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BIG DATA ANALYSIS: THE INFLUENCE OF SCIENCE AND MATHS EDUCATION ON PREGNANCY OUTCOMES: EXAMINING THE MEDIATING EFFECTS OF CUMULATIVE GPA, BIRTH CONTROL, AND BAD HABITS

TING TIN TIN[1], CHONG MIN KIT[2], SAM YEW THENG[3], NICHOLAS CHAN WEI JIE[4], SAN WAI CHUNG[5], TEOH CHONG KEAT[6], CHAW JUN KIT[7], LEE KUOK TIUNG[8]

[5] Faculty of Data Science and Information Technology, INTI International University, 71800 Nilai, Negeri Sembilan, Malaysia
[2-5] Faculty of Computing and Information Technology, Tunku Abdul Rahman University of Management and Technology, 53300 Kuala Lumpur, Malaysia
[6]DigiPen Institute of Technology Singapore
[7]Institute of Visual Informatics, Universiti Kebangsaan Malaysia, 43600 Bangi, Malaysia
[8]Faculty of Social Science and Humanities, 88400 Kota Kinabalu, Universiti Malaysia Sabah, Malaysia
[1]tintin.ting@newinti.edu.my, [2]chongmk-wp20@student.tarc.edu.my, [3]samyt-wp20@student.tarc.edu.my, [4]nicholascwj-wp20@student.tarc.edu.my, [5]sanwc-wp20@student.tarc.edu.my, [6]christopher.teoh@digipen.edu, [7]chawjk@ ukm.edu.my, [8]lee@ums.edu.my

ABSTRACT

The importance of successful pregnancy outcomes for the necessary fulfilment of different phases of life and ultimately improving families' happiness is often a challenge for the society. Despite many studies that examine the relationship between education level and socioeconomic status, there is a lack of measurement of this relationship in large datasets. This study analyses the relationship between educational attainment in science and maths and pregnancy outcomes, along with the mediating variables cumulative GPA, birth control, and bad habits. 9 variables and a sample size of 1,011 was used to identify how science and maths education influences pregnancy outcomes. A correlation test and mediation analysis were conducted to measure the significant relationship between the variables. This study is significant because it highlights the existence of a positive relationship between education level and the success of women's pregnancy outcomes. Our findings suggest that high levels of education are positively correlated with successful pregnancy outcomes, while possession of bad habits and poor birth control measures had a negative impact on pregnancy outcomes.

Keywords: *Pregnancy outcomes, Science education, Maths education, Cumulative GPA, Birth control, Bad Habits, Mediating effects.*

1.0 INTRODUCTION

Pregnancy outcomes continue to vary widely among women, and while several risk factors have been identified, emerging research suggests that a woman's science and maths education may also play a role. This study aims to explore the relationship between a woman's highest science/maths level taken in all years and pregnancy outcomes, while considering the potential mediating effects of cumulative science and maths GPA, birth control, and bad habits. The objective is to fill a significant research gap in the literature by exploring the impact of academic preparation on maternal and foetal health. The study also employ a conceptual framework in which the independent variable is the highest science level taken and the highest maths level taken in all years, the dependent variable is pregnancy outcome, and the three mediators are cumulative GPA across all years, birth control, and bad habits. The framework posits that a woman's science and maths education may impact her pregnancy outcomes, as these subjects are fundamental to understanding the physiological processes of pregnancy and foetal development. A quantitative research design is used along with large sample dataset from the National Longitudinal Study of Adolescent to Adult Health

(Add Health), 1994-2018 [Public Use] (ICPSR 21600). Statistical analyses will be used to test the relationship between independent and dependent variables, as well as the mediating effects of cumulative science and maths GPA, birth control, and bad habits. The findings of the study may provide valuable information on the possible impact of academic preparation on maternal and foetal health and inform future research and policy efforts to improve pregnancy outcomes. Ultimately, the study may contribute to the development of interventions aimed at improving science and maths education of women of reproductive age to promote better pregnancy outcomes.

1.1 Problem Statement

Despite significant advancements in maternal and foetal health care, pregnancy outcomes continue to vary widely between women. Some women experience complications such as preterm labour, gestational diabetes, preeclampsia, and low birth weight, while others have healthy pregnancies and deliveries. The causes of these variations are multifactorial and complex, and several risk factors have been identified, including maternal age, pre-existing medical conditions, lifestyle choices, and socioeconomic status [1, 24]. However, emerging research has suggested that a woman's academic background, especially her science and maths education, may also affect pregnancy outcomes [4].

Previous studies have indicated that maternal education and academic achievement are positively correlated with better pregnancy outcomes, such as higher birth weight and lower rates of preterm labour. Furthermore, research has suggested that maternal science and maths education may have a specific impact on pregnancy outcomes [2], as these subjects are fundamental to understanding the physiological processes of pregnancy and foetal development. Despite these findings, the relationship between a woman's science education, specifically the highest science level taken in all years, and pregnancy outcomes has not been thoroughly explored in the literature. Therefore, there is a significant research gap that needs to be addressed.

To address this research gap, this study aims to investigate the relationship between a woman's highest science level taken in all years and pregnancy outcomes, while considering the potential mediating effects of cumulative science and maths GPA. The findings of the study may provide valuable information on the possible impact of academic preparation on maternal and foetal health and inform future research and policy efforts to improve pregnancy outcomes.

2.0 LITERATURE REVIEW

The relationship between a woman's education level and pregnancy outcomes has been studied extensively. In their study on socioeconomic factors and adolescent pregnancy outcomes, lower levels of education were associated with a higher risk of neonatal and postnatal deaths [1]. The study discovered a positive association between maternal education and pregnancy outcomes [2]. The relationship between these variables was moderated by the time of birth, which was dependent on the health behaviours and the health status of the pregnant woman. These results revealed that there was a higher likelihood of preterm birth among women with lower levels of education [3]. However, the relationship between a woman's education level in science and maths and pregnancy outcomes has received less attention. Although the studies reviewed have provided valuable insight into the relationship between a woman's education level and pregnancy outcomes, there are some limitations to consider in science and maths academic performance. For example, most studies have focused on the level of education achieved rather than the specific subjects studied. Therefore, more research is needed to explore the specific effects of science and maths education on pregnancy outcomes and how academic performance, such as cumulative GPA, may mediate this relationship. Table 1 summarises this literature review.

Table 1. Study Findings

Study	Findings
Markovitz et al. (2005)	Lower education quality is associated with an increased risk of neonatal and postnatal deaths.
Augustine et al. (2015)	Maternal education was positively correlated with the outcome of pregnancy and that this relationship was mediated by the timing of birth, which, in fact, was determined by the health conditions and health

	behaviours of the pregnant woman.
National Academies Press (2007)	Lower education quality is associated with an increased risk of preterm birth.
Mueller et al. (2020)	Childbirth education can improve maternal outcomes and maternal satisfaction.

Research has shown that maternal education is an important factor in pregnancy outcomes. However, the specific effects of science and mathematics education on pregnancy outcomes are not well understood. A study investigated the effects of childbirth education on maternal outcomes and maternal satisfaction [5]. The authors found that women who received childbirth education had lower rates of preterm birth and were more likely to report a positive experience of childbirth. This suggests that education, even in specific topics such as childbirth, can have a positive impact on pregnancy outcomes. More research is needed to explore the specific effects of science and maths education on pregnancy outcomes and whether specific types of education or training can improve pregnancy outcomes for pregnant women.

In addition to education, other factors can also influence pregnancy outcomes. The study investigated the role of structural inequity in pregnancy desires among emerging adults [6]. The authors found that structural factors such as poverty, lack of access to healthcare, and racism were associated with lower desires for pregnancy. This highlights the importance of addressing structural inequity and social determinants of health to improve pregnancy outcomes for all women. Future research should explore the interaction between education, structural factors, and pregnancy outcomes to develop effective interventions and policies to improve maternal and child health.

Meanwhile the desire to have a child also affect pregnancy outcome. However, the desire to have a child could also be affected by the level of education of the individual. Approximately half of the teenagers in the study felt that they were not ready to become parents, and most of the participants who have an educational level is at least college students [6]. In another study that is based in South Africa and Malawi, 44% of these women have a desire to have a child in the future and their average age to have education is 4 years [7]. As we can see, lack of sufficient education might affect desire for pregnancy. Age can affect pregnancy desires and will eventually affect the outcome eventually. In the study carried out in Dutch, the level of statistic shows that the education in the household will correlate with the desires to have a child. In addition to that, we can also find that the desire to have a child correlates with the cumulative pregnancy rate [8]. In addition to that, the research found that the highest rates of pregnancy in adolescents are among those without or only an elementary education, particularly those under the age of 16 years in Kenya, Tanzania, and Uganda [9]. This study further emphasises the level of teenagers with the risk that they will become an adolescent mother. In the study carried out in Russia, they believe that the power of education can improve the situation of adolescent pregnancy [10]. The outcome of pregnancy is significantly affected by education; in most cases in those studies have shown that the lower the level of education, the higher the rate they will get pregnant.

High levels of alcohol consumption have been shown to have a critical impact on many aspects of human being's life, including academic performance. Several studies have connected excessive alcohol consumption with poor academic performance. This is because students who consume excessive alcohol are more likely to be late for class, skip classes, and struggle to complete assignments compared to students who drink less alcohol [11]. Alcohol consumption has also been shown to have a negative impact on fertility, and recent research has shed light on the mechanisms underlying this phenomenon. The XRCC1 gene, which plays a critical role in maintaining genomic stability, is one of the main genes involved in the regulatory process of DNA damage repair. Alcohol consumption has been associated with increased DNA damage, which is exacerbated in people who have certain genetic variations in the XRCC1 gene [12]. Even among women who consume five or fewer drinks a week, alcohol consumption is associated with a decrease in fertility. This finding needs to be confirmed, but it seems reasonable to advise women to avoid drinking alcohol while trying to conceive [13]. Furthermore, some studies have shown that, in many nations, smoking during pregnancy is considered the most important avoidable potential cause of a negative pregnancy result. Cigarette use is associated with a restriction of foetal growth, and growing evidence suggests

that it can also cause miscarriage, premature births, and infant death syndrome, and perhaps lead to placental abruption. Smoking during pregnancy will continue to be an important potential risk to maternal and foetal outcomes during pregnancy [14]. In terms of the relationship between education level and smoking, less educated people are less likely to have the opportunity to learn about smoking and its health impacts compared to those with higher education. Therefore, less educated persons have a higher rate of current smoking compared to more educated people [15]. In addition to that, some of the studies have also shown that smoking during pregnancy will be linked to a variety of negative developmental consequences in the offspring. Nicotine in cigarette smoke has an influence on placental vasculature, as on binding of the well as nicotinic acetylcholine receptor in foetal membranes [16].

The outcome of pregnancy can also be associated with factors such as birth control and their education in general science in high school. Contraception, also known as the birth control method, is an intentional method of avoiding pregnancy using artificial tactics while engaging in sexual activity using various medications, devices, and surgical procedures. In India, it is shown that most teenage pregnancies occur in rural areas where education is not prioritised [17]. Factors such as poverty, social pressure, and employment opportunities may also have contributed to it. However, the rate of teenage pregnancy is much lower in urban areas. Previous studies showed that women with higher education who use modern contraceptives were less likely to experience complications of conception than those with lower education levels [18]. It is also emphasised that the outcome of a woman's pregnancy can be affected by the birth control used [19]. Women who suffered side effects from a modern birth control method tend to switch to alternative methods of birth control, whether it be other modern, traditional or abandon usage of it entirely. A woman's decision is likely to be influenced by information or knowledge that she receives. This can affect the outcome of a woman as different women have different effects on their body when switching birth control methods. The effects of knowledge choice and the appropriate and consistent use demonstrate the importance of contraceptive instruction [20]. To put it simply, a woman's education and guidance on contraception is important to ensure that she makes informed choices about birth control and uses it effectively. In contrast, this demonstrates that inadequate knowledge of birth control is associated with incorrect perception of risks and side effects or inconsistent use [21]. According to a study, illiterate women had a 100% chance of becoming pregnant, while women with only a basic education or primary education had a 34.3% chance of becoming pregnant, while high school graduates had the lowest chance of becoming pregnant, 17.3% [17]. Based on these results, it showed that education can be associated with contraceptive methods and improve decision-making on contraceptive usage.

Based on the study conducted in the previous sections, this study constructed a conceptual framework as shown in Figure 1.

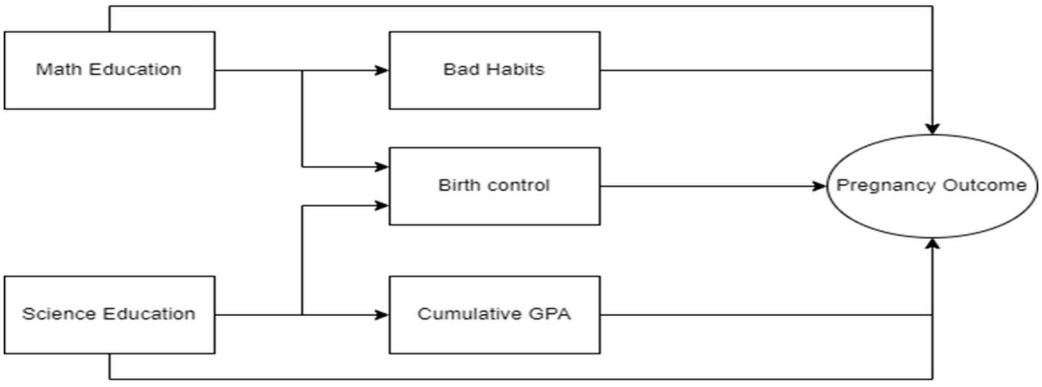

Figure 1. Conceptual Framework Table

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The hypotheses for this study are as follows:

H1: Maths education is correlated with pregnancy outcome.
H2: Bad habits mediate the relationship between maths education and pregnancy outcomes.
H3 : Birth control mediates the relationship between maths education and pregnancy outcomes.
H4 : Science education is negatively associated with pregnancy outcomes.
H5: Birth control mediates the relationship between science education and pregnancy outcomes.
H6: Curative mediates the relationship between science education and pregnancy outcomes.
H7: There is a significant relationship between a woman's highest science level taken in all years and her pregnancy outcomes.
H8: There is a significant relationship between a woman's highest science level taken in all years and her cumulative science GPA.
H9: There is a significant relationship between a woman's highest science level taken in all years and her cumulative maths GPA.
H10: There is a significant relationship between a woman's cumulative science GPA and her pregnancy outcomes.
H11: There is a significant relationship between a woman's cumulative maths GPA and her pregnancy outcomes.
H12: The mediating effect of cumulative science GPA is significant in the relationship between a woman's highest science level taken in all years and her pregnancy outcomes.
H13: The mediating effect of cumulative maths GPA is significant in the relationship between a woman's highest science level taken in all years and her pregnancy outcomes.
H14: A woman's science and maths education levels are independently related to pregnancy outcomes.
H15: The highest level of maths taken during the year is negatively with the outcome of pregnancy.
H16: The desire to have a child after pregnancy mediates the relationship between the highest level of maths taken in all year and the outcome of pregnancy.

3.0 RESEARCH METHODOLOGY

Our dataset was obtained from the Interuniversity Consortium for Political and Social Research (ICPSR), an international consortium consisting of approximately 800 institutions. ICPSR has conducted more than 18,000 studies spanning more than 60 years, and their datasets are freely and fairly accessible to all users (ICPSR, 2023). Dataset was cleaned and processed according to Figure 2 adopting Ting et al. methodology [25]. The source of this data set is the National Longitudinal Study of Adolescent Health in Adults (Add Health), 1994-2018 [Public Use] (ICPSR 21600). We used data from Wave III: Home Questionnaire, Public Use Sample (Section 18: Pregnancies), Wave III: In-Home Questionnaire, Public Use Sample (Section 22: Completed Pregnancies) and Wave III: Public use education data. The cleansed dataset contains 84 variables and a sample size of 1,011. Table 2 shows the further selection of variables based on the conceptual framework for this study. Table 3 shows the questionnaire item that was used to obtain the data.

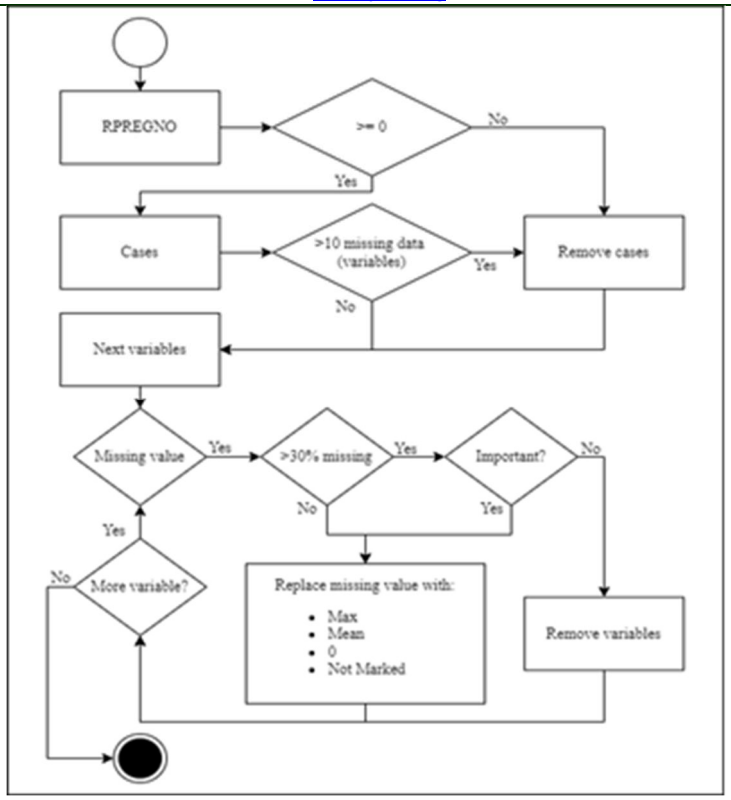

Figure 2. Data Transformation Process.

Table 2. Variables And Datasets

Variable ID	Datasets		
AID	Respondent Identifier		
RPELNO	Romantic relationship number		
RPREGNO	Relationship pregnancy number		
DS10 Pregnancies			
H3TP1	Pregnancy outcome	H3TP3	Live birth from pregnancy
DS12 Completed pregnancies			
H3PG4	Any contact during pregnancy	H3PG5	Birth control before pregnancy
H3PG6A	First method of birth control	H3PG6B	Second method of birth control
H3PG6C	Third method of birth control	H3PG7	Birth control in month before pregnancy
H3PG8	Want child before pregnancy	H3PG9	Want child later
H3PG10	Want to be your child's parent	H3PG11	Dr. or nurse for prenatal care
H3PG12	Partner went with you checkups	H3PG17A	You or your partner paid prenatal care
H3PG17B	Parents paid prenatal care	H3PG17C	Private insurance paid prenatal care
H3PG17D	Medicaid paid prenatal care	H3PG17E	Government assistance paid prenatal care
H3PG17F	Other source paid prenatal care	H3PG18	How often drank alcohol
H3PG19	How often used drugs	H3PG20	How many cigarettes smoke
H3PG21A	You or your partner paid hospital care	H3PG21B	Parents paid hospital care
H3PG21C	Private insurance paid hospital care	H3PG21D	Medicaid paid hospital care

H3PG21E	Government assistance paid hospital care	H3PG21F	Other source paid hospital care
H3PG22	Married at time of birth	H3PG23	Living together at time of birth
H3PG24	Relationship at time of birth		
DS16 - Education			
EAMSQ1	Math sequence level year 1	EAMSQ2	Math sequence level year 2
EAMSQ3	Math sequence level year 3	EAMSQ4	Math sequence level year 4
EAMSQH	The highest maths level taken in all years	EAMSQB1	Maths level with credit year 1
EAMSQB2	Maths level with credit year 2	EAMSQB3	Maths level with credit year 3
EAMSQB4	Maths level with credit year 4	EAMSQBH	The highest maths level with credit all years
EASSQ1	Science sequence level year 1	EASSQ2	Science sequence level year 2
EASSQ3	Science sequence level year 3	EASSQ4	Science sequence level year 4
EASSQH	The highest science level taken in all years	EASSQB1	Science level with credit year 1
EASSQB2	Science level with credit year 2	EASSQB3	Science level with credit year 3
EASSQB4	Science level with credit year 4	EASSQBH	The highest science level with credit all years
EAMGPA1	Math GPA year 1	EAMGPA2	Math GPA year 2
EAMGPA3	Math GPA year 3	EAMGPAC	Cumulative math GPA across all years
EASGPA1	Science GPA year 1	EASGPA2	Science GPA year 2
EASGPA3	Science GPA year 3	EASGPAC	Cumulative science GPA across all years
EAOGPA1	Overall GPA year 1	EAOGPA2	Overall GPA year 2
EAOGPA3	Overall GPA year 3	EAOGPA4	Overall GPA year 4
EAOGPAC	Cumulative GPA across all years	EAMFIX1	Math failure index year 1
EAMFIX2	Math failure index year 2	EAMFIX3	Math failure index year 3
EAMFIXC	Maths failure index across all years	EASFIX1	Science failure index year 1
EASFIX2	Science failure index year 2	EASFIX3	Science failure index year 3
EASFIXC	Science failure index across all years	EAOFIX1	Overall failure index year 1
EAOFIX2	Overall failure index year 2	EAOFIX3	Overall failure index year 3
EAOFIX4	Overall failure index year 4	EAOFIXC	Overall failure index across all years

Table 3. Questionnaire Item

Variable ID	Questionnaire Item
EASSQH	Ordinal variables that represent the highest-level science course taken in each year of taking the high school course taking (EASSQ1-6), and the highest level science course taken at the end of high school (EASSQH).
EAMGPAC	GPA of maths courses taken each year (EAMGPA1-6) and cumulatively (EAMGPAC).
EASGPAC	GPA of science courses taken in each year (EASGPA1-6) and cumulatively (EASGPAC).
H3TP1	Next, indicate the outcome of this pregnancy by selecting the appropriate response. If the pregnancy involved more than one baby and all had the same outcome, indicate that outcome, for example, a pregnancy involving twins who were both live births should be coded as live birth.
H3PG8	Think back to the time just before {<PARTNER>/YOU} became pregnant. Did you want to have a child then?

EAMSQH	Ordinal variables that represent the highest level math course taken in each year of students' high school course taking (EAMSQ1-6), and the highest level math course taken by the end of high school (EAMSQH).
EASSQBH	B Version: Ordinal variables that represent the highest level science course for which a student received credit in each year (EASSQB1-6), and the highest level science course for which the student received credit by the end of high school (EAHSSQB).
H3PG6A	What kinds of birth control were you or SHE / HE? You may report as many as three methods. 1st response
H3PG18	During this pregnancy, how often did SHE / YOU drink alcoholic beverages?
EAOFIXC	Proportion of all courses that students failed in each year (EAOFIX1-6) and cumulatively (EAOFIXC).
EAMSQBH	B Version: Ordinal variables that represent the highest level math course for which a student received credit in each year (EASMSQB1-6), and the highest level math course for which the student received credit by the end of high school (EAMSQBH).
H3PG20	How many cigarettes did {SHE/YOU} smoke?

3.1 Data Analysis

This study analyses data using IBM SPSS 24.0 for data transformation and Pearson's correlation, the PROCESS Macro v4.2 by Andrew F. Hayes, for mediation analysis. First, the study ensures that all independent variables within the dataset are significantly affecting the dependent variable (pregnant outcome). Variables that are not significant from the dataset are removed. Subsequently, the dependent variable and mediator are chosen for PROCESS Macro to be further analysed for the direct and indirect relationship of independent variables and mediators.

4.0 RESULTS

For H1 and H4 in this study, which is Maths Education and Science Education correlate with Pregnancy Outcome, is accepted due to the significant value in the calculation of Pearson's correlation, all are .00. The result shows that both Maths Education and Science education are negatively correlated with Pregnancy Outcome. Therefore, H1 and H4 are supported. Table 4 shows the correlation between IVs and DV.

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Table 4. Correlation Of IV And DV

Independent Variable	Dependent Variable	Sig	Pearson's Correlation
Highest Maths level (credit) all years	Pregnancy Outcome	.000	-.162
The highest Maths level taken in all years	Pregnancy Outcome	.000	-.164
Highest Science level (credit) all years	Pregnancy Outcome	.000	-.118
The highest Science level taken in all years	Pregnancy Outcome	.000	-.118

4.1 Mediation Analysis

To find out whether every mediator is significant to the relationship between education and pregnancy outcome in the study, a table of unstandardised direct and indirect effects is generated. Table 5 shows that both bad habits of drinking alcohol (indirect effect = 0.0209, 95% CI = [-.0363, -.0060]) and having cigarettes (indirect effect = 0.0119, 95% CI = [-.0025, -.0243]) mediate the relationship. Therefore, H2 is supported. In addition, this table also results in birth control 1. Want a child after pregnancy (indirect effect = 0.0080, 95% CI = [(-.0188, .0015)]) mediates the relationship between maths education and pregnancy outcome. Therefore, H3 is supported. Birth control 2 The first method of birth control (indirect effect = 0.0058, 95% CI = [(-.0143, .0003)]) mediates the relationship between science education and pregnancy outcome. Therefore, H5 is supported. CGPA1 (indirect effect = <0.0306, 95% CI = [(-.0143, .0003)]) mediates the relationship between science education and pregnancy outcome. Therefore, H6 is supported.

Table 5. Direct And Indirect Effects With Bootstrap 95% Confidence Interval For Mediation Analyses

Predictor	Mediator	Dependent Variable	Direct Effect	Indirect Effect (95% CI)
ME	BH1	PO	-0.1002	-0.0209(-.0363, -.0060)
ME	BH2	PO	-0.1232	0.0119(-.0025, -.0243)
ME	BC1	PO	-0.1092	-0.0080(-.0188, .0015)
SE	BC2	PO	-0.1120	-0.0058(-.0143, .0006)
SE	CGPA1	PO	-0.0871	-0.0306 (-.0539, -.0092)
ME	CGPA2	PO	-0.1029	-0.0170(-.0463, .0108)

Note: ME = Maths Education, SE = Science Education, BH = Bad Habits, BH1 = how often drink alcohol -w3, BH 2 = how many cigarettes smoke -w3, BC = Birth Control, BC1 = want child later -w3, BC2 = first method of birth control -W3, CGPA = cumulative GPA, CGPA1 = Science, CGPA2 = Maths, PO = pregnancy outcome. Results based on 5000 bootstrap samples. CI: 95% confidence interval for bias for indirect effects. * $p < 0.05$.

5.0 DISCUSSION

Consistent with the result provided, it emphasised that there is a negative correlation between all maths and science education and the result of pregnancy. Therefore, H1 is supported, and the results indicate the existence of a negative correlation between the highest level (credit) in all years and the outcome of pregnancy. This leads us to believe that the importance of maths education is necessary for a successful pregnancy outcome. Mathematical activity of the mother during pregnancy is shown to be associated with child development due to brain activity that increases blood flow of vital arteries [22]. The participation of a mother in mathematical activities and foetal brain blood flow can also lead to enhancement of brain function which factors in pregnancy outcome. H2 is supported, and the results indicate that the highest maths level taken in all years shows a negative correlation with pregnancy outcome. The most practical relevance of this observation expresses the need for the mother to not disregard maths education as it can influence the outcome of pregnancy [22]. Based on the results, H3 is also supported. Birth control mediates the negative relationship between maths education and pregnancy outcomes. High maths-level education can both directly and indirectly boost the use of birth control which in turn helps to lower the pregnancy outcome. Studies show that inadequate education, specifically birth control, is a significant factor related to pregnancy outcome [17].

H4 is also supported. The result indicates a negative correlation between science education and pregnancy outcome. A study carried out in the UK that saw the highest rate of teenage pregnancy

in western Europe found that women who had lower educational achievement compared to peers were at higher risk of teenage pregnancy [18]. This shows that education can have an impact on the outcome of a woman. In addition to that, H5, which states that birth control mediates the relationship between science education and pregnancy outcomes, is supported. The study shows that women who live in urban areas with a higher educational background, which may or may not include science education, are more prevalent in the use of birth control than rural areas where education is not considered important [17]. Birth control has been shown to be associated with science education, which in turn influences the success rate of pregnancy outcome. H6 mentions that cumulative GPA mediates the relationship between science education and pregnancy outcome. A study has shown that a woman with a higher education background is more likely to have a successful pregnancy result because they have a greater understanding of their autonomy that affects the pregnancy outcome [17]. Furthermore, H7, which is the significant relationship between the highest science level taken in all years and her pregnancy outcomes, is partially supported. It has been proven that there is a large association between overtime earnings for women with college degrees than for women with less education [2]. The highest science level taken in all years has been significantly correlated with the overtime earnings in life.

H8, which is the significant relationship between a woman's highest science level taken in all years and her cumulative science GPA, is also partially supported. A study has found that higher maternal education was associated with cumulative science GPA [2]. It is undeniable that the science level affects the cumulative GPA at the individual level. Moreover, H9, which is the significant relationship between a woman's highest science level taken in all years and her cumulative maths GPA, is partially supported. Research has shown that higher levels of education are related to better academic performance, which may include cumulative maths GPA [2]. For example, the logic and critical thinking involved in science education levels will have indirect positive effects on the cumulative maths GPA. The H10, which is the significant relationship between a woman's cumulative science GPA and her pregnancy outcomes, is partially supported. Poor pregnancy outcomes are often associated with maternal educational attainment [3]. Women with a higher cumulative science GPA could potentially have better knowledge of pregnancy and therefore take better care of themselves. The H11, which is the significant relationship between a woman's cumulative maths GPA and her pregnancy outcomes, is partially supported. The results showed that higher pregnancy outcomes are positively associated with mother's educational achievement, which is inclusive of cumulative maths GPA [2]. The educational level of the women will have an indirect effect on their pregnancy outcomes. H12 states that the mediating effect of cumulative science GPA is significant in the relationship between a woman's highest science level taken in all years and her pregnancy outcomes, is partially supported. The study has shown that the risk of neonatal mortality can be reduced by the association of maternal academic achievement [1]. However, the highest science level taken in all years has all the potential to affect the cumulative science GPA of the woman that influences the outcome of pregnancy.

H13 states that the mediating effect of cumulative maths GPA is significant in the relationship between a woman's highest science level taken in all years and her pregnancy outcomes is partially supported. Structural inequities caused by educational level, followed by income, will have an effect on pregnancy outcome [6]. It can be proven that cumulative maths GPA has been associated with the highest science achievement and therefore influences the success rate of pregnancy outcome. H14 which mentions that A woman's science and maths education levels are independently related to pregnancy outcomes is rejected. Although lower levels of maternal education can have a positive association with infant mortality, there is no proven record of the level of independent maths education of the level or independent science education that can leads to neonatal deaths [1]. The study shows that academic performance acts as a whole acts to influence the women's pregnancy outcomes. H15 which states that the highest maths level taken in the whole year is negatively with pregnancy outcome is rejected. The study provided evidence that maternal academic achievement can produce a higher success rate of pregnancy outcome [2]. Thus, a higher level of education in math that produces higher failure rate of pregnancy outcome cannot be justified. H16 which states that the desire to have a child after pregnancy mediates the relationship between the highest level taken in all year and pregnancy is partially supported. Higher education attainment that includes highest math level taken

throughout the year can influence the number of children desired, directly affect the potential of pregnancy [24]. Therefore, the number of pregnancy outcomes can vary depending on the level of education of the women.

6.0 CONCLUSION

This study aimed to investigate the correlation between maths and science education and pregnancy outcomes, while also considering the mediating roles of bad habits, cumulative GPA, and birth control. The results of the analysis suggest that having a strong mathematical and science education background is crucial to improving pregnancy outcomes. This is because a strong background in these subjects can help reduce the dependence on bad habits, such as smoking and alcohol consumption, which can have negative effects on pregnancy outcomes. Furthermore, a strong math education background can directly and indirectly increase the use of birth control, which is essential to reduce unintended pregnancies and improve pregnancy outcomes. Furthermore, the study found that the high levels of science education were associated with better academic performance, which is also an important factor in pregnancy outcomes. Therefore, improving the science education background can not only improve academic performance but also improve pregnancy outcomes. Importantly, the study used a nationally representative sample from the United States, which provides greater generalisability and accuracy of the findings compared to previous studies focused on specific locations or populations. In general, these findings highlight the importance of investing in maths and science education to improve pregnancy outcomes and reduce the risk of negative health outcomes associated with bad habits and unintended pregnancies.

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