What are the risks associated with adolescent pregnancy and how do they impact child development?

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This is Molly, she began her university adventure in 2019 after the completion of her NVQ Level 3 as an Early Years Educator. Molly is extremely passionate about the voices and mental wellbeing of young people, more specifically those with special educational needs, prompting her to pursue a specialist degree in Child and Adolescent Mental Health and Wellbeing. During her study, Molly became interested in teenage pregnancy and the effects on the child and how this may influence the manifestation of mental health in the offspring or, learning disabilities which is evidenced in her dissertation project. Her passion lies within the area of children with special educational needs and how their mental health is just as important as anyone else's. Molly feels as though further research is required to enhance the current support in place to protect teenage mothers' mental health when having their first child as there is a lack of evidence to suggest the developmental outcomes of the child and how their mental health can be maintained.

Abstract: Teenage pregnancy is the term used to describe the conception rate in young females aged between 13 and 19. Complications associated with teenage pregnancy worldwide are the second most prevalent cause of death in female teenagers and accounts for 23% of the world's disease in disability-adjusted life years. This emphasises that the mother and baby may be at risk of adverse birth outcomes. According to the World Health Organisation, teenage pregnancy is a global health concern with just under 13 million young girls giving birth each year.

Aim: This literature review aims to investigate the link between teenage pregnancy and the adverse risks this may have on child development.

Method: The author has chosen a systematic review regarding the link between adolescent pregnancy and poor developmental outcomes as the chosen method. This is due to the limited amount of literature available on the topic, prompting the need for future research and critical analysis.

Results: The results have displayed a clear correlation between adolescent pregnancy and poor developmental outcomes on their children with the main themes consisting of early birth complications, child development and maternal experiences. The fourteen studies that were analysed all provided different but relevant data that confirmed the research aim and objective. However, there were some gaps within the literature regarding the leading cause of different conditions such as low birth weight and labour issues that would benefit from further research.

Conclusion: Overall, the systematic review confirms the link between adolescent pregnancy and poor developmental outcomes in their children. Although the risks discussed can be experienced in adult mothers within similar percentage brackets, it is clear through the evidence that teenage pregnancy is at a higher prevalence of risk. The implementation of laws, policies, and procedures in LMIC's may help educate communities and enforce the need for further research and preventative strategies such as the Teenage Pregnancy Prevention Strategy within the UK.

1.0 Introduction

1.1 Teenage Pregnancy

Teenage pregnancy is the term used to describe the conception rate in young females aged between 13 and 19 (Maynard, 2019). Complications associated with teenage pregnancy worldwide are the second most prevalent cause of death in female teenagers (Mayor, 2014). Cook and Cameron (2015) concur that teen pregnancy accounts for 23% of the global burden of illness in disability-adjusted life years (DALYs), highlighting the danger of unfavourable birth outcomes for both the mother and the baby. According to the World Health Organisation (WHO) (2021), teenage pregnancy is a global health concern with less than 13 million young girls giving birth each year out of the 130 million global birth averages. New and expecting mothers face various challenges, including the bio-psychosocial changes occurring in their bodies and environment, as well as the developmental challenges of being a teenager (Soma-Pillay et al., 2016). Owing to the adolescent mothers age, teenage pregnancy may be consequential for both mother and infant as the risk of fatality and stunted development is greater (Jonas et al., 2016).

Although considered a global health issue, the adolescent pregnancy rate has decreased by 11.6% over the past two decades due to sexual health education and access to contraception (WHO, 2021). Despite this, Sedgh et al. (2015) highlight that adolescent pregnancy rates differ across regions and is a reoccurring problem in Low-to-Middle-Income Countries (LMICs) where education, health care and employment opportunities are harder to access. For example, The United Kingdom (UK) remains a country exhibiting one of the highest teenage pregnancy rates globally, with 15.7 women per 1000 conceiving under 16 years old in 2018, including abortion (ONS, 2019). Whereas African countries such as Niger, Angola, Congo and Rwanda display rates as high as 207.1 per 1000 adolescents in 2019 (United Nations, 2020). According to McCall et al. (2014), the high rates displayed in the UK are due to many teenage pregnancies being unplanned and unsafe, resulting in higher rates. Yet, this data does not consider the births of teenagers aged between 17 and 19, suggesting that the rates could be higher which may impact the reliability (de la Calle et al., 2021). Validating this, The Nuffield Trust (2018) provide statistics of childbearing in those aged under 19 years old to 17 per 1000 teenage conceptions within the UK, making the prevalence higher.

1.2 Maternal Risk Factors

Maternal Mental Health (MMH) is amongst one of the most common health issues associated with pregnancy that affects both the mother and child and is classed as a public health concern (Herrman et al., 2019). According to Abel et al. (2019), the prevalence of MMH accounts for 23.3% of new and expectant teenage mothers throughout Europe that may last up to one year after birth. The rate of MMH is eight times higher in adolescent mothers than that of adult mothers globally due to a confluence of multiple psychosocial risk factors, including social insecurities, low academic achievement, and low socioeconomic status (Duberstein, 2012). Yet, it is significant to consider that the true prevalence of MMH in teenage mothers may not be accurate due to non or misdiagnoses (Hall et al., 2016). Multiple studies have verified that babies are more likely to have a low birth weight and experience developmental delays later in life because of high amounts of the stress hormone cortisol passed through the umbilical cord (Glover, 2014; Rakers et al., 2020). As a result, 1 in 4 children are impacted by MMH, increasing the risk of foetal and infant morbidity rates and a decline in child welfare after birth (Russel, 2017). Valid incidence and prevalence data such as this can prompt the need for policy and programmatic responses to monitor MMH in teenagers to reduce the risk both physically and mentally (Hadley, Ingham and Chandra-Mouli, 2016). However, some factors differ across regions for how teenage pregnancy may be approached (Brindis, 2017).

Globally, adolescent girls face gender discrimination where they are less likely to attend school to promote positive wellbeing, which may contribute to higher teenage pregnancy rates (Duberstein, 2012; Arceo-Gomez and Campos-Vazquez, 2014). UNICEF (2021:1) states that "worldwide, 129 million girls do not have access to school", highlighting the gender inequalities that exist contributing to high rates globally. Additionally, Collado et al. (2014) emphasise that many teenagers are not equipped with the knowledge required to prevent unintended pregnancies. In agreement, a study by Teixeira and Taquette (2014) confirmed that most of the teenage participants did not understand the risks associated with unsafe sex and peer pressure from others taking part in sexual activities. This is evident with 13 cases of pregnant primary school-aged children occurring in Mpumalanga, making teenage pregnancy an educational and societal concern (Nkosi and Pretorius, 2019). With pregnancy occurring in primary schools, this suggests a lack in capacity, cognition, and increased risk of vulnerability regarding the central facts of sexual activities (Braams et al., 2015). Still, fewer than 50% of young girls in countries such as South Africa of whom have access to primary education lack basic literacy skills (Pritchett and Sandefur 2020). Overall, this questions their ability to

understand basic language and knowledge of safe sexual relations (Arceo-Gomez and Campos-Vazquez, 2014).

Defined as having little materials or income, poverty and deprivation influences social, economic, educational, and physical issues that may contribute to higher rates of teenage pregnancy (Ross, Baird and Porter, 2014). Globally, there are over 580 million girls aged between 10 and 19 years old that live in poverty earning under £2 per day, preventing them from achieving economic wellbeing (Fasoro, 2017). Multiple studies suggest that poor outcomes for the mother and child, including the risk of abuse, exploitation, drug misuse and poor child development are associated where teenage parents live in areas of high deprivation (Garwood et al., 2015; Jensen, Berens and Nelson, 2017). Additionally, living in high deprivation may result in a shortage of basic resources including food and water which are essential for a healthy pregnancy and labour process (Del Mastro, 2021). In agreement, McLeigh, McDonell and Lavenda (2018) conducted a study that discovered that economically deprived areas globally have high child abuse and neglect rates. Lacking essential nutrients can initiate conditions such as anaemia, pre-eclampsia, haemorrhage, and death in mothers during pregnancy (Indarti et al., 2020). A report by Chaudry and Wimer (2016) agreed with the issues regarding nutritional deprivation. They further discussed the additional risk that poverty poses on child development and wellbeing and how being born into poverty can predict a child's future lifestyle. Yet, it is clear from the literature that when teenage girls have access to education, their job potential increases, child marriage rates, child mortality rates, maternal mortality rates, and child stunted development all decrease. This emphasises the need for teenage pregnancy prevention programmes (Calder, 2013).

1.3 Global Context

In the UK, the Teenage Pregnancy Prevention Strategy (TPPS) has been classed as an overall success in the efforts to reduce teen pregnancy rates (Cook and Cameron, 2015). The rates reached a historic high with 45 conceptions per 1000, including abortion (ONS, 2019). To accomplish this, the £280 million strategy was introduced which aimed to improve access to relationship and sex education, free contraception, and sexual health services (Public Health England, 2010). A study by Hadley, Ingham and Chandra-Mouli (2016) examined the effectiveness of the TPPS with results showing a 60% decrease in the conception rate in young

females. This was due to having access to appropriate education and contraception across the UK in complying schools and local authorities.

Nevertheless, not all schools were on board with making safe sex education part of their curriculum, resulting in a lack of awareness and an increased risk of teenage pregnancy. As a result, the House of Commons and Long (2020) made relationship education a compulsory and legal requirement in September 2020, ensuring equal learning opportunities for all young people. This follows Sections 34 and 35 of the Children and Social Work Act (2017). Additionally, it is essential to consider that girls are faced with constraints that make education harder to access in LMIC's due to gender discrimination, family conflict, unstable economic advantage, and political issues (Panda, 2018; Ajufo, 2019; Mohr, Carbajal, and Sharma, 2019). Therefore, the lack in education prevents them from learning about safe sex and, good grades that enforce job opportunity, adding to the risks that influence the higher rates of teenage pregnancy (Pritchett and Sandefur 2020).

1.4 Child Development

In addition to the presenting risks that pregnancy has on mothers, it is necessary to explore the risk on the child for the review. Child development involves the changes that occur from the prenatal stages of life and continues through adulthood (Crowley, 2014). The Critical Period is explained by Lindon and Brodie (2016) as the first 1001 days of childhood where social interactions are essential for biological, physical, social, emotional, and cognitive development. The 1,000 trillion synaptic connections that occur in the brain through the process of Neurogenesis are from undergoing new experiences that influence child development (Human Memory, 2019). However, all children are unique and with this comes their rate of achieving academic and physical milestones (Garvey and Zeedyk, 2018). In agreement, Burton, Pavord and Williams (2014) highlight how children who have additional needs like autism can have restricted development due to not having a good awareness or understanding of their environment, reducing the synaptic connections. Nevertheless, when interactions are not made within the crucial period, there is a higher possibility of missed development opportunities that may impact the child later in life (Van Schijndel et al., 2018). In agreement, research directed by Mollborn and Dennis (2015) using a global longitude cohort study identified that 63% of teenage mothers included between 16 and 19 did not take part in

play interactions daily, resulting in a lower Intelligence Quotient (IQ) and higher behavioural issues in their children.

In addition to the direct consequences such as developmental delay, there are other significant impacts on an infant that may be a result of teenage pregnancy (Kost and Lindberg, 2015). Low Birth Weight (LBW) is when a child is born weighing less than or equal to the healthy average of five pounds and eight ounces (Hughes, Black and Katz, 2016). There is evidence to suggest that a baby born at or under this weight has a high survival rate and the chance of a healthy life but dependent on healthcare access, some babies may develop health problems that require treatment for survival (Moreira, Sousa and Sarno, 2018). Children born with LBW are more likely to struggle during feeding routines and therefore, struggle to gain weight (Dutta et al., 2015). Additionally, other complications and lifelong health issues following LBW consist of Sudden Infant Death Syndrome (SIDS), intraventricular haemorrhages, Cerebral Palsy, and multi-sensory impairments (McCall et al., 2018). According to Azevedo et al. (2015), the incidence of LBW in teenage pregnancy is greater than that of adult mothers which may be due to higher rates of risk-taking behaviours that occur in adolescents. Research by Del Mastro (2021) added that teenage mothers often live in deprivation resulting in a lack of resources such as food and water which are required for a healthy pregnancy. Yet, there is contradicting evidence regarding the subject, making the link between adolescent pregnancy and LBW harder to determine (Khashan, Baker and Kenny, 2015).

An additional risk that may occur during childbirth is preterm birth (Kost and Lindberg, 2015). Preterm birth is considered when a baby is born before the 37-week margin in which additional health issues may arise (Vogel et al., 2018). Research by Frey and Klebanoff (2016) discovered that although some children born before 37 weeks look as healthy as a full-term baby, they are truly at a higher risk of adverse birth outcomes. In agreement, Boyle et al. (2017) explain that short term health complications of preterm birth consist of minor breathing issues, hypertension, and temperature control issues. Conversely, long term health issues associated with preterm birth include intraventricular haemorrhages, necrotizing enterocolitis, sepsis, pneumonia, and infant mortality (Luu, Rehman Mian and Nuyt, 2017). Approximately, three-quarters of births result in infant death within the first week of life, due to lack of skilled healthcare and preterm birth as the leading cause, resulting in 2.4 million causalities globally (WHO, 2020). Yet, as with LBW, there is evidence that is supportive and unsupportive of the

link between teenage pregnancy and preterm birth (Khashan, Baker and Kenny, 2015; Koullali et al., 2016), urging for additional research to be conducted on the gap within the literature.

1.5 Rationale

Through a brief scope of the literature, the researcher discovered a gap regarding the link between teenage pregnancy and adverse birth outcomes. Whilst uncovering literature for the background section of this review, it was apparent that the number of studies regarding the desired topic was limited. Most of the literature discovered were either scoping reviews with little information on the focus area (Pham et al., 2014), literature reviews that fixated on an alternative topic with brief context regarding teenage pregnancy and child outcomes or studies where fathers where the primary carer following maternal morbidity. The following systematic review aims to add a focus to the area of teenage pregnancy concerning child developmental outcomes by analysing the small amount of relevant literature available in the hopes of providing insight to the significant link, whilst prompting future research (Baker, 2016).

1.6 Aims and Objectives

This literature review aims to investigate the impact of teenage pregnancy and the adverse risks this may have on child development with the objective of:

- synthesising and critically analysing primary and secondary research regarding the risks of teenage pregnancy and the adverse effects this has on child development to answer the research question.

1.7 Research question

What are the risks associated with adolescent pregnancy and how do they impact child development?

2.0 Methodology

2.1 Method

Efron and Ravid (2019) define a systematic literature review as an overview of synthesized studies that are collaborated to answer a specific research question. The review interprets background information on an already existing topic for the reader to gain an understanding before presenting the research aim and question (Nakano and Muniz Jr, 2018). For a systematic review, the author should follow an organised plan that is transparent and comprehensive, allowing replication for future researchers (Kraus, Breier and Dasí-Rodríguez, 2020). In comparison to primary research, systematic reviews allow the author to detect, select and critically appraise data to validate the desired research question (Torraco, 2016). Additionally, literature reviews can recognise inconsistencies within a study, prompting future research regarding gaps to evaluate and validate a specific topic of interest and, advise other academics on strengths and weaknesses within their study (Baker, 2016; Maggio, Sewell and Artino, 2016).

Yet, it is important to consider that there are limitations of systematic reviews being the chosen research method. When undergoing the initial searches for data needed for the review, access to various databases is required to obtain high quality, credible, peer-reviewed journals that contain information relevant for answering the research question (Cooper et al., 2018). However, this can cause issues for non-professionals, such as students, where the database does not allow institutional or full access, which may be costly and time-consuming (Chen et al., 2015). Additionally, researcher bias is a potential issue whilst constructing systematic reviews during the inclusion, exclusion and screening process being adapted to achieve the research aim and question (Gao, 2020). In agreement, Buetow and Zawaly (2021) discuss that researcher bias enlightens the effort to achieve the aim of the research, however they state that it is not something to necessary avoid or dismiss. Moreover, the researcher has the flexibility to discuss what they deem appropriate for their review which ultimately can make the study risk of becoming subjective and unreliable (Winchester and Salji, 2016).

Taking the discussed benefits and limitations into consideration, the author has chosen a systematic review regarding the link between adolescent pregnancy and poor birth outcomes as the chosen method. Owing to the limited amount of literature available on the topic, this is

the appropriate method to use. Using systematic reviews for research allows the author to explore primary and secondary data provided by other researchers to use within their study to validate their research question (Uman, 2011). Doing so permits the synthesis of the results, ensuring they are credible and validate the research aim (Wee and Banister, 2015).

2.2 Search Strategy

Three primary characteristics must be present for an excellent data search to conduct a systematic literature review: orderliness, comprehensiveness, and transparency (Cooper et al., 2018). When searching an academic and reliable database, an effective search strategy must be clear and address the initial concepts and elements of the selected research question (Paul et al., 2021). Unstructured search tactics can have an impact on the results of the search, resulting in a loss of vital data that could be useful in confirming the research aim and question (Boland, Cherry and Dickson, 2015). To ensure an effective search result, the researcher needs to keep detailed documentation of the search strategy that was conducted (O'Connor et al., 2014). Once the desired topic has been identified, an evaluation may be completed on the search quality to determine the reliability and credibility of the search to ensure the study can be replicated in the future (Coughlan, 2021).

2.3 Databases and Sources

From September to December 2021, research was undertaken to discover the desired topic for the literature review. The initial scoping search began with using Google Scholar and Discover More through the Edge Hill University library to gain a basic understanding of teenage pregnancy. For this search, the author used the term “Teenage Pregnancy” to uncover background information on the topic to create relevant search terms to refine the specific area of interest. Although most journals discovered in the scoping search did not fit all the desired inclusion criteria, they proved useful elsewhere in the systematic review when discussing the topic of teenage pregnancy.

Following on from the scoping search, the author turned to credible sources such as CINAHL, Science Direct and Scopus to create a finalised list of primary research that achieve the aim of the study. The databases that have been used offer high quality, peer-reviewed and credible sources of data that are essential for the research aim (Ghaddar et al., 2012). CINAHL provides access to nursing and health journals that examine different health conditions, relevant for the

study (Hopia and Heikkilä, 2020). Science Direct has access to approximately one-quarter of the world's peer-reviewed, full-text, scientific, social, and medical primary research content (Harnegie, 2013). Finally, Scopus is the world's largest abstract database for any subject that assists with the creation of a literature review (Harzing and Alakangas, 2016). The databases selected are more likely to provide primary research that is deemed ethical, reliable, generalised, and valid for this systematic review.

2.4 Search terms

When collecting data for the systematic review, specific terms were used to search for relevant, reliable, and credible information to answer the research question. The following key terms were used when searching CINAHL, Science Direct and Scopus. "Teenage Pregnancy OR Teenage Mothers OR Adolescent Childbearing" AND "Child* Development OR Infant Growth OR Adolescent Outcomes OR Child Birth". Using the Boolean operator OR allows the databases to search for alternate phrases that have the same meaning for the specific topic that can generate further results (Bramer et al., 2018). Additionally, using AND created a search that linked the two key phrases and, using the asterisk (*) would retrieve articles with a similar word such as "child's" or "children" (Grover and Basu, 2017). After using these search terms in all three databases, the total number of studies generated was 12,750 before applying the inclusion and exclusion criterion. To limit the searches further, the author then specified where the search terms should be located. The abstract was selected (AB) for both terms to appear to ensure the subject of the study matched the desired topic. This narrowed results from all databases to 1,396.

2.5 Inclusion and Exclusion Criteria

Inclusion and exclusion criteria are two main features of research that are essential for a systematic literature review (Patino and Ferreira, 2018). By definition, inclusion criteria is what the author deems beneficial and relevant for the topic area for a study to be included in the research whereas, exclusion criteria is the disregard of irrelevant studies (Garg, 2016). Having the ability to identify applicable inclusion and exclusion criteria supports the screening process of results to be included in the project (Connolly, 2020). Table 1 identifies the selected inclusion and exclusion criteria for this study.

Table 1. Inclusion and Exclusion Criteria Table:

Inclusion	Exclusion
Publish date: 2017 - 2022	Publish date: 2017 and prior
Language: English	Studies regarding fathers as primary caregiver
Geographical Location: Worldwide	Grey literature: • Letters • Newspaper articles • Reviews
Participants: • Adolescent mothers between 13 and 20 years old of any race, ethnicity, and marital status • Adult mothers between 21 and 50 years old of any race, ethnicity, and marital status • Infants before conception up to adulthood can be male, female, any race or ethnicity	Studies involving adolescent mothers with pre-existing medical conditions that effect the reproductive system: • Endometriosis • Cancer • HIV/AIDS • Uterine Myomas • Polycystic Ovary Syndrome
Primary/secondary research that is qualitative or quantitative	
Access to full text	
Full methodology section	
Study Design: • Cohort Study • Cross Sectional Study • Surveys	

The purpose of selecting a publish date between 2017 and 2022 to be included within the review is to guarantee more reliable and credible results with up-to-date research and findings (Pieper et al., 2014). The chosen geographical location has been set to worldwide on all databases due to adolescent pregnancy being a global health concern, allowing access to research from all areas of the world for greater comparison (Guironnet and Peypoch, 2018). Adolescent participant's ages will be between 13 and 20 years old. As some 19-year-olds may turn 20 at the time of birth, this still categorises them as an adolescent at the time of pregnancy. Additionally, adult mothers may be included in the study to compare the difference between adolescent and adult pregnancy complications, with both having children of any gender.

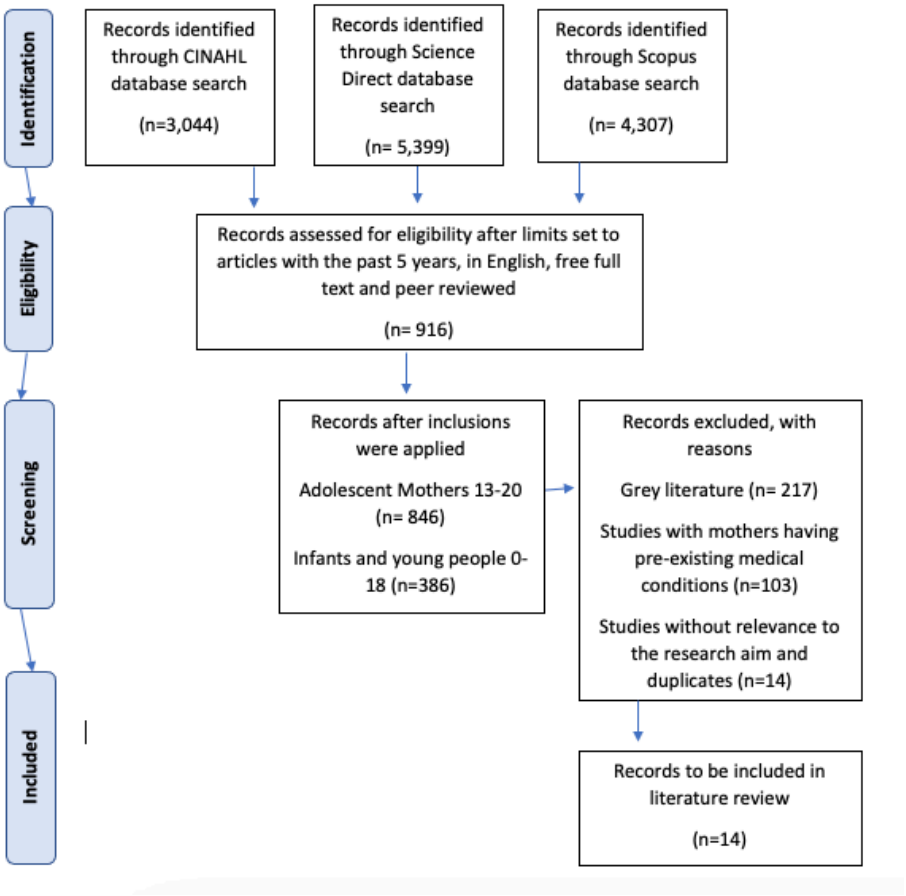
Primary or secondary data can be used for the systematic research review that is qualitative or quantitative to provide generalised information (Rahman, 2016). The method of study can be

either; cohort, essential for measuring multiple conclusions simultaneously (Tay and Tinmouth, 2007); cross-sectional, required for assessing the prevalence of a disease or condition (Boyko, 2013); surveys, for an understanding of views and experiences (Fogli and Herkenhoff, 2018). Additionally, the researcher will identify the quality of the journal by ensuring there is access to full text and a methodology section, enabling a strong understanding of the research. Having access to full text permits critique between different authors work, determining the credibility and reliability of the study (Garg, 2016). With all inclusion and exclusion criteria selected, this helped to refine the search to journals that were considered eligible for the systematic review resulting in 916 studies across all databases. Although there can be a risk of researcher bias involved in the inclusion and exclusion criteria, the author has considered this during the research process. Ultimately ensuring that the project is not at risk of being subjective (Buetow and Zawaly, 2021).

2.6 Screening

Screening is an essential aspect of research that refines and determines if the literature in question will be beneficial to the aim of the research (Stephens and Duncan, 2013). Although screening is a key feature of research, Chai et al. (2021) provide insight into how time-consuming this may be, making the process longer to bear leading to academic burnout. Following on from the concluded 916 recognised articles, the author refined further to 386 to be screened thoroughly across all three databases. This was due to grey literature, duplicates, articles having no relevance to the study and, others that still contained exclusion criteria. This section is conducted by effectively screening the title and abstract of the journal first to deem the relevance of the journal (Lavrakas, 2008). Next, a full-text screening is performed to identify if the academia meets all inclusion criteria and does not meet any exclusion criteria discussed in section 2.5. Screening allows the author to examine the article for useful information that is significant to the specific topic area as the abstract provides key points such as aims, method, results, and conclusion (Fink, 2020). Once screening has been completed, the author can then establish if the selected journal can be included in the review (Murad et al., 2018). Moreover, 14 studies were identified that fitted all inclusion and exclusion criteria ready for the data extraction and analysis of the findings to reach the study aim. The following PRISMA flow diagram in Figure 1 identifies the processes taken when examining the literature for the screening process.

Figure 1. PRISMA Flow Diagram



2.7 Data Extraction and Analysis

Upon the completion of the inclusion, exclusion and screening procedures, the literature was extracted and analysed to ensure the data is validated and generalisable for the review (Jonnalagadda, Goyal and Huffman, 2015). Following this step enables a detailed summary of all literature that makes a comparison easier to understand through the form of a narrative synthesis (Munn, Tufanaru and Aromataris, 2014). To perform this section of the systematic review, the method section is evaluated in each journal to confirm that the source of the data is reliable to answer the research question (Lajeunesse, 2015).

2.8 Critical Appraisal

Once data extraction and analysis of each journal has been finalised, a critical appraisal was completed on the fourteen articles. The purpose of critical appraisal is to justify trustworthiness, reliability, and credibility (Lobiondo-Wood, 2021). For best researching practice, critical appraisal identifies any limitations that can influence the research conclusion as well as providing a methodical evaluation regarding the value of the study (Williams, Boylan

and Nunan, 2019). For this systematic review, the author followed the Critical Appraisal Skills Programme (CASP) which is a pedagogical tool that validates the selected studies to reduce researcher bias and, identifies the strengths and weaknesses of a study (Brice, 2022). CASP is widely used within research and provides insight into the credibility of studies using a twelve yes or no questionnaire therefore, it will be included in this systematic review (CASP, 2022).

3.0 Result of the Literature

3.1 Main Findings

Whilst conducting the literature review, multiple journals were evaluated to determine the link between adolescent pregnancy and poor developmental outcomes for the child. From the fourteen studies identified, eleven are cohort studies, two are surveys and there is one cross sectional study. All of the studies focussed on teenage mothers between the ages of 13 and 20, adult mothers between the ages of 21 and 50 and, their children. Regarding geographical location, the studies selected are from different areas of the globe to provide a clear view of a global context. Some geographical locations included the UK, USA, Australia, Turkey, Sweden and India.

3.2 Key Themes

Table 2. Key Themes and Sub Themes

Themes	Sub Theme	Authors
Early Birth Issues	**Low Birth Weight**	(Amankra, 2018) (Subedi et al., 2018) (Nguyen et al., 2019) (Zer et al., 2019) (Abebe et al., 2020) (Trommlerová, 2020) (Harron et al., 2021)
	Preterm Delivery	(Socolov et al., 2017) (Amankra, 2018) (Subedi et al., 2018) (Karataşlı et al., 2019) (Rexhepi et al., 2019) (Zer et al.,2020) (Verfuerden et al., 2020)
	Infant Mortality	(Karataşlı et al., 2019)

		(Trommlerová, 2020) (Verfuerden et al., 2020) (Zer et al., 2020) (Harron et al., 2021)
Child Development	**Stunted and Foetal Development**	(Khatun et al., 2017) (Socolov et al., 2017) (Nguyen et al., 2019) (Zer et al., 2020)
	Child Behavioural Issues	(Khatun et al., 2017) (Agnafors et al., 2019) (Trommlerová, 2020)
Maternal Experiences	**Maternal Mental Health**	(Khatun et al., 2017) (Amankra, 2018) (Agnafors et al., 2019) (Soares et al., 2021)
	Pregnancy and Labour Issues	(Socolov et al., 2017) (Karataşlı et al., 2019) (Nguyen et al., 2019) (Rexhepi et al., 2019) (Abebe et al., 2020)
	High Deprivation	(Khatun et al., 2017) (Rexhepi et al., 2019) (Agnafors et al., 2019) (Nguyen et al., 2019) (Verfuerden et al., 2020)

The above themes displayed in Table 2 were strongly interlinked across the majority of articles included as not all projects set out to find the results that occurred. To produce a systematic review, all articles will undertake a critical analysis to verify the purpose of the study. This will also aid the narrative synthesis needed for a critical discussion.

3.3 Early Birth Complications

3.3.1 Low Birth Weight

There was a significant amount of evidence that linked LBW to adolescent pregnancy which was present in seven studies. Amankra (2018), Subedi et al. (2018), Abebe et al. (2020) and Harron et al. (2021) discovered that there are factors that influence maternal experiences which increases the likelihood of LBW in their children by a mean percentage of 28.3%. Additionally, a survey by Nguyen et al. (2019) revealed that out of 14,107 adolescent births, all had a low weight for age score (WAZ). Similarly, Zer et al. (2019) stated in their results that all adolescent pregnancies included resulted in LBW. Contrary to these findings, Trommlerová (2020) research emphasised the significance of maternal biological immaturity within her study, only 24% of the 90,828 births resulted in LBW. Upon reflection, the results by Trommlerová (2020) suggest there is less statistical significance compared to the results by Amankra (2018), Subedi et al. (2018), Abebe et al. (2020) and Harron et al. (2021).

3.3.2 Preterm Delivery

As with LBW, preterm delivery was another dominating subtheme within the seven articles. Studies by Socolov et al. (2017), Karataşlı et al. (2019) and Rexhepi et al. (2019) determine the average gestational age in adolescent mothers between 34 and 37 weeks with 32.7% of adolescent mothers <15 having higher risk of experiencing preterm births owing to the higher risk of infections and lack of healthcare access. Research by Amankra (2018) and Zer et al. (2019) also validated the link between preterm birth and adolescent pregnancy with Subedi et al (2019) adding valuable insight to the incidence of preterm births accounting for almost 16% of their adolescent participants. However, Verfuerden et al. (2020) study containing mothers aged between 15 and 19 concluded that teenage pregnancy only had a 2% higher chance of preterm births compared to adult mothers, which is only a small percentile of the 3,002,749 participants.

3.3.3 Infant Mortality

Infant mortality was the final subtheme identified within the early birth complications section with five included studies. Harron et al. (2021) with 12.9% more infant deaths per 100,000 concluded that adolescent pregnancies that occur in teenagers aged <15 have a higher rate of

infant mortality. Agreeingly, Trommlerová (2020) adds that her study showed similar percentages of infant mortality in adolescent pregnancies but only considered those between 15- and 19-year-olds. Also, Zer et al. (2020) established a link between low maternal age and high infant mortality with Verfuerden et al. (2020) providing insight to the risk being 4.38 times more likely compared to adult mothers. Contrary to the discussed results, Karataşlı et al. (2019:350) acknowledges the still birth rate being higher during their research but they state, "we did not conclude this in our study".

3.4 Child Development

3.4.1 Stunted and Foetal Development

Khatun et al. (2017) led a cohort study that monitored the IQ of 7223 children born to adolescent mothers at sperate intervals. The intervals were at 5 days old, 6 months old and 14 years old. A sub sample of 2643 children were monitored at 21 years old, all showing a clean trend linking low IQ in children born to adolescent mothers. Concurrently, Nguyen et al. (2019) represented stunted development in children born to adolescent mothers with a height for age score (HAZ) below two, of which was prominent in the pregnancies. Additionally, both Socolov et al. (2017) and Zer et al. (2020) agree that the biological immaturity of an adolescent mother puts the new-born at risk of stunted development. This is due to the mother's fat reserves not being able to mobilise normally because of the early age pregnancy which can affect development later in life (Zer et al., 2020). Owing to the mutual findings across the results, the research aim of linking adolescent pregnancy to poor child development is therefore validated.

3.4.2 Child Behavioural Issues

Agnafors et al. (2019) identified the connection between younger mothers and higher amounts of behavioural issues in their children. The Child Behavioural Check List (CBTL) with 100 items with answers such as "problematic" and "not problematic" was used in an extensive assessment on children (Agnafors et al., 2019:2). Results from this study found that 23.4% of children of mothers <18 experienced external behavioural issues in their children compared to those aged between 21 and 24. Likewise, Trommlerová (2020) adds that where children display challenging behaviour when born to adolescent mothers, they are more likely to experience physical punishment at any time. Yet, Khatun et al. (2017) provides statistics from their study

showing that 88.8% of children experienced abuse and physical punishment consequent to their behaviour, making the child's behavioural rationale somewhat difficult to determine.

3.5 Maternal Experiences

3.5.1 Maternal Mental Health

MMH proved to be a dominant subtheme with four studies having similar correlations with adolescent pregnancy. Khatun et al. (2017) used a seven-item scale from the Delusions Symptoms State Inventory: State of Anxiety and Depression (DSSI: SAD). The results revealed that there are higher rates of maternal depression in adolescents compared to the adult mothers used in the study with 35.9% showing symptoms. Also, Amankra (2018) and Agnafors et al. (2019) gave insight to the MMH prevalent in the adolescents in both of their studies resulting in a mean percentage of 31.5% experiencing depressive symptoms up to three years after birth. Moreover, Soares et al. (2021) provided statistics of separate mental health conditions in adolescent mothers such as 9.1% having anxiety disorders, 28.5% having mood disorders and, 12.6% showing signs of suicidality. These results imply a scientifical consensus that MMH is a risk associated with adolescent pregnancy, aiding the research aim.

3.5.2 Pregnancy and Labour Issues

Pregnancy and labour issues were an additional subtheme identified within five different studies. Socolov et al. (2017) and Karataşlı et al. (2019) learned during their studies that caesareans are more prevalent during adolescent childbirth with additional risks like cephalopelvic disproportion and pre-eclampsia. In agreement, Nguyen et al (2019) added that the adolescent mothers included in their study presented with higher rates of anaemia and nutritional issues compared to adult mothers. Moreover, Abebe et al. (2020) provides extra information explaining the rates of hypertension and the need for episiotomy during childbirth due to adolescent mothers being biologically immature. Overall, this confirms the research aim of identifying the risks associated with teenage pregnancy.

3.5.3 Deprivation

Deprivation became prevalent throughout five studies in conjunction with adolescent pregnancy. Khatun et al. (2017) discovered that 20.3% of adolescent mothers included in the research did not complete high school, depriving them of educational advantage. As a result, amongst other factors, maternal educational level was the leading cause of low IQ levels in their children. This was like the literature by Rexhepi et al. (2019) emphasising that educational deprivation in young mothers causes high rates of teen pregnancy and poverty due to job disadvantage. Therefore, this was positively associated with low school achievement within their children with only 36.5% finishing secondary school. Likewise, Agnafors et al. (2019) and Nguyen et al. (2019) agree that high rates of poverty and high school dropout rates are significantly linked to the leading causes of teenage pregnancy, with Verfuerden et al. (2020) adding that adolescent mothers across all countries included in the study fell into the most deprived in the quintile. Therefore, these results concur that higher rate of multiple deprivation types will significantly affect child development which validates the research aim and objective to discover the risk of adolescent pregnancy and poor child developmental outcomes.

4.0 Discussion

4.1 Early Birth Complications

The goal of this systematic review was to investigate the link between teenage pregnancy and the adverse risks this may have on child development. The author discussed and analysed the key findings from the selected peer-reviewed articles by comparing them to already existing literature to validate the aim of the review. A study by Bhaskar et al. (2015) validated that LBW is a co-occurring issue that links with adolescent pregnancy and can impair a child's future development. The cohort study included 318 women, 22.01% of whom were born to adolescent mothers aged 15 to 19, and over 16% were born with LBW. This makes the findings enlightened by Amankra (2018), Subedi et al. (2018), Abebe et al. (2020) and Harron et al. (2021) credible, confirming the aim of the review. Furthermore, the children born with LBW had greater rates of additional health issues and needed prenatal care, jeopardising their developmental capacity (Bhaskar et al., 2015).

However, Bhaskar et al. (2015) study also considered mothers aged 19 to 30 resulting in just under 21% presenting with LBW which, is a 5% comparison to adolescent mothers. This suggests that biological immaturity, as discussed by Trommlerová (2020), may not be the leading cause of LBW in adolescent mothers. Brosens et al. (2017) agrees with this statement but later argues with Trommlerová (2020) that biological immaturity is not the primary cause of LBW among adolescent mothers' children in their study. They examine how life stressors such as maternal marital age, educational level, and sociodemographic circumstances may also contribute to LBW in adolescence, leading to poor developmental outcomes. As a result, children may experience mild long-term developmental difficulties that influence their neuromotor functioning, cognition, and attention abilities (Martinson and Choi, 2019). Although the results of this study validate LBW as a developmental issue associated with adolescent pregnancy, the critical analysis implies that the leading cause is hard to determine. Overall, further research may be needed to gain a better understanding.

From the reoccurring themes, preterm birth was a comorbid condition commonly associated with LBW (Purisch and Gyamfi-Bannerman, 2017). The epidemiology of preterm birth estimates that 15 million births globally fall within this category and is discussed by Blencowe et al. (2013) as being the leading cause of infant mortality. Risks of preterm births on surviving

children include cerebral palsy, visual and hearing impairments, mental retardation, and stunted growth (Dodd et al., 2015). The result of this subtheme is supported by Alrahmani et al. (2017) retrospective study analysing additional risks associated with low gestational age and adolescent pregnancy on child development. Their outcome determined that the mean gestational age of the 59 adolescent mothers aged under 19 years old was 31 weeks. Yet, the small sample size from this study compared to the 7120 in Amankra (2018) project suggests that the results are not generalisable to the entire population. Therefore, questioning the validity of the results.

On the other hand, Stevens-Simon, Beach and McGregor (2002) confirm the findings from section 3.3.2 with their theory deliberating that incomplete teenage growth predisposes preterm birth on young mothers. This theory demonstrated that adolescent mothers' bodies are a biological obstetric risk factor that contributes to preterm birth and adverse developmental outcomes for the offspring. This conflicts with Verfuerden et al. (2020) findings of a 2% difference between adolescent and adult mothers delivering preterm. Developmental issues that occurred due to preterm birth were identified by Stevens-Simon, Beach and McGregor (2002) as poor foetal development, sensory impairment and, high infant mortality rates. Overall, this validated the risk of adolescent pregnancy contributing to poor child development outcomes.

Supportive of the results in section 3.3.3 and adding to the validity, the Nuffield Trust (2022) provided data concluding that infant mortality rates per 1000 in the UK for adolescent mothers are 60% higher than that of adult mothers. This is because of the high rates of teenagers living in poverty and the increased risk of accidents that may affect their well-being. Jaramillo-Mejía and Chernichovsky (2019) agree that infant mortality is a danger associated with teenage pregnancy. Their study explained that the lower maternal age presents a higher chance of a loss in life within their children up to one year after birth due to biological immaturity and adverse health risk, concurrent with Zer et al. (2020). This implies that the research aim is credible regarding risks associated with adolescent pregnancy and the impacts on child development.

4.2 Child Development

Concerning stunted and foetal development, an additional research project by Efevbera et al. (2017) was evaluated to certify the results of this systematic review. The study aimed to identify the risk of stunted development in children who are led into marriage <18.

Additionally, the study intended to rectify if maternal age, education status and economic stability had an impact on the risk of developmental delay. The results indicated that marrying early did not increase the risk of stunted development, however, conceiving, and enduring labour at a young age is significantly linked with stunted and foetal development delay (Efevbera et al., 2017). This also links with the theory previously discussed by Stevens-Simon, Beach and McGregor (2002), stating that the unfinished growth of a teenage mother foundations risks for healthy child development and therefore, poses a risk to the foetus' development. This confirmed the results discovered by Socolov et al. (2017), Nguyen et al. (2019) and, Zer et al. (2020) regarding the biological immaturity of teenage mothers having a significant impact on child developmental outcomes.

From the subtheme of child behavioural issues, literature by Mollborn and Dennis (2015) links adolescent pregnancy to adverse behavioural issues and low IQ in their offspring. The global longitude study, using the method of surveys, discovered that 63% of the teenage mothers <19 did not take part in daily play interactions that are discussed as crucial by Lindon and Brodie (2016) in the first three years of life. This resulted in the external behaviours displayed in their children. Although, surveys have limitations that may alter the results collected by the researcher as participants may not feel obliged to provide honest or accurate answers or provide answers which may portray the participant in an unfavourable manner (Andrade, 2020). This associates with the study conducted by Agnafors et al. (2019) where mothers completed a checklist regarding what they think are problematic and non-problematic behaviours displayed in their children. To provide insight, Goossens (2015) discusses the stresses that teenage mothers are faced with on top of being a mother such as higher rates of poverty, societal judgement, education, mental health conditions and the biopsychosocial changes that occur through puberty (Soma-Pillay et al., 2016). This validated results by Khatun et al. (2017) giving insight into the physical punishment and abuse inflicted on children which are positively associated with teenage pregnancy (Garwood, 2016).

4.3 Maternal Experiences

MMH was a significant factor within the results associated with teenage pregnancy and the adverse risks on child developmental outcomes. Issues that arise with MMH, as reviewed by WHO (2021), include problems with breastfeeding, maternal and infant bonding, brain development issues and insecure attachment types. The Mental Health Foundation (2013:5) provided statistics that enlightened the importance of MMH in young mothers stating that

“53% of teenage mothers experience post-partum depression”. Furthermore, a quantitative study by Russell (2017) discovered that out of the adolescent mothers included within the research with MMH, only 7% received specialised support for their condition. Additionally, 38% waited between four weeks and one year to obtain an initial appointment which overall, puts the mother and child at further risk. This closely links with the results presented by Soares et al. (2021), Khatun et al. (2017), Amankra (2018) and, Agnafors et al. (2019), validating the risk of adolescent pregnancy and adverse developmental outcomes on the child.

Comorbid with MMH, pregnancy and labour issues were positively associated with teenage pregnancy (Socolov et al., 2017; Karataşlı et al., 2019; Nguyen et al., 2019; Rexhepi et al., 2019; Abebe et al., 2020). Concurrent to the studies that provided the discussed results, Fleming et al. (2013) produced evidence that validates this subtheme. From the 23,000 adolescents included in the population-based cohort study, 47% experienced pregnancy and labour issues with problems such as ruptured membranes, higher rates of caesarean deliveries due to cephalopelvic disproportion, gestational diabetes, and infections. Conversely, a systematic review by Kassa et al. (2018) agreed that teenage pregnancy has higher risks during pregnancy and labour issues but argued that there are factors that may influence these risks. They add that most of their sources established that adolescent mothers are usually underweight, use drugs and alcohol regularly and, do not have safe sex which puts them at a higher risk of infection. Overall, adolescent pregnancy is linked with pregnancy and labour issues, although it may be beneficial for future research to be undertaken as it is not clear within the literature whether adolescent age or, additional factors are the leading cause of this issue.

The final point of the discussion is deprivation. This topic was too interconnected with teenage pregnancy and the developmental effects on their children. As discussed, low IQ and poor educational achievement in children were a result of the high rates of educational dropout displayed in teenage parents (Rexhepi et al., 2019). Birchall (2018:2) explained the influence of higher poverty rates and educational dropout in the UK, expressing that “girls who become pregnant or are married early may already have been performing poorly at school”. Also, Birchall (2018) provided international context regarding poverty, early marriage, and educational dropout. The document discussed the issues of early marriage and little to no school access in low-income countries such as Sub-Saharan Africa, contributing to higher rates of deprivation. Some policies in African countries ban pregnant girls from school, in violation of article 2 of the United Nations Conventions on the Rights of the Child (UNCRC) (1989),

which prohibits discrimination and, article 28 of the UNCRC, which emphasises the right to education. Based on this analysis, deprivation is a key contributing factor to poor developmental outcomes for children born to adolescent mothers, owing to higher rates of educational dropout and the consequences of early marriage (Khatun et al., 2017; Agnafors et al., 2019; Nguyen et al., 2019; Verfuerden et al., 2020).

4.4 Recommendations

The primary aim of this systematic literature review was to synthesise and critically analyse primary and secondary research regarding the risks of teenage pregnancy and the adverse effects this has on child development. Upon completion of the project, one recommendation that may require future research is the multiple factors associated with LBW. Although biological immaturity was the most common factor (Trommlerová, 2020), the critical analysis evidenced that the true reasoning behind this issue is unclear (Bhaskar et al., 2015; Khashan, Baker and Kenny, 2015; Del Mastro, 2021). Additionally, research failed to identify minimal evidence of cultural elements, which are clearly present in nations where child marriage is legal (Calder, 2013). Also, the primary reason for pregnancy and labour complications was not well-defined within the literature, indicating a gap and the need for specialised research (Kassa et al., 2018). Conducting further research regarding the deliberated gaps within the literature can enforce and improve any existing services and treatments that are available to help prevent further issues (Büyüközkan and Göçer, 2018).

4.5 Limitations

The systematic review included limitations, much like any other type of research. Publication bias was unavoidable when conducting a literature search utilising specified search terms, inclusion, and exclusion criteria (Garg, 2016). This is due to a lack of access to a wide range of databases where additional and relevant publications with results that could have interpreted the study's goal differently could have been located (Marks-Anglin and Chen, 2020). Geographical considerations were also a factor in the inclusion and exclusion criteria. Due to a shortage of peer-reviewed literature on the topic of the systematic review that were based in the United Kingdom, the researcher expanded the search to other parts of the world for a global perspective. As a result, the factors that influence adolescent pregnancy and poor developmental outcomes became more prominent. This made the factors that influence teenage pregnancy and the poor developmental outcomes on children difficult to determine as there are

different protective measures in different countries (Masten, 2015). Finally, the systematic review's topic might have benefited from being developed in the manner of a primary research project. A primary project may have increased the availability of information from first hand sources, implying that the information received would have been more reliable. Also, relatable trends may have been discovered to confirm LBW and labour issues to confirm these results alongside unique results that are generalisable to the population (BBC, 2021). Overall, this method may have yielded concrete and credible results for the research project's goal.

Conclusion

To summaries, the findings show that there is a substantial amount of data linking the risks associated with adolescent pregnancy to negative developmental outcomes for the child. Preterm birth, infant mortality, impaired development, behavioural difficulties, MMH, and maternal deprivation are all concerns connected with adolescent pregnancy, according to the fourteen articles reviewed. Throughout the literature review, it became clear that more research was needed to fill in the gaps regarding the cause of LBW in adolescent pregnancies and poor labour experiences. This was owing to conflicting information from other sources surrounding the elements that influence these outcomes. More study would be needed to answer the review's highlighted recommendations.

Overall, the systematic review confirms the link between adolescent pregnancy and poor developmental outcomes in their children. Although the risks discussed can be experienced in adult mothers within similar percentage brackets, it is clear through the presented evidence that teenage pregnancy is at a higher prevalence of risk. The implementation of laws, policies, and procedures in LMIC’s may help educate communities enforcing the need for further research and preventative strategies.

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