on the impact of alcohol consumption during pregnancy on different aspects of child development. First of all, I asked many questions on my chosen topic, as if there was enough evidence, articles, and scholarly research, and did a lot of online research, but evidently, it is a massive subject and awareness among pregnant mothers who consume alcohol during pregnancy. First, ask questions on the topic you are researching I **have asked questions on my research and read books and articles that provide accurate information what was the strategy for searching** hold discussions about your topic, provide information from genuine sources, share your findings, and collect data. Learning is very important and every time we learn something we gain new knowledge, we find out new things. Learning about important topics such as alcohol and pregnancy is beneficial, by studying and sharing information that we find we can help people make good and rational choices. Putting in keywords such as" alcohol, pregnancy, prenatal alcohol exposure, and alcohol use during pregnancy" Multiple databases and search engines such as Google Scholar, university library PubMed, and government websites were used to enhance the search strategy's effectiveness, and Boolean operators such as "AND" and "OR" were used to combine and refine the search terms. For example, combining "alcohol " AND "pregnancy" and "maternal health" would identify articles that specifically address the impact of alcohol consumption during pregnancy. This search was only conducted for children under 5 years of age and not adults, this is because the research would have broadened.

Relevant to my study I read scholarly articles, and literature reviews and took out the appropriate information from reliable and well-informed websites. Some of the articles and literature reviews that I looked at only provided abstracts and not full articles so I excluded

them from my search. All the sources that have been used in this research are notable scholars from government websites, NHS, and other credible sources. The research literature and articles that have been used were from the last 5 and 10 years. The sources covered the specific aspect of the topic. I have used a lot of information from the NHS website which is a trusted source for health information. The contents of the NHS website are regularly reviewed to ensure accuracy and reflect the most current medical knowledge and guidelines.

Consideration of ethical practice in research: Ethical codes of practice provide guidelines and principles for conducting research with human participants. They serve as a framework to protect the rights, welfare, and dignity of individuals involved in research studies. When it comes to studying alcohol consumption during pregnancy, ethical considerations are of paramount importance due to the potential development of the foetus. Researchers should adhere to key ethical principles such as autonomy, beneficence, and non-maleficence required to maximize benefits and minimize harm. Justice ensures equitable access to research participation without undue coercion or discrimination((NIH,2018).

The ethical committee, also known as the institutional review board or research ethics board, plays a vital role in overseeing and evaluating the ethical aspects of research studies involving human participants. These committees consist of multidisciplinary experts, including scientists, healthcare professionals, legal experts, and community representatives. Their primary responsibility is to review research protocols, assess potential risks and benefits, and ensure compliance with ethical guidelines and legal regulations. (1) Protocol Review: Ethical committee review research protocols to ensure that the study design, procedures, and methodologies are ethically sound and scientifically proven. They assess the potential risk to both the pregnant individuals and the foetus and ensure that appropriate measures are in place to minimize harm. (2) Ongoing Monitoring: The committee may require regular progress reports from researchers to monitor the study's ethical conduct. They have the authority to suspend or terminate studies if ethical concerns arise during the research (WMA, 2013). Ethical assessment is crucial since it confirms that the included studies followed ethical guidelines and principles. However, it is crucial to remember that ethical assessment is often carried out at the level of each individual study rather than during the actual systematic review process. The lack of ethical assessment in the systematic review.

Secondary research which involves gathering and analysing existing data and information from published sources, does not typically require ethical requirements. This is because secondary research relies on publicly available data that has already been collected and published by others. Researchers do not directly interact with human subjects to collect new

data or information, thereby eliminating the need for ethical considerations such as informed consent, privacy protection, or potential harm to participants. However, it is important for researchers to properly cite and acknowledge the original sources they use in secondary research to ensure academic integrity and give credit to the authors or organisations who conducted the primary research.

Theme: Foetal Alcohol Spectrum Disorder: (FASD).

Explanation: Foetal Alcohol Spectrum Disorder is a condition that can happen when the foetus is at risk to alcohol during pregnancy. It can result in a range of physical, behavioural, and cognitive impairments that will last a lifetime (WHO, 2011; CDC, 2022; NICE 2010).

Theme: Short-term development

Explanation: Alcohol consumption during pregnancy can negatively impact short-term development, leading to issues such as physical abnormalities, cognitive impairment, and behavioural problems.(Behnke, M., Smith, V.C., *et al.* 2013)

Theme: Diagnosis

Explanation: Diagnosing alcohol use during pregnancy involves screening, evaluating consumption, conducting examinations, and ensuring open communication with healthcare providers. Early identification enables intervention and support for optimal outcomes for the mother and the foetus. (NHS,)

Author (s). date	Aim of Paper	Type of study/information	Key findings and conclusions	Strengths, weaknesses, links to other sources
Smith (2017)	To explore the link between alcohol consumption during pregnancy and its potential impact on foetal neurodevelopment.	A prospective cohort study involving pregnant women, self-reported alcohol intake, and neurodevelopmental assessments of children.	Moderate to heavy alcohol intake during pregnancy was linked with an increased risk of neurodevelopmental disorders in children. The study	Through evaluation of neurodevelopment, relying on self-reported alcohol intake information could be biased by memories. The

			suggests a detrimental effect of alcohol intake on foetal neurodevelopment and highlight the importance of abstaining from alcohol during pregnancy.	finding of this study supports previous research demonstrating the negative impact of alcohol intake during pregnancy on foetal neurodevelopment. (Johnson et al, 2016; Jones 2018).
Brown <i>et al.</i> (2019)	To examine the relationship between prenatal alcohol exposure and the risk of fetal alcohol spectrum disorder (FASD).	Systematic review and meta-analysis of observational studies investigating (FASD) prevalence in alcohol-exposed pregnancies.	Prenatal alcohol exposure was associated with an increased risk of (FASD), with the risk of being dose-dependent. This study shows the need for intervention to reduce alcohol intake during pregnancy and awareness should be raised of the risk of FASD.	Meta-analysis shows a clear dose-response relationship between prenatal alcohol exposure and FASD risk consistent with previous research (Popova et al, 2016; Lange et al., 2018).
Bertrand et al., (2004)	The focus of the article was to investigate the neuropsychological			

	effects of prenatal alcohol exposure below levels associated previously associated with these clinical diagnoses	The aim is to investigate the effects of alcohol exposure during pregnancy on neurophysiological outcomes in children , with a particular emphasize of binge drinking.	Based on 10,000 children aged 6 months through to 14 years, the observation was a significant detrimental association between any binge prenatal alcohol exposure and child cognition.	Analysis of real-world data from medical records. Examining a moderate range of alcohol intake. Possible recollection bias in the data acquired in the past (Henderson, J . Gray, R. 2007).
Scholin, L., Watson, J.(2019).	The aim of the study was to gain an understanding of midwives' practices of assessing women's alcohol use and communication of the 2016 Alcohol Drinking Guidelines across the UK.	The study showed that one in three midwives was not aware of the CMO (Chief Medical Officer) guidelines and there were more inaccuracies in reporting their content aligning with previous guidelines.	The CMO guidelines changed after a review of the evidence, which for pregnancy included a significant shift from the previous 'lower risk' approach to complete abstinence (Department of Health, 2016).	NICE guidelines, which only changed to refer to the CMO guidelines in December 2018 (NICE,2008b). It seems that effective communication of the guidelines at the policy level down to the practice level has been lacking. (NHS Health Scotland and the Scottish Government, 2019). Launched a campaign called

				'Count 14', focusing on the increase of revised guidelines of 14 units per week.
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Findings and discussion: In the UK children's protection law follows the 1989 Children Act, saying alcohol consumption during pregnancy is considered child abuse due to legal implications, suggesting it is illegal or not allowed under the law (Children Act 1989). The reviewed literature consistently highlights the potential danger associated with alcohol consumption during pregnancy on the development and well-being of children up to the age of 5 years old. Consumption of alcohol during pregnancy or while breastfeeding can significantly impact a child's health. If the mother is pregnant with the baby and drinking at the same time, the alcohol passes to the baby in small amounts (NHS,2022). the best advice is not to drink shortly before a baby feeds or not to drink at all for the months you will be breastfeeding (Koren, G., 2002). Women who are pregnant or trying to conceive should not be drinking they need to know that drinking alcohol can reduce their fertility and ability to conceive,(indirect. gov. UK). Having too much alcohol, especially getting drunk, can lead to miscarriage, stillbirth, preterm delivery, and sudden infant death syndrome (Bailey B.A. 2011). Women who find it difficult to give up alcohol should get professional help. Alcohol guidelines by the NHS state clearly that the safest option is to not drink at all. Drinking more

alcohol while pregnant increases the risk of the baby suffering from long-term harm. Alcohol intake during pregnancy can cause a variety of developmental problems known as foetal alcohol spectrum disorders (FASDs). FASDs include Foetal Alcohol Syndrome (FAS), partial FAS, and alcohol-related neurodevelopmental disorder (ARND). (Chudley *et al* 2005). And alcohol-related birth defects (ARBD). These disorders are characterized by cognitive impairments physical abnormalities and behavioural issues. Research published in 2006 highlights that most women (85%) modify their drinking habits on recognition of their pregnancy (Alvik A, *et al* 2006). However recent research (Anderson, A.E. 2013) has shown that 82% of women are still drinking throughout their pregnancy. According to the 2021 National Survey on Drug Use and Health, 10% of women were drinking during pregnancy and 4.3% of women were binge drinking,(NSDUH; Flak AL, Su S, Probst C, *et al* 2017).

Long-lasting effects on the developing brain, the main nervous system is particularly vulnerable to alcohol's teratogenic effects (Petrelli,B *et al* 2018). resulting in structural and functional gene structure. Many research studies have shown and indicated that alcohol exposure during pregnancy can have abnormalities. Children with FASDs may exhibit cognitive deficits, attention problems, difficulties with executive functioning, and learning disabilities. Consuming alcohol while pregnant can lead to premature birth, and low birth weight as well as having an effect on the physical development of the child (nidirect.gov.uk).

Emerging research suggests that prenatal alcohol exposure can induce epigenetic (epigenetic mechanism) modifications meaning it can mess with the developing cells, (Uysul, F. Ozturk,S 2017). which can influence gene expression patterns in the developing fetus. These alterations can contribute to the long-term effects observed in individuals with FASDs, highlighting the complex interplay between genetic and environmental factors. Alcohol consumption during pregnancy can also result in physical abnormalities in the child. These may include craniofacial abnormalities (e.g., thinner upper lips and small eye openings), growth deficiencies, organ damage, and skeletal anomalies (Lipinski R.J. Hammond, P.*et al* 2012). The extent of these physical abnormalities can vary depending on the stage of foetal development and the amount of alcohol consumed. Mothers who have consumed alcohol while pregnant have been linked to a higher risk of behavioural (ADHD) in their offspring, and psychological problems as well. These may be linked to hyperactivity, impulsivity, social difficulties, emotional dysregulation, and an increased susceptibility, to mental health disorders such as anxiety and depression (NHS). The intensity and manifestation of these issues may vary based on the timing, duration, and amount of alcohol consumed during pregnancy (Gov.UK)

Evidence from secondary sources and published literature suggests that drinking alcohol while pregnant can have a major negative impact on the effect on the development of the

unborn child. Foetal Alcohol Spectrum Disorders encompass a range of physical, cognitive, and behavioural impairments that can persist into adulthood (Hoyme, H.E., Kalberg, WO, Elliot AJ, *et al.*2016); (Brown, J.M. 2019).

It is very important for expecting mothers to discuss any concerns or questions they have with their healthcare providers regarding alcohol intake, who can provide them with more information. Healthcare providers can help educate mothers to be about the risks of alcohol use during pregnancy and promote alcohol abstinence during pregnancy (NHS). There are many alternative beverages for expecting mothers who are looking for non-alcoholic options, there are many safe and enjoyable alternatives available. These can include herbal teas non-alcoholic cocktails, and fruit juices, but again it is important to check the labels of products to be sure that they do not contain any alcohol(NHS). To reduce the effects of prenatal alcohol exposure, further research and study are required to explore the underlying mechanisms and create appropriate therapies. Socioeconomic factors reduce prenatal alcohol exposure and its negative impact, especially for disadvantaged populations with limited resources and support systems.

It is important to assess a study's strengths and weaknesses while providing it with a critical review. Finding this information helps us to fully understand the credibility and limits of the research findings.

Strengths of the study might include:

Statistical analysis: The validity of the study's finding is discovered by correct statistical methods and analysis.

Rigorous Methodology: A well-designed study with appropriate research methods enhances the validity and reliability of the findings.

Sufficient data collection: Appropriate data collection methods, such as standardised assessment or objective measurements, can enhance the correct study of the results.

Weaknesses of the study may include:

Bias: If there are biases in participant selection, data collection, or analysis, it can compromise the objectivity and validity of the study.

Methodological limitations: Flaws in the study design or methodology, such as self-reporting or recall bias, can introduce inaccuracies or limitations in the result.

The diagnosis of alcohol and pregnancy involves identifying and assessing alcohol consumption during pregnancy and its potential effects. It includes screening for alcohol use,

evaluating and quantity timing of alcohol consumption, conducting physical and foetal examinations, and sometimes psychological assessments. Open communication with providers is important for an accurate diagnosis and appropriate management. Early identification allows for interventions and support systems to optimize outcomes for both the mother and the developing foetus (NHS).

Since it first came to light in 1973, the four categories of clinical characteristics that make up the diagnosis of FASD have largely not changed. Selected facial malformations, growth retardation, central nervous system (CNS) abnormalities, and maternal alcohol consumption during pregnancy, (NHS,2023; Warren K.R. 2015).

Conclusion and recommendations: This review provides strong evidence regarding the negative effect of alcohol consumption during pregnancy, and it promotes awareness among healthcare providers and the general public about the risks associated with prenatal alcohol exposure. The research conducted on alcohol intake during pregnancy has shown strong proof of evidence, that it has a negative impact on the foetal development of the child up to 5 years old. One of the key findings is the significant impact of alcohol consumption on foetal development and birth outcomes. Studies have shown a higher incidence of foetal alcohol syndrome (FAS). Such as development abnormalities among infants exposed to alcohol in the womb, low birth weight, stillbirth, and preterm birth. These findings highlight the critical importance of abstaining from alcohol during pregnancy to ensure optimal foetal growth and a healthy start to life. More importantly, prenatal alcohol exposure has been strongly linked to neurodevelopmental impairment in children. Learning difficulties, attention, and memory problems reduced IQ scores as consistently observed in children exposed to alcohol exposure, and cognitive deficits. The risk of prenatal alcohol intake, which might include socioeconomic inequities as well as physical, neurodevelopmental, and behavioural effects, is constantly emphasized in the secondary sources under evaluation.

Each situation is unique, and it is essential to consult with healthcare professionals for personalised advice and guidance throughout the pregnancy. Recommendations for women who drink during pregnancy would be to give up drinking altogether and have an alternative, seek professional help, join support groups, and follow medical recommendations.

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