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Chapter

The Impacts of Parental Schizophrenia on the Psychosocial Well-Being of Offspring: A Systematic Review

Sabreena Hussain

Abstract

Previous literature has identified the development and prevalence of psychiatric disorders amongst offspring of those with schizophrenia. Little attention has been given to the investigation of the impacts of parental schizophrenia on the psychosocial well-being of offspring. Thirteen papers were chosen, and the quality was assessed using a quality assessment tool for cross-sectional and longitudinal studies. The results displayed an overall negative impact on aspects of psychosocial well-being on offspring of those with schizophrenia. The negative impacts of parental schizophrenia resulted in a higher prevalence of psychiatric disorders, lower levels of social functioning (social deficits), poorer employment situations, lower levels of self-concept (e.g. self-esteem and self-confidence) and lowered quality of life in comparison to healthy controls (HC) and other high-risk groups. Findings support the diathesis-stress model which suggests negative impacts on the psychosocial well-being of offspring are due to the interplay between genetic and environmental factors coinciding with vulnerabilities in the brain. This provides opportunities for clinicians to develop interventions for offspring of those with schizophrenia and rationalises public health to provide more funding for this group to be used as a preventative method.

Keywords: high-risk, schizophrenia, parental schizophrenia, offspring of parents with schizophrenia, high-risk offspring, psychiatric disorders

1. Introduction

Schizophrenia is a type of 'psychosis' which causes individuals to experience distressing symptoms [1] such as the lack of ability to distinguish between reality and one's own thoughts and beliefs [2]. Schizophrenia consists of positive symptoms which are those that are an addition to the individual (i.e. delusions and hallucinations) and negative symptoms which take away something from the individual (i.e. anhedonia and lack of social interest) according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; [3]). The prevalence of schizophrenia in the United Kingdom is 0.7% amongst a population of 74,176 [4]. The prevalence of schizophrenia in the United States of America is 0.5% amongst a population of 10,000,000 [5]. In a multinational study of 52 countries, the

prevalence of schizophrenia is 1.11% amongst a population of 181,445 [6]. This indicates that there is a high prevalence amongst a relatively small proportion of a population, the importance of investigating such individuals as a global concern.

Living with a close relative suffering from a mental illness may cause debilitating negative impacts on that individual such as developing symptoms of schizophrenia or the illness itself [7]. Researchers identified that the closer the relative to the individual with schizophrenia, the greater the incidence of being diagnosed with a psychiatric disorder [8]. Previous research has explored the heritable component of schizophrenia, also considered as the high-risk (HR) perspective in research, whereby the offspring of the individual with schizophrenia are investigated [9]. The genetic risk of developing schizophrenia for relatives of those with schizophrenia is within the range of 60–80% [10]. In addition, it was found that the risk for HR offspring to develop psychotic or other psychiatric conditions ranged between 15 and 40% [11]. Previous studies displaying the risk of developing schizophrenia and other psychiatric disorders identify the relatively high heritability of schizophrenia amongst HR offspring, which further suggests a possible genetic influence of the disorder. This may propose a model indicating the genetic influences of the susceptibility to negative outcomes, such as psychiatric disorders amongst the offspring, thus signifying the importance of investigating such individuals.

Moreover, research has explored the effects of parental schizophrenia on offspring and found that offspring living with one parent diagnosed with schizophrenia has been found to have a 13% risk of developing schizophrenia, in comparison to an increased 45% risk of developing schizophrenia of those with two parents clinically diagnosed [12]. Previous research has also highlighted upon the cumulative incidence across other cultural populations, whereby the cumulative incidence in Denmark for HR offspring was a 16.2% risk of developing schizophrenia [13], 10–15% in Edinburgh [14] and 13.1% in the United States of America [15]. Research also found that HR offspring developed negative symptoms associated with schizophrenia including anhedonia [16]. This builds upon the notion of schizophrenia being highly heritable, thus supporting the idea that there is a strong genetic vulnerability of negative outcomes on the well-being of offspring, such as symptoms of schizophrenia and other psychiatric disorders passed from parent to offspring.

In addition, previous literature has identified an increased risk of HR offspring developing psychiatric conditions other than schizophrenia which include personality disorders [13], thought disorders [17], depression [18] and attention deficit hyperactivity disorder [19]. Previous literature also reports higher comorbidity rates twice that of offspring without a parent with schizophrenia [15], suggesting that parental schizophrenia increases the risk of a dual diagnosis amongst offspring. This signifies the importance of investigating HR offspring, strengthening the idea that schizophrenia amongst parents has a strong genetic influence of negatively impacting well-being.

1.1 Psychosocial aspects

Furthermore, research has identified the impact of parental schizophrenia on the psychosocial well-being of HR offspring. The term 'psychosocial' impact concerns psychological aspects and the interaction between emotions, behaviours, feelings and social factors, e.g. social functioning [20]. Social factors refer to the way an individual lives different experiences via different attitudes and personalities [20]. Poor social functioning is a hallmark of schizophrenia [21]. The term 'well-being 'concerns an individual's optimal functioning level, physically and psychologically [22]. It also involves having a sense of comfort and happiness in one's own everyday living. This also overlaps with having a good quality of life, whereby an individual has a complete sense of physical and mental well-being. Quality of life differentiates slightly from

well-being, in terms of the individual's perception of their quality of life. Nonetheless, research has been conducted to investigate the social impacts on HR offspring. It was found that HR offspring present themselves as more socially dysfunctional than the control group [23]. Additionally, some research has found further negative impacts on the psychosocial well-being of HR offspring such as decreased quality of life [7], reduced self-esteem [24], inability to express emotions [25], deficits in social competence [26] and higher rates of behavioural issues [27]. It has also been found that poor social functioning predicts the later development of schizophrenia [28], indicating an association between psychosocial aspects and the diagnosis of schizophrenia amongst HR offspring. This suggests that the genetic influence of negative impacts of parental schizophrenia extend to psychosocial functioning which appears to be impaired amongst HR offspring. This identifies that not only is the HR offspring susceptible to psychiatric conditions but also vulnerable to impaired psychosocial functioning, implying a genetic propensity provided by the parent to their offspring.

In contrast, research has identified other impacts on HR offspring unrelated to the psychosocial aspects previously stated, which includes poor academic performance [29, 30], working memory deficits [31], high offending rates [32], higher mortality rates [33] and poor self-reported physical health [34]. As much research has focused on aspects unrelated to the psychosocial well-being of HR offspring, it is important to focus on the under-researched aspects of the HR perspective. This further highlights the importance of identifying the underlying mechanisms involved.

1.2 Brain abnormalities

As previous research has found schizophrenia to be highly heritable amongst HR offspring [35], this raises questions regarding the underlying mechanisms and processes that make schizophrenia heritable. Studies have explored the neurological pathways amongst those with schizophrenia and have found there to be altered brain connectivity and volumetric brain differences, resulting in symptoms of schizophrenia amongst these individuals [36–38]. It has been found that HR offspring of those with schizophrenia have volumetric deficits in brain connectivity and networks, resulting in abnormal brain functioning and consequently symptoms of schizophrenia [39, 40]. Volumetric brain reductions have also been found amongst HR offspring in the hippocampus, amygdala [41] and the frontal and temporal lobes [42]. These findings indicate the existence of brain abnormalities amongst those with schizophrenia, suggesting that parental schizophrenia negatively impacts HR offspring due to the genetically transmitted brain vulnerability. This also implies that the brain abnormalities are present from birth, and thus, HR studies exploring the developmental trajectories of the illness using longitudinal studies will be able to map out the disorder and biological markers involved. Longitudinal studies can further identify a potential critical period for the development of negative psychosocial impacts on HR offspring.

1.3 Environmental influences

Moreover, the HR perspective has been investigated in different types of environments in which the offspring is living away from the parent with schizophrenia through carrying out adoption studies. Adoption studies aid in eliminating the environmental impacts of living with a parent suffering from schizophrenia. Parental schizophrenia can result in a distorted environment for the HR offspring resulting in negative outcomes such as schizophrenia and other psychiatric conditions. By conducting adoption studies, this will allow a nature and nurture argument can take place [8]. It was found that adopted children were more likely to

develop schizophrenia, if they had a biological parent suffering from schizophrenia, in comparison to those that did not [43]. This supports the idea that schizophrenia is genetically transmitted strengthening the notion that neurological pathways are distorted amongst HR offspring as with the parents. Therefore, this indicates that not only is there a genetic influence but there is also an environmental influence, suggesting a gene-environment interaction arising from the development of negative impacts on the psychosocial well-being of offspring.

Moreover, another method to explore the HR perspective is by exploring HR offspring that are twins in studies. This allows an enhanced perspective regarding genetic and environmental influences to be considered. Twin and adoption studies found that the risk of HR individuals developing schizophrenia was 9% for siblings, 13% for HR offspring with one parent suffering from schizophrenia and 46% for HR offspring with two parents [44]. As there was found to be a genetic risk amongst twin and adoption studies for HR offspring, these findings also display an environmental influence as the genetic risk is not 100%. Therefore, there must be other factors within the offspring's environment involved in the development of schizophrenia suggesting a possible diathesis-stress model of schizophrenia. The diathesis-stress model is the idea that mental illnesses are developed from a genetic or biological component of a particular illness (i.e. schizophrenia) which is combined with stressful environmental factors, which all influence the vulnerability for a mental illness. In this particular instance, this involves negative environmental factors interacting with the genetic vulnerability for schizophrenia amongst HR offspring, resulting in an elevation of risk and heritability in the development of negative impacts on the psychosocial well-being of offspring [45].

Furthermore, extending beyond the idea that environmental factors elevate the risk for developing psychological difficulties, much research has been conducted within this area exploring other factors. This includes factors such as unemployment and socio-economic disadvantage [12], childhood sexual abuse [34], marital conflict amongst the parents of HR offspring [46], poor upbringing due to hospitalisation of parents or neglect [47], inadequate parental care [48] and other stressful life events such as loss and traumatic events [49, 50]. Stressful life events have the potential to trigger the onset of symptoms of schizophrenia and other disorders [51]. Such studies, highlighting upon the environmental factors involved in the developmental trajectory of schizophrenia, strengthen the proposed diathesis-stress model explaining why negative outcomes occur in HR offspring. This is by demonstrating that the environment acts as a stressor in increasing the genetic risk and heritability of schizophrenia and symptoms involved.

1.4 The current review

This systematic review is exploring the following psychosocial aspects influencing the well-being of HR offspring: social skills and functioning, self-concept, quality of life, employment situation and the prevalence of disorders and emotional/behavioural symptoms. Regarding the term 'social skills and functioning', this includes self-esteem and self-concept. Due to the limited amount of research within these domains, it would be worthy to investigate and obtain insightful formulations.

A review is needed with recent studies that build upon the HR research but also focus on the psychosocial impacts signifying a diathesis-stress model, linking parental schizophrenia and negative impacts on HR offspring. This is because awareness can be raised and possible support can be given to HR offspring as a preventative technique regarding the prevention of negative psychosocial impacts. Current interventions focus on aiding the parent with schizophrenia but should also be put in place to aid the HR offspring [12].

1.4.1 Aims

To identify the impact of parental schizophrenia on the psychosocial well-being of HR offspring.

To explore the likelihood that HR offspring will develop schizophrenia or other psychiatric conditions.

2. Methods

This paper is a systematic review compiled of cross-sectional and longitudinal studies. The findings of the articles were presented into a narrative synthesis. An extensive search strategy was adopted to identify relevant papers using applicable terms and synonyms. The process involved a critical evaluation of relevant papers and steps to be followed such as searching databases according to the inclusion/exclusion criterion, data extraction and quality assessments of relevant papers. An electronic database named PROSPERO was also searched to identify pre-existing systematic reviews within the chosen topic to minimise any potential bias and identify the 'grey literature'. The selection strategy of papers was divided into categories comprising of population, exposure, comparator and outcome(s), shown in **Figure 1**.

2.1 Study selection

The articles retrieved from the databases in accordance to the selection criteria were imported into EndNote, an electronic reference manager. Duplicate articles were also deleted and were then examined to be included and excluded in accordance to the stated criterion for PECO. Those that were excluded were justified with

	Inclusion Criteria	Exclusion Criteria
Population	Individuals who have a parent with a sole diagnosis of schizophrenia, not exclusive to the DSM-IV [3]. Offspring who have a parent with schizophrenia and are considered High-Risk (HR).	Individuals who have a parent with a diagnosis of any other mental illness except schizophrenia. Infants (aged below two years).
Exposure	Offspring who have a parent with schizophrenia and are considered High-Risk (HR)	Offspring whom have a parent with any other diagnosed mental illness apart from schizophrenia (e.g. bipolar disorder, depression).
Comparison	Healthy Controls (HC; offspring who do not have a parent with mental illness) and offspring with parents with psychiatric disorders (OHR; other High-Risk) other than schizophrenia such as bipolar disorder.	
Outcome(s)	The psychosocial impacts of parental schizophrenia on offspring which includes social functioning and skills, quality of life, employment situation, self-concept and prevalence of emotional/behavioral symptoms and psychiatric disorders.	Other outcomes irrelevant to impacts on psychosocial well-being such as outcomes on neurodevelopmental characteristics, cognitive functions etc.

Figure 1.
Inclusion and exclusion summary of PECO.

reasons documented. Those articles with only abstract access were also removed due to limited information provided. Those articles that were remaining were also peer reviewed by two other individuals who were MSc students at Queen Mary University to prevent any errors and bias being made during the selection process. This involved a brief peer review examining the chosen article titles, authors and abstracts to identify relevancy to the topic.

2.2 Quality assessment

Articles were assessed to identify the level of quality of each study using the Joanna Briggs Institute Critical Appraisal Checklist for Analytical Cross-Sectional Studies [52]. This tool was utilised to highlight upon any potential limitations in cross-sectional studies. Articles that utilised longitudinal methods were assessed for quality using the Critical Appraisals Skills Programme [53].

3. Results

A total of 13 articles were chosen for this current review. A PRISMA flowchart [54] was produced to allow a visual representation of the selection process

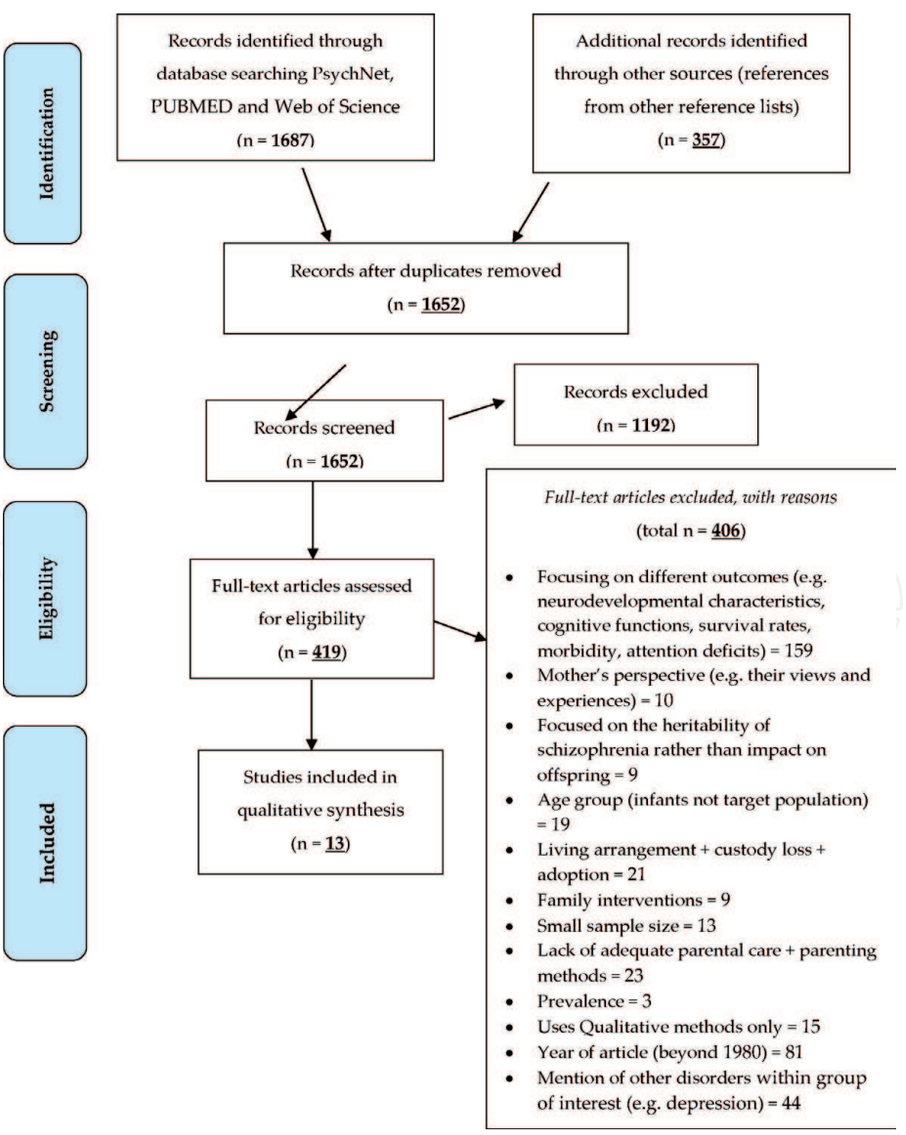


Figure 2.
PRISMA flow diagram displaying the selection process [54].

(see **Figure 2**). A total of 1192 records were initially excluded due to having no relevance at all, to the topic of interest. The remainder of full-text articles was then screened for further relevance (n = 419). As a result, 406 articles were excluded, and relevant reasons were given such as focusing on different outcomes unrelated to the outcomes of this review.

3.1 Participant characteristics

Across all chosen studies, there were a total of 1963 offspring who participated in which ages ranged from 5 to 50 years with mean age ranges from 9 to 43 years (displayed in **Table 1**) from different ethnicities and background.

Article	Sample size	Age	Group of interest	Comparator	Ethnicity
[7]	61 daughters	30–50 years (HR mean = 43, HC mean = 41)	HR = 31 (all female)	HC = 30 (all female)	Recruited from the Israeli foundation mental health centre
[55]	51	18–43 years (mean = 29)	HR = 51 (male = 25, female = 26)	None	Obtained in Tokyo, Japan
[56]	244	19–35 years (HR mean = 19, FE = 25, ME = 36, HC = 22)	HR = 86 (male = 49, female = 37)	HC = 55 (male = 33, female = 22) FE = 50 (male = 30, female = 20) ME = 53 (male = 38, female = 15)	Caucasian 84–93% African American 2–7% Other 5–18%
[57]	150	7–12 years (mean = 9)	Childhood HR = 46 (males = 24, females = 22) Adolescent HR = 32 (males = 20, females = 12)	Child HC = 65 (males = 37, females = 28) Adolescent HC = 58 (males = 35, females = 23) Child OHR = 39 (males = 18, females = 21) Adolescent OHR = 35 (males = 16, females = 19)	Collected from New York, USA
[58]	116	12–22 years (mean = 17)	HR = 41 (males = 21, females = 20)	HC n = 36 (males 22, females = 14) OHR n = 39 (male = 23, females = 16)	Obtained from Jerusalem
[59]	150	5–18 years	High-risk offspring = 50	HC = 5, OHR = 50	Data collected in East Azerbaijan, Tabriz

Article	Sample size	Age	Group of interest	Comparator	Ethnicity
[60]	60	5–16 years (HR mean = 11, HC mean = 10)	HR = 30 (male = 13, female = 17)	HC = 30 (male = 14, female = 16)	Obtained from New Delhi, India
[61]	52	5–19 years (mean = 12)	High-risk offspring n = 17 (male = 7, female = 10)	Healthy control n = 35 (male = 13, female = 22)	HC = 22% non-white, HR = 41% non-white
[62]	157	9–21 years (mean = 16)	HR = 75 (male = 34, female = 41)	HC = 82 (male = 40, female = 42)	Data collected in Western Pennsylvania, Pittsburgh
[63]	90	13–26 years (HR mean = 19, HC mean = 18)	HR = 35 (male = 16, females = 19)	HC = 55 (males = 24, females = 31)	White >50% African American <20% Hispanic <23% Asian <9% other 3%
[64]	60	18+ (HR mean = 21.5, HC mean = 20.7)	HR = 30 (male = 21, female = 9)	HC = 30 (male = 21, female = 9)	Obtained from Bangalore, South India
[65]	431	18+ (mean = 27.6)	HR = 431 (male = 233, female = 198)	No control group	Data collected in Cuiaba, Brazil
[66]	341	Not known	HR = 155	HC = 186	Data collected in Finland

Table 1.
Participant characteristics.

3.2 Comparators

The comparator in all studies included used healthy controls (HC) with the exception of [55], whereby in this study, a control is not stated (see **Table 2**). Some of the studies [56–59] used a comparison of offspring of those with a mental illness other than schizophrenia (OHR).

3.3 Effect size and mean differences

Across all studies within the HR, HC and OHR groups, the mean incidence ratings/scores and effect sizes were similar to that of the control group and also were not 100%.

3.4 Assessment of quality

Overall, the majority of studies used a clearly defined inclusion and exclusion criteria similar to that of this review. Also, the diagnoses of parents with schizophrenia were clearly established using reliable and valid methods amongst all studies (**Tables 3** and **4**).

Article	Aims/objectives	Design	Measures	Population	Exposure	Comparator	Outcomes
[7]	Quality of life in HR offspring	Cross-sectional study	Questionnaires	61 offspring	HR offspring	HC group	Lowered quality of life and negative emotions in HR
[55]	Psychiatric disorder and level of social functioning in offspring and cultural comparison	Longitudinal study	Questionnaires and demographic information	51 HR offspring	HR offspring	No control	Incidence of SZ was 13.7% HR did not significantly affect the risk in Japanese offspring and social functioning
[56]	Social functioning levels in HR individuals	Cross-sectional study	Questionnaires	244 participants	HR offspring	HC, offspring experiencing first episode of psychosis (FE), offspring experiencing multi-episode psychosis (ME)	Significant deficits for HR in social functioning long before onset of potential psychosis
[57]	New York High-Risk Project, social competence and affective deficits amongst offspring	Longitudinal cohort study	Child and parent report and counting broad smiles assessed via interviews	150 offspring	HR subjects	HC and OHR group	HR adolescents the greatest social and affective deficits
[58]	Symptoms in offspring	Longitudinal cohort study	Records collected (1991–1995) and structured clinical interviews	116 adolescents from 61 families	HR offspring	HC group and OHR group	Greater prevalence of disorders in HR group, greater for males
[59]	Prevalence of emotional and behavioural disorders	Cross-sectional study		150 offspring	HR offspring	HC group and OHR group	Higher prevalence of emotional and behavioural symptoms in HR group
[60]	Psychosocial effects in offspring	Cross-sectional study	Questionnaires and interviews	60 offspring	HR individuals	HC group	HR group significantly scored greater on internalising/externalising behavioural problems

Article	Aims/objectives	Design	Measures	Population	Exposure	Comparator	Outcomes
[61]	Social deficits amongst high-risk offspring	Cross-sectional study	Questionnaires and interviews	52 offspring	HR offspring	HC group	The HR had worse social skills, assertion and empathy outcomes
[62]	Prevalence of psychopathology in HR offspring	Cross-sectional study	Interviews	157 offspring	HR individuals	HC group	HR offspring had increased risk for one or more psychiatric disorders (60%)
[63]	Social development (i.e. personality traits) and psychopathology amongst HR individuals	Longitudinal study	Seven tests and questionnaires assessing psychopathology, personality traits and social development	90 offspring	HR subjects	HC group	HR displayed less positive involvement, poor physical anhedonia and less cooperation
[64]	Self-concept in HR offspring	Cross-sectional study	Questionnaires	60 subjects	HR group	HC group	Poorer self-concept in HR
[65]	Social impacts in HR offspring	Cross-sectional study	Questionnaires	431 offspring	HR individuals	No control group	HC—poor employment situations and lowered marriage rates
[66]	Prevalence of psychopathology in adopted offspring	Cross-sectional study	Interview and questionnaires	341 offspring given up for adoption	HR offspring	HC group	HR has a higher percentage of psychiatric disorders

Table 2.
Data extraction table.

Article	Outcome 1	Outcome 2	Effect size/mean difference
[7]	HR group had significantly lower quality of life and greater negative emotions than positive emotions	Lower levels of family functioning, greater resource loss and lower resource gains	Mean scores: quality of life score HR = 2.85, HC = 3.42 Negative emotions: HR = 2.56, HC = 3.35 Positive emotions: HR = 3.22, HC = 3.8
[55]	Psychiatric disorder prevalent amongst HR offspring	Social functioning not significantly impacted by parental schizophrenia	Incidence for schizophrenia amongst Japanese offspring was 13.7%
[56]	Deficits in social functioning prior to onset of psychosis in HR group	HR group scored higher for quality of life in comparison to ME and FE group	Mean scores of social functioning HR = 125.29, FE = 129.14, ME = 136.53, HC = 161.65
[57]	Greater social and affective deficits amongst HR group	Poorer social competence, affective flattening and reduced smiling per minute. Higher scores for social competence and affective flattening reflect greater pathology	Mean incidence of social/affective deficits: social competence child HR = 0.17, adolescent HR = 0.49, child OHR = 0, adolescent OHR = −0.06, child HC = −0.11, adolescent HC = −0.19 Affective flattening Child HR = 0.42, adolescent HR = 1.1, child OHR = 0.38, adolescent HR = 0.62, child HC =0.46, Adolescent HC = −0.68 Smiling Child HR = 0.58, adolescent HR = 0.49, child OHR = 0.63, adolescent OHR = 0.93, child HC = 0.72, adolescent HC 0.97
[58]	HR at highest prevalence disorders amongst the schizophrenia spectrum, avoidant personality disorder and anxiety	Highest prevalence in males	Incidence of disorders: HR = 17.1%, OHR = 7.7%, HC = 2.8%
[59]	HR group displayed significantly greater prevalence of emotional and behavioural symptoms in HR group ($p < 0.01$)	No significant difference in gender and age distribution, family income, education levels and socio-economic status in HR group	Incidence of emotional/behavioural symptoms (standardised means-effect size): HR = 1.33, HC = 0.43, OHR = 0.71
[60]	Highest prevalence of internalising/externalising behavioural problems for HR group	No significant differences in education, religion, employment, monthly income and gender	Mean incidence of internalising/externalising behavioural problems: HR = 39.13, HC = 31.53

Article	Outcome 1	Outcome 2	Effect size/mean difference
[61]	HR group scored worse on social adjustment across all periods of development. HR group had poorer social skills than HC group Majority of social skills deficits were within domain of assertion and empathy	Anomalous findings were that eight subjects in HR group displayed excellent social skills and nine subjects in HR group displayed below normative scores with none in the mid-range No differences observed in age, education and occupation level	Mean score for social skills: HC = 109.5, HR = 99.2 Lower scores represent poorer social skills

Table 3.
Summary of outcomes.

Article	Outcome 1	Outcome 2	Effect size
[62]	Greater risk for one or more psychiatric disorders amongst HR group	No significant difference amongst age or gender	Incidence of psychopathology; HR = 60%
[63]	Lowered positive involvement, poor physical anhedonia and less cooperation in HR offspring	HR offspring 17 years and above displayed poor physical anhedonia and positive involvement whereas older HR displayed less cooperation	Cohen's d: Social difficulties = 0.88 (HR > HC) Physical anhedonia = 0.66 (HR > HC) Cooperativeness = −0.57 (HR < HC) Positive involvement = −0.69 (HR < HC)
[64]	HR group had lower scores on self-concept indicting poorer self-esteem and self-confidence in comparison to HC group Positive correlation between duration of parent illness and self-esteem in HR group	Duration of illness of parent was 11.67 years. Early-onset subjects (<10 years of age) showered lower scores on self-esteem than late-onset subjects (>10 years of age). Mean age of onset 10.6 years	Mean self-concept: Personal self-esteem: HR = 64.43, HC = 75.3 Self-confidence: HR = 66.07, HC = 76.03
[65]	Offspring had poor employment situations indicating poorer social adjustment HR offspring	24.8% of male offspring had a reported mental disorder, and 16% of female offspring had a reported mental disorder	Employment: 66.7% Married = 61.4% Mental disorder = 21%

Article	Outcome 1	Outcome 2	Effect size
[66]	HR group had a greater prevalence of psychiatric disorders than HC group	Psychiatric disorder occurred in disturbed familial environments	No diagnosis: HR = 51%, HC = 57% Personality disorder: HR = 19.4%, HC = 13.4% Psychosis: HR = 8.4%, HC = 0.5% Schizophrenia: HR = 5.2%, HR = 0.5%

Table 4.
Summary of outcomes.

4. Discussion

This review presented evidence for the impacts of parental schizophrenia on the psychosocial well-being of offspring. There appears to be many similarities across the studies such as similar negative outcomes, i.e. the greater incidence of psychiatric conditions amongst HR offspring in comparison to controls. The findings identified the negative impacts of parental schizophrenia on the psychosocial well-being of offspring highlighting upon the heritability of schizophrenia, extending beyond those that are clinically diagnosed.

4.1 Prevalence of disorders

A preliminary synthesis of the research found that HR offspring had a greater prevalence of behavioural and emotional disorders in comparison to those without a parent with schizophrenia. It was also found there to be a greater prevalence of psychiatric disorders amongst HR offspring; for example, it was found there to be a 13.7% prevalence of psychiatric disorders amongst HR offspring [55]. Furthermore, HR offspring are at greater risk in developing at least one or more psychiatric conditions. It appeared that the greatest prevalence was for personality disorders amongst HR offspring. This signifies the negative impact parental schizophrenia has on the psychosocial well-being of HR offspring, regarding the development of a psychiatric disorder.

4.2 Social skills

Research identifies a negative influence of parental schizophrenia on HR offspring, arising deficits in social skills in the domains of social competence, reduced smiling, affective flattening, assertion, empathy, cooperation, positive involvement, physical anhedonia, self-esteem, self-confidence, social adjustment and employment situation. This emphasises upon the debilitating negative impacts of parental schizophrenia on the psychosocial well-being of offspring.

4.3 Internalising and externalising behavioural problems

Furthermore, it was found there to be a greater prevalence of internalising and externalising behavioural problems amongst HR offspring in which the incidence was greater for the HR group than the HC group [60]. HR offspring were also found to have *fewer positive emotions*, *greater negative emotions and reduced quality of life*, all of which differed from the HC group in mean scores [7]. This highlights upon the behavioural issues experienced for HR offspring further indicating a negative impact on the psychosocial well-being of HR offspring.

The findings of this review build upon the idea that parental schizophrenia influences the development of psychiatric disorders amongst HR offspring [7, 8, 10–15, 17–19, 35, 43–45, 62] which have also identified the development of psychiatric conditions amongst HR offspring. Moreover, the stated findings also build upon the idea that parental schizophrenia arises social deficits amongst HR offspring as also detailed in previous literature [7, 12, 23–28]. Overall there is a negative impact of parental schizophrenia on the psychosocial well-being of offspring as displayed across all studies. This signifies a genetic propensity being passed from the parent with schizophrenia to the offspring.

There were several interesting findings unrelated to the psychosocial well-being of HR offspring. Firstly, it was found that the prevalence for psychiatric disorders in HR offspring was higher for males than females, arising questions into potential gender characteristics, such as different coping mechanisms resulting in differed psychosocial distresses [58, 65]. The predominance of males in some studies and females in other studies may aid in differentiating the impacts of gender on the psychosocial well-being of HR offspring. Moreover, social functioning amongst HR Japanese offspring was not significantly impacted, which suggest cultural differences amongst HR offspring regarding psychosocial well-being [55]. Overall, studies included in this review cover a broad range of cultures, allowing the conclusions of this review to be generalised to many cultures, whilst building upon previous literature and highlighting upon the cumulative incidences across cultures [13–15]. Future research may look into examining western and non-western cultures to make comparisons along with the investigation of gender differences.

In addition, an anomalous finding arose, in which eight HR offspring had excellent social skills and nine HR offspring displayed below average scores, none of which were within the average on measures of social skills [61]. This suggests that offspring within this study had extreme scores on each end but may have been due to the relatively small sample size. Interestingly, it was also found that poor physical anhedonia and positive involvement were present in those aged 17 years and below, whereas those aged above 17 years displayed lower cooperation levels [63]. This highlights differences in age, in which future studies could address by comparing different age groups. Findings presented strengthen the diathesis-stress explanation. In addition, this may indicate possible ideas for intervention strategies targeted for different age groups. Therefore, these particular results can inform clinicians and therapists of the psychosocial impacts parental schizophrenia has on different age groups.

Moreover, another study found [7] lower levels of family functioning and a greater perception of losses in resources and lowered resource gains. This suggests that there are negative impacts of parental schizophrenia unrelated to the psychosocial outcomes as the environmental stressors involved in this study were lowered levels of family functioning. These environmental stressors regarding family functioning could have been maltreatment, neglect or an unidentified stressor. This finding could identify as a confounding factor, as these outcomes may have resulted in the lowered quality of life and greater negative emotions. Therefore, it may be difficult to examine a causal relation between parental schizophrenia and the impact this has on the psychosocial well-being of HR offspring. Future research may consider investigating these aspects to distinguish the extent to which this impacts HR offspring. It was also found that those within the HR group had higher scores on measures of quality of life than the ME and FE group [56]. This suggests that there are confounding factors influencing the findings in an opposite direction. Highlighting upon the existence of possible confounding factors, there was a greater prevalence of psychiatric disorders amongst HR offspring in disturbed familial environments [66]. This implies that the environmental factors surrounding HR offspring may play an important role in the development of negative impacts on the psychosocial well-being of HR offspring.

4.4 Confounding factors

Environmental factors are important to identify, as these alone can result in negative outcomes such as the incidence of psychiatric conditions amongst HR offspring. This is because the offspring may experience an upbringing whereby the environment is distorted, thus elevating the risk for negative impacts on the psychosocial well-being of offspring. Across all findings, the effect sizes and mean differences between the HR groups and control groups were not 100%, suggesting other factors influencing the onset of negative psychosocial distress and difficulties. Also, there were not vast differences between the HR group and control groups regarding the effect sizes and mean differences, for example, it was found there to be mean incidence of 39.15 for externalising/internalising behavioural issues amongst HR offspring, in comparison to a 31.53 mean incidence for the HC group [60]. This supports the idea that the environmental factors play a role in the negative impacts, further strengthening the idea of a diathesis-stress explanation.

The direction of the findings may have been due to the participant size across studies. Most studies included had a relatively large sample size [56–59, 62, 63, 65, 66]. However, some studies had a relatively small sample size. The small sample size amongst these particular studies may have resulted in the effect size and mean incidence scores/ratings produced and thus reducing the statistical power and generalisability of these findings. Therefore, future reviews may aim to include studies consisting of a relatively larger sample, similar to each other and the control groups, to prevent biased findings.

There were many confounding factors which were not mentioned or described such as environmental factors, including maltreatment, child abuse, marital conflict and other stressful life events as detailed in previous literature [12, 34, 44–49, 51]. This may imply that poor psychosocial functioning may not be due to having a parent with schizophrenia but rather the surrounding environment of the offspring. Previous literature identifies a link to the negative impacts on the psychosocial well-being of HR offspring which may suggest and support the diathesis-stress model of the development of these outcomes. This model suggests that environmental factors increase the risk of developing psychological difficulties, particularly amongst HR offspring as they have a genetic vulnerability as mentioned in previous literature [36–42] in which an environmental stressor occurs which triggers a negative outcome (i.e. the onset of a psychiatric condition or symptom), also stated in previous literature [43, 44]. To summarise, findings cannot establish which factor causes the outcome; therefore, future research must aim to address this by incorporating the measures for environmental factors.

Moreover, findings revealed there to be a positive correlation between the duration of parental schizophrenia on the self-esteem of HR offspring [64] which suggests that the longer the parent was diagnosed with schizophrenia, the greater the self-esteem scores within the HR group (mean duration of parental illness = 11.67 years). This is a confounding result, as it implies that parental schizophrenia in the long-term had an almost reversal effect on scores of levels of self-esteem. This may have been due to the HR offspring being able to adjust and adapt to their parent's mental illness over time, which also further suggests confounding factors involved in this outcome. All other studies included did not sufficiently state the duration of parental illness or age of offspring at which parent diagnosis occurred. This is an important aspect for future studies to address.

Furthermore, it was also found that HR offspring had lower self-esteem in early-onset offspring, in comparison to later onset offspring in which self-esteem scores were higher (mean age of onset = 10.6 years) [64]. This indicates that the younger the offspring is when their parent is diagnosed, the worse the impact this has on

HR offspring's self-esteem levels. This further indicates that age has an impact on the vulnerability of HR offspring, in which developmental literature can address in future research, by conducting more longitudinal studies to map the trajectory of this vulnerability and make comparisons between different age groups (i.e. less than 10 years old and greater than 10 years old). Moreover, parental physical illness was incorporated by eliminating HR offspring of those that were suffering from chronic physical illnesses [64], to minimise the effect of this stressor. This is because this may cause greater significant stress on the HR offspring, which may impact the psychological difficulties the HR offspring may encounter. Therefore, to minimise bias amongst the findings, these particular HR offspring were excluded from the study.

Considering living arrangements amongst HR offspring, the HR perspective was explored amongst those adopted offspring living away from the biological parent suffering from schizophrenia [66]. Findings revealed that HR offspring still displayed a greater prevalence of psychopathology in comparison to the HC group. This finding highlights upon a predominant genetic vulnerability amongst HR offspring, despite being reared away from their biological parent with schizophrenia. This builds upon previous literature [36–42] highlighting upon the idea that brain abnormalities are genetically transmitted to HR offspring, thus supporting a diathesis-stress explanation.

4.5 Clinical implications

The findings build upon the idea that parental schizophrenia negatively impacts the psychosocial well-being of HR offspring regarding the following aspects: the prevalence of emotional and behavioural symptoms, internalising and externalising behaviours, psychiatric conditions, lowered quality of life, poorer self-concept, social adjustment, social functioning and employment situation. The greatest impact across studies in this review was the impairments in social functioning, which can be interpreted using the diathesis-stress explanation. The genetic vulnerabilities appeared to have been transmitted from parent to offspring, whereby environmental factors and stressors surrounding these individuals triggered an onset of these impairments. This review provides a more current set of findings with the inclusion of social impacts as well as psychological impacts, in comparison to the previous systematic review based solely upon the development of psychiatric conditions of HR offspring [11].

The current findings can aid public health authorities in raising awareness for this HR population by means of prioritising education in mental health, mass media and by increasing public funding. Revelations can also encourage early visits to mental health centres for screenings and evaluations to prevent and provide support [12]. It can also inform clinicians about targeted intervention strategies for HR offspring, such as taking into consideration the developmental differences in the onset of psychosocial distress. All these aspects can either prevent the later emergence of psychosocial difficulties or reduce experienced.

5. Conclusions

Overall, the implications for having a parent with schizophrenia have a negative impact on the psychosocial well-being of offspring. There are also implications concerning the development of psychiatric conditions including schizophrenia amongst HR offspring. Future research will be able to develop upon ideas and notions gathered, regarding the extent to which parental schizophrenia impacts the psychosocial well-being of offspring. This review highlights upon the demands and needs of HR offspring, which requires greater awareness to be made, allowing not only the parent to receive support but also the HR offspring.

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Author details

Sabreena Hussain
Queen Mary University, United Kingdom

*Address all correspondence to: sabreenahussain07@hotmail.co.uk

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