Examining the evidence of transgenerational transmission of PTSD between parents and their offspring

Thesis in Medicine
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Abstract

Background: Posttraumatic stress disorder (PTSD) is a common disease worldwide. Certain populations are at a higher risk of developing Posttraumatic Stress Disorder, specifically people who have been exposed to war-related trauma. This raises the interest of whether there is an impact of parental PTSD on the mental health of their offspring. The aim of this study is to understand the evidence of transgenerational transmission of parental PTSD and the effects this has on their children.

Methods: A search was conducted in the reference-database Public Medline (PubMed). Using MeSH-words and synonymous textwords for PTSD and transgenerational transmission resulting in N= 128 articles. Subsequently inclusion and exclusion criteria were used to obtain a final 11 articles and two additional articles from the examination of reviews.

Results: Of the 13 studies, there were five different study-designs. Seven of which were case-control studies, two cohort studies, top cross-sectional studies, one case-report study and one pilot-study. Ten of the studies in this review found an association between parental PTSD and a transgenerational transmission of it to their offspring. Three studies did not find any association between parental PTSD and transgenerational transmission of this to their children.

Conclusions: The majority of the studies showed a correlation between parental PTSD and an impact of this among their children. The symptoms of transgenerational transmission among children are various, and different factors appear to play a role in the transgenerational transmission of PTSD. This indicates that for a greater understanding of this relationship, further research that takes these factors into account is necessary.
Abstract

Baggrund: Post-traumatisk stress syndrom (PTSD) er en udbredt sygdom på verdensplan. Visse populationer er i større risiko for at udvikle PTSD, især mennesker som er udsat for krigsrelaterede traumer. Dette vækker en interesse for, hvorvidt forældre med PTSD kan påvirke deres børns psykiske velvære. Formålet med dette studie er således at undersøge evidensen af transgenerational transmission af PTSD fra forældre til deres børn.

Metode: I dette studie er søgningen foretaget i database Public Medline. Der er anvendt MeSH-ord og synonyme tekstord for PTSD og Transgenerational transmission, hvilket har resulteret i N=128 artikler. Efterfølgende blev der ud fra inklusions- og eksklusionskriterier opnået 11 relevante artikler samt to yderligere artikler ved gennemgang af reviews.


Konklusion: Størstedelen af disse studier har vist en korrelation af forældre med PTSD og en påvirkning af dette hos deres børn. Der er forskellige symptomer af transgenerational transmission fra forældre med PTSD til deres børn, og forskellige faktorer kan muligvis have en betydning for transgenerational transmission af PTSD. Yderligere studier bør iværksættes med det formål at tage højde for disse faktorer og således give en bedre forståelse af dette forhold.
Introduction
Instances of Post-Traumatic Stress Disorder (PTSD) have been described as early as the American Civil War. At the end of 1800s the disease was called Da Costas Syndrome, or Soldier’s heart, and during the First World War, it was described as shell shock (1) p. 209. The disease was often misunderstood, and many of the soldiers with symptoms of PTSD were executed as deserters. However the disease later became acknowledged after being described by many American soldiers who participated in the Vietnam War, and shortly after it was introduced into the American diagnostic system DSM-III in 1980.
Today PTSD is a common disease worldwide and its prevalence depends on present environmental stressors. In a general population lifetime prevalence of PTSD is assessed to be 5% for men and 10% for women. This figure can vary in different countries. PTSD manifests as an intense, prolonged and delayed reaction caused by an extraordinary stressful event. The event is often characterized to be life threatening and the person feels paralyzed or totally helpless. Four following criteria must be met according to DSM-IV in order to diagnosis PTSD (2) p. 30:

1) The person must have been exposed to a traumatic event, which causes an immediate, intense feeling of fear, helplessness and horror.
2) The person suffers from recurrent flashbacks of the event.
3) The person avoids any stimuli that remind them of the event.
4) They have sustained psychical arousal.

The risk of developing PTSD arises most commonly in populations that are exposed to war-related trauma. Holocaust survivors represent one of these populations as a result of surviving Hitler’s “Final Solution”, which exposed Jewish people to huge physical pain and psychological degradation. Another evident population is veterans who have been exposed to war zone stressors in Vietnam. Studies have found a strong relationship between participating in the Vietnam War and the development of PTSD and other psychiatric disorders (3). In fact the PTSD diagnosis itself was discovered as a result of increasing symptom patterns of PTSD among veterans of the Vietnam War (cf. earlier).
A third vulnerable population to PTSD are those individuals who have been forcibly displaced outside of their native countries – it is estimates that there are 13 million people who have been displaced from their homes around the world. There is also a much larger population of former refugees who reside in foreign countries having been granted citizenship.

Little research has been conducted on refugees with PTSD and the effects it has on their children despite the fact that this major population is a high risk group for the development of PTSD.

Empirical research and clinical observations have shown that the consequences of traumatic experiences are not just limited to the people exposed to a given event. They often affected others in their environments, such as their families (4). The term secondary traumatization has been used to describe the influence of a parents PTSD and the effect this has on their offspring. The underlying premise is that trauma-related symptoms can be passed to children as a consequence of having a close bond with a parent or primary care giver, who has been traumatized (5). Rosenheck and Nathan, in 1985, also describe the phenomenon in their case-report study included in the review.

The current review examines the evidence of secondary traumatisation among children whose parents suffer from PTSD. More precisely, the transgenerational (or intergenerational) transmission of PTSD from parents to their children, as the term “secondary traumatisation” can be a transmission that occurs as a consequence of a close bond between two people, while the current review solely looks at the parent-child bond. Yet both terms will be used as synonyms in this study.

Given the above, there is evidence to suggest the need for a review of transgenerational transmission of parental PTSD to their children. The focus of this study will be on how parental PTSD may or may not affect the mental health of their children.

**Aims of this review:**

- To review the current literature to assess the evidence of transgenerational transmission of PTSD among parents to their children.
- To discuss the findings and their strengths and limitations.
- To discuss the psychological and psychosocial theories.
Methods
Searching in Public Medline and using MeSH-terms made it possible to identify any relevant studies. In this review the main focus was on children and parental PTSD, which is why PTSD was used as a major MeSH term. Different methods of searching the major MeSH-term “PTSD” were used in order to obtain the broadest result. Added to this was a more general search for transgenerational transmission: “transgenerational transmission”, “intergenerational transmission” and “secondary traumatization”. This is because authors use several different terms to describe transgenerational transmission.

Several attempts to combine broad MeSH-terms and searching words in PubMed such as “parent”, “children”, “mental health” and “war” were used to try and obtain the exhaustive results within the current subject. Unfortunately this resulted in a small number of articles that were insufficient to cover the study, which is why the use of many MESH-terms was avoided. The short searching-string bellow appeared to give the best quantitatively result.

The final search string was:

((("Stress Disorders, Post-Traumatic"[Majr]) OR (Posttraumatic stress disorder OR PTSD))) AND (Secondary traumatization OR intergenerational transmission OR transgenerational transmission)

The above search string resulted in 128 articles. The abstracts of all articles were read and a final 11 articles were chosen based on inclusion and exclusion criteria.

From the 11 articles, relevant reviews, references and citations were reviewed to find any more relevant articles that had not been found in the search. Two additional articles were found from the examination of the reviews.
Results

The reviewed studies have some differences and commonalities. Seven of the studies were case-control studies. Two were longitudinal studies; two were cross-sectional study, one case-report, and one pilot study was also included, resulting in a total number of 13 studies. They all relied on semi-structured and structured clinical interviews and self-reporting questioners, except for the case-report study, which used an observation and analysis.

There were differences in terms of the populations chosen for each study. Four of the studies based their research on children of Holocaust survivors. Three of the studies based their research on refugee and immigrant children, whose parents had suffered from torture. Four of the studies had different populations. These being children whose mothers have been exposed to the Rwandan genocide, children of Vietnam Veterans and children of former prisoners. A common factor for all the above populations was that the children’s parents had been exposed to war-related trauma. The last two studies however, which base their research on children whose mothers had a lifetime diagnosis of PTSD, but not due to any war-related trauma, were the exception. All of the above research was based on children who had a parent that was suffering from PTSD.
The research contained within this review, used subjects that fulfilled the diagnostic criteria for PTSD according to the DSM-III and DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders). In the study of Daud et al., parents in both groups were assessed for PTSD using a semi-structured clinical interview by a psychiatrist.

Each study aimed to investigate whether parents who suffer from PTSD can have a negative affect on their children’s own development. Several measurements were made in order to assess and further understand the role of transgenerational transmission of PTSD between parents and their children. The findings of these studies are presented below. In appendix 1 the studies are schematically categorized.

**Case-control studies:**

A Swedish study (6) aimed to explore resilience among refugee children whose parents had been traumatized and were suffering from PTSD. The study comprised of 80 refugee children, divided into two groups. The test group consisted of 40 children whose parents had been tortured in Iraq before arriving in Sweden. The result concerning PTSD in parents, and PTSD related symptoms in children, showed that 31 children of traumatized parents showed PTSD-related symptoms. There was no case of PTSD-related symptoms among children with non-traumatized parents. Furthermore, children in the non-traumatized parents group had statistically significantly higher scores for verbal-IQ, performance-IQ and full scale-IQ, than the children in the traumatized parents group. Concerning self-esteem according to ITIA (I think I am Questionnaire, which is a self-report instrument for the purpose of measuring children’s self-esteem), children from the non-traumatized families had higher scores and a tendency to show better relationships with their family compared with the children from traumatized families. Concerning SDQ-scores, children without PTSD/PTSS irrespective of family background, had more positive scores.

Another Swedish study (7) tested the hypothesis that immigrant children whose parents have been tortured before coming to Sweden, suffer from depressive symptoms, post-traumatic symptoms, somatisation and behavioural disorders. They recruited 15 families, which consisted of 30 traumatized parents who came to Sweden from Iraq and Lebanon with a total of 45 children. The comparison group consisted of 15 families with a total of 31 children whose parents were not traumatized. The
children in both groups were studied using DICA (Diagnostic Interview for Children and Adolescents) and the results showed that children with traumatized parents had more symptoms with respect to attention deficiency, maladaptive behaviour with depressive aspects and post-traumatic stress symptoms, than children in the comparison group. They also showed more anxiety symptoms and more psychosocial stress symptoms, based on DSM-IV criteria. However, there were also some similarities concerning depressive symptoms. A German study (8) aimed to examine whether there are differences in psychopathology between adult offspring of refugees with PTSD and without PTSD. 25 refugees, who were born towards the end of World War II, who had a high PDS (post-traumatic diagnostic scale) score, were compared with 25 age and sex-matched refugees who had a very low PDS scores. For the later stages of this experiment one of the refugees adult offspring took part. The results showed that offspring of parents with PTSD and without PTSD did not differ on any scale of the SCL-90-R. There were also no significant group effects shown by measurement of quality of life assessed by a Short-form 36 question Health Survey (SF-36) between offspring of parents with PTSD and without PTSD. However there was some evidence to suggest that experienced burden of parental refugee history has an effect on the current mental-health and life quality of their offspring. Hairston et al. examined the role of infant sleep in intergenerational transmission of trauma (9). The groups in the present study included one group of mothers (n=83) with a history of child abuse, who met criteria for lifetime PTSD. The other group consisted of (n=38) women with a history of child abuse but who did not meet criteria for lifetime PTSD. The control-group (n=64) was the final group comprised of women, with no history of abuse or PTSD. The main findings here appeared to be mother’s post-partum depression symptoms, rather than PTSD symptoms, that predicted the degree of mother-infant bonding impairment, which also predicted externalizing problems at 18 months. Concerning to amount of wake during the night (WASO), the results showed that this was associated with mothers’ symptom severity (in particular PTSD) and contributed independently to the degree of mother-infant bonding impairment. Yehuda et al. (10) investigated associations between childhood trauma and PTSD in 51 adult children of Holocaust survivors and 41 comparison adult children, with respect to parental trauma exposure and parental PTSD. The researchers also
examined these variables in relation to 24-hr urinary cortisol levels. Here, the results showed that offspring of holocaust survivors reported higher levels of emotional abuse, emotional neglect, physical neglect, and sexual abuse than comparison participants, but not physical abuse. They also found that parental PTSD was associated with a higher incidence of emotional abuse, but not emotional neglect. The mean urinary cortisol level was lower in individuals reporting emotional abuse than in those without emotional abuse.

Danielson et al. (11) also look at cortisol levels in a population. They examine cortisol reactivity in response to an acute stressor among offspring of mothers with a lifetime diagnosis of PTSD and offspring of mothers without PTSD. Both groups consisted of 36 offspring. Cortisol results for the control group showed a rise from baseline (laboratory arrival, before challenge) to reactivity (as a response to the challenge) followed by recovery (15 minute interval after the challenge) to baseline levels with a significant quartic component. For the offspring of the maternal PTSD group, there was no significant cortisol change over time. Results were maintained after controlling for an offspring’s traumatic event history and maternal and child depression.

The last case-control study (12) investigated the influence of Holocaust exposure and PTSD in mothers and fathers on glucocorticoid sensitivity in offspring. Thus, they examine the effects of endocrine transgenerational transmission. The study comprised of 80 Holocaust offspring and 15 offspring of non-exposed Jewish parents. The measures in this study showed that maternal PTSD was associated with increased glucocorticoid sensitivity in offspring. However, an interaction of maternal and paternal PTSD on the DST (Dexamethasone Suppression Test) and 24-hr urinary cortisol, showed an effect of decreased glucocorticoid sensitivity in offspring with paternal, but not maternal, PTSD.

**Longitudinal studies**

Two cohort studies also investigated the influence of transgenerational transmission of PTSD. A Norwegian study (13) aimed to study the association between the psychological distress of Vietnamese refugee parents and their children after 23 years resettlement. They also aimed to analyse paternal predictors for their children’s mental health. Information concerning 88 children’s mental health was made available. It appeared that there was a generally low level of child psychopathology
and in spite of this, there was an association between “probable caseness” (a high psychological score) in offspring and in fathers. Interestingly, they underline at the same time, that these Norwegian Vietnamese children, as a group, report less psychological distress than their Norwegian peers. A significant negative paternal predictor for the children’s mental health was the father’s PTSD at arrival in Norway.

Contradictory to other studies an Israeli longitudinal study (14) examined post-traumatic growth (PTG) among Holocaust survivor offspring following their own exposure to trauma. The study is part of a larger research project on veterans of the 1973 Yom Kippur War. The studies results showed that second-generation Holocaust survivors had lower PTG levels than non-second generation survivors.

**Cross-sectional studies**

The first cross-sectional study was based on 125 12-year old children, whose mothers had experienced the genocide of 1994 in Rwanda (15). The results did not identify an association between children’s psychopathology and maternal traumatic experiences and maternal PTSD. Instead, a significant relationship was found between children’s psychopathology and their experienced maternal violence at home. Furthermore, maternal violence against the child was also related with the mother’s own experiences of family violence during their childhood.

A study made in Israel (16) examined Secondary Traumatisation (ST) symptoms and parental bonding among adult children of former prisoners of war (ex-POW’s children). The ex-POW’s adult children consisted of Israel Defence Forces (IDF), land force veterans who had been captured during the Yom Kippur War. The control-group consisted of 90 adult children of IDF land force veterans who had not been captured during the Yom Kippur War. Children’s ST symptoms were assessed with PTSD inventory based on DSM-IV criteria. The main findings in this study indicate that ex-POW’s children reported more ST symptoms compared to controls’ children. Ex-POW’s children also reported lower levels of fathers’ care in their first 16 years as compared to controls’ children. No significant difference was found with respect to children’s parental bonding with their mother.
Case-report study
This last case-report study is from 1985 (3) and it describes a ten years old boy, whose father served in the Army in Vietnam and was frequently involved in heavy combat. When he returned to USA he got PTSD, assumed as a consequence of his involvement in Vietnam War. The analysis of the observation of this 10-year-old boy showed that there were clear symptoms of secondary traumatization in him.

Pilot study
An Australian study (17) also examined intergenerational transfer of PTSD among children of male Vietnam veterans. The study consisted of 59 veterans and 55 of their children. They were compared with of 44 civilians and 39 of their children. Findings among offspring groups showed no significant differences on measures of self-esteem, PTSD symptomatology, or any of the remaining three measures of family functioning: behavioural control, communication or roles. Furthermore, there was no evidence of a relationship between the self-esteem and post-traumatic stress scores of the PTSD veterans and those of their offspring.

Discussion
Strengths and limitations
Seven case-control, two cohorts, two cross-sectional, one case-report and one pilot study were included in this review. There are several considerable limitations and biases to be considered. Generally, all the studies have a small sample size; the number of participants extends between 1-125, providing limited statistical power. The studies were also vulnerable for information bias. There is a recall bias for remembering past trauma among studies which used samples of refugees, Holocaust survivors and their children and mothers with a history of childhood abuse. Another weakness of many of the studies is that they carry with them a potential selection bias. The studies recruit samples with a diagnosis of PTSD, in this case, virtually all of the participants had experienced war-related trauma. These samples potentially represent a particularly resilient group having survived trauma, therefore managing to participate in a study despite their PTSD. It is possible that other groups of people with more severe PTSD had died before these studies were undertaken.
Furthermore, Roth et al., which is one of the two studies of cross-sectional design, does not demonstrate the cause-and-effect relationships. Roth et al. did not identify an association between children’s psychopathology and maternal traumatic experiences and maternal PTSD, but they found an association between children’s psychopathology and their experienced maternal violence at home. However it is also possible that family violence could have as much of an effect on a child’s symptoms. It is also important to acknowledge that this type of study only provides a snap-shots of how different variables relate.

Two longitudinal studies in the current review, Dekel et al. and Vaage et al. are suitable for this examination, since there are a time frame, (respectively 30/35 and 23 years of follow-up) which make it possible to follow the development of the children and the impact of their parental PTSD, and the role of other factors or causes that can provide more insight to the given outcome. Vaage et al. found that traumatic experiences without PTSD among parents did not predict mental problems among the offspring, while a significant paternal predictor was PTSD at arrival. One of the limitations of this study is, that the sample size is small, and one of the consequences is that the number of fathers with PTSD at the arrival was low. The disadvantage of this long time frame in this type of study is that it often gives occasional dropouts, which is also seen in these two studies, which impair its generalizability.

This literature review also has several limitations. Besides the search in the international database as Public Medline, searching in other databases such as PsycINFO and SveMed would possibly provide more and smaller scales which were not indexed in the current database used.

Furthermore the search in Public Medlin did not fully cover the subject, since additional relevant articles were found, indicating that the search was incomplete. The results of the current review are also very non-homogeneous, considering that the populations within each of the studies have different ethnicities and backgrounds. The circumstances and therefore subsequent backgrounds and upbringing of refugee children and children of Holocaust survivors may well be different. The age of the offspring also differ in each study, as some studies measure symptoms in adult offspring, and children below 18 years old, while other studies include infants. The
study-designs are also different, which makes it difficult to compare the different studies. Thus, making generalisations from this review is problematic.

The aim of this review was to investigate the evidence of transgenerational transmission of PTSD from parents to their children. The following ten studies: Danielson et al. (11), Lehrner A. et al. (12), Daud et al. (6), Hairston et al. (9), G. Zerach and R. Aloni (16), Yehuda et al. (10), Vaage et al. (13), Dekel et al (14), Daud A. et al. (7), and Rosenheck R., Nathan P. (3) found an association between parental PTSD and this having an effect on their children. The findings in these studies that found an association between parental PTSD and an influence of it on their children are following: children of traumatized parents showed more symptoms of childhood trauma, anxiety, depression, post-traumatic stress, attention deficits, behavioural disorders, less favourable values with respect to total scores (ITIA, SDQ), emotionality, relation to family, peer relation and prosocial behaviour than the children in the comparison group. They also showed less PTG (Post-traumatic Stress Growth).

Three of the studies from above also found a biological influence, measuring cortisol levels among children (10) (12) (11). The final study found sleep disturbances among infants of mothers with PTSD (9). These outcomes of transgenerational transmission (or secondary traumatization) of PTSD can be categorized into three main focuses: psychological, biological and social affects.

As mentioned earlier, three of the studies also investigated the role of cortisol among offspring from parents with PTSD. Danielson et al. (11) found that offspring of mothers with PTSD demonstrated an attenuated response to acute stressor, whereas offspring of mothers without PTSD demonstrated an expected peak in cortisol immediately following the stressor. Yehuda et al. (10) found that emotional abuse, as one of the five CTQ (Childhood Trauma Questionnaire) dimensions, was significantly associated with 24-hr mean urinary cortisol. The finding in the last study, Lehrner et al. (12), showed greater glucocorticoid sensitivity and lower urinary cortisol excretion in offspring, in association with maternal PTSD. These findings suggest that a lower cortisol excretion, as a result of an altered hypothalamic-pituitary-adrenal (HPA), may increase children’s vulnerability in the face of a traumatic event or major life stressor. Theories that suggest an association between altered HPA-axis functioning and
PTSD, indicate that low cortisol levels, may negatively impact the metabolic, immune- and neurodefensive processes. These processes play an important role for coping adaptively with acute stressors (18).

The three following studies Muhtz et al. (8), Ann C. Davidson, David J. Mellor (17) and Roth et al. (15) did not find any connection between parental PTSD and their children’s mental health. Muhtz et al. (8) examined whether there are differences in psychopathology between 25 adult offspring of 25 refugees with PTSD and 25 adult offspring of 25 refugees without PTSD. The children’s psychological distress was assessed by SCL-90-R, which is a 90-item self-report measure of psychopathological symptoms. The groups here did not differ on any scale of the SCL-90-R.

Still, they found evidence to suggest experienced burden of parental refugee history had an effect on their current mental well-being, and in turn the quality of life of their offspring. However, the study has some limitations that must be acknowledged, besides the study’s small sample size. The study recruited refugees who were born between 1933 and 1940 and were exposed to traumatic events (as a consequence of World War II) during their flight at age 5-12 years. This means that refugee families were studied for more than 60 years after their displacement, why the impact of additional factors, such as social relations, family resources, social services in the residence country, is unknown. It is also unknown whether refugees’ parents were exposed to trauma and if so, in what extend. The study only uses questionnaires to measure the psychological distress among the adult offspring as a target for transgenerational transmission of PTSD. It could be possible that other measurements of intergenerational transmission of PTSD as semi-structured interviews or schema analysis were subtler. Furthermore, only one parent of the adult offspring is included, and we have no information about the mental health of the other parent.

The second study came from Ann C. Davidson, David J. Mellor (17) is a pilot study, and due to its size and purpose, this study is considered exploratory. The findings of the study showed no significant differences between 50 offspring of 50 male veterans and an age-matched group of 33 civilian peers. The results showed that PTSD among male veterans did not affect their children’s score when measured for post-traumatic stress symptomatology or when assessed on levels of self-esteem. This is when
compared with the children whose fathers did not have PTSD as well as those from civilian fathers.

However, scores from children in the PTSD-group, when measured on levels of self-esteem and PTSD, presented a wider range of responses during testing, generally showing to have lower self-esteem and higher PTSD symptoms. This is in contrast to the non-PTSD-group and civilians having similar scores across all measures. Each group of offspring reported communication in their families as unhealthy.

Several factors may have contributed to the results of the present study. Firstly, the children’s ages range from 14-34, mean = 23, 4. The children of both groups were not age-matched, so that the children of veterans were younger, more likely to be completing school, while children of civilians were mostly employed. This variable may explain the diversity in the self-esteem scores of veteran’s (with PTSD) children. In addition, a selection bias may have a potential role, as only one child per family was included. It is possible this resulted in veterans self-selecting their children with whom they had the healthiest relationship. Furthermore, the study did not investigate the role of the veteran’s wives and their reaction to their husband’s PTSD. An Australian study from 1999 (19) suggests that wives of veterans with PTSD often provide a buffer-zone between the veteran and the rest of the world. It might be interesting to examine the role of veteran’s wives in the current study, if they have a role of maintaining a stable relationship between their husband’s difficult behaviours and their children. A larger study could focus on wives roles in a family as a unit.

Roth et al. (15) investigated a community sample of 125 Rwandan mothers who experienced the genocide of 1994, and their 12-year old children. They assessed children’s anxiety symptoms, depression symptoms and aggressive behaviour with respective questionnaires. The results did not indicate an association between mother’s traumatic events and children’s psychopathology. The main findings of the study also indicated no group differences in children’s psychopathology, comparing children of mothers with PTSD and mothers without PTSD. Instead, they found an association between children’s psychopathology and maternal violence at home, independent of mothers PTSD status. Interestingly, they found that maternal violence at home was associated with mothers’ own experiences of family violence during childhood. Besides the limitations of this study mentioned earlier, we also lack data regarding the father, which might help explain any increased variance of a child’s
symptoms. Furthermore, children’s anxiety symptoms were assessed using HSCL-25, which is an instrument designed for adults. A better measurement of children’s anxiety could possibly have been an assessment with a semi-structured interview.

**Psychological and psychosocial theories**

From the studies that found an association between parental PTSD and the effect of PTSD on their children, Daud et al. measured some remarkable qualities. The study (6) measured resilience and vulnerability with refugee children from traumatized and non-traumatized parents, and here they found that children without PTSD/PTSS (post-traumatic stress symptoms) from the traumatized parents group with PTSD had scored more positively with respect to emotionality, family relations, peer relations and prosocial behaviour than the children in the same group with PTSD related symptoms. Daud et al. refer to a concept known as *salutogenic features* and explains that children of traumatized parents who demonstrate no evidence of having developed PTSD/PTSS, might have “displayed salutogenic features (freedom from PTSD/PTSS) as a consequence of their resilience which was characterized by their maintaining adequate family and peer relations “ (6) s. 7. The same result was found in a qualitative study made with Brazilian offspring of Holocaust survivors (20). The findings here also showed that systematization of the different ways in which offspring can deal with parental trauma, as an indicator of resilience and the development of salutogenic features.

A professor in medical sociology Aaron Antonovsky developed the theory of salutogenesis (21). The term salutogenesis highlights the aspects of wellbeing rather than pathogenesis. A. Antonovsky refers to *Sense of Coherence* (SOC) theory. He suggests that people who have health concerns, but remain healthy despite these challenges have a greater resilience, partly because of their past experiences. He emphasises the importance of a predictable environment which allows a person to feel more in control and therefore more confident about their own future. I.e. the person’s experience of environment being comprehensive, manageable and meaningful (22). In turn Antonovsky suggest this helps ones own ability in overcoming external pressures.
SOC is an essential factor of an individual’s sense of well-being. Furthermore, the theory has a focus on four domains, namely: inner feelings, social relations, to be psychologically stabile, and ones involvement in rewarding activities (23). Although Daud et al. did not focus on the concept of salutogenesis, yet, some of their study’s result involving SDQ (Strengths and Difficulties Questionnaire) with sub-scales emotionally and prosocial behaviour, which encompass what Antonovsy denoted as the psychological domain in salutogenesis. The study also used ITIA (I think I am- questionnaire to measure children’s self-esteem), which has a sub-scale with respect to measuring their relation to family and SDQ’s sub-scale peer problems cover the domain called social relations. Also Dekel et al., which is a longitudinal study, examine the post-traumatic growth (PTG) among Holocaust survivor offspring. PTG in this study was measured using the Post-traumatic Growth Inventory (PTGI). It consists of items on a 4-point scale, comprising of five subscales: Relating to Others, New Possibilities, Personal Strengths and Appreciation of Life. The measurements here are perceived as salutogenic outcomes, and offspring (here veterans) of Holocaust survivors appear to have lower PTG than veterans without such family history.

The salutogenic features may play a role in the process of transgenerational transmission of parental PTSD to their children. According to A. Antonovsky’s SOC-theory, development of salutogenic features may have a protective affect against secondary traumatization on children whose parents suffer from PTSD. Only two of the ten studies in this review focus on these features, while the others focus on mental problems and deviation cortisol excretion among children of parents with PTSD compared with children of parents without PTSD.

Further studies are needed to explore this in order to obtain a better understanding of its role on transgenerational transmission of parental PTSD.

Roth et al. (15) suggests a model that demonstrate the factors that have an affect or have to be further examined in order to obtain a better understanding of transgenerational transmission of PTSD from parents to their children. The model consists of the child as a central focus, and here several factors affect the child. Genetic predisposition may alter a child’s vulnerability or resilience by the knowledge of parental traumatic experiences, thus helping a child’s sense of coherence, cf. (24). The studies in this review have showed that having parents who are exposed to
Traumatic events have different influence on their children’s mental health. Some children can develop resilience, while other become more vulnerable to mental health problems. Secondly, the child’s biological parent’s mental health and their resources and coping strategies, which may have an affect on the child. Many of the studies in this review have not considered the role of the other parent and their mental health, which may also have an impact in the transmission of PTSD. Thirdly, the general family context must be considered, as a majority of the studies in this review have not involved the role of siblings or general family functioning such as communication, stress-coping strategies and parenting capacity. Fourthly, the role of social environments needs to be taken into account, such as the level of integration into a community as well as the amount of help and support offered by the community.

Recent research conducted by Willem Frankenhuis from Radboud University in Nijmegen, introduces a different way of interpreting the behaviour of children who have come from challenging social backgrounds. Willem Frankenhuis, who is one of the front figures in this new research, presents a term called *evolutionary adjustment* (25). He suggests that children, who grow up in
unsafe environments potentially suffering neglect or abuse have some advantages, when coping with further tough and unpredictable environments. Frankenhuis tested this hypothesis asking children to identify a person’s facial expression such as anger or happiness. The results showed that underprivileged children from harsh environments were both faster and more exact in their identification (25). Frankenhuis calls this ability a *cognitive upgrade*. Coining this term as something positive, Frankenhuis paves the way for a different viewpoint of those previously seen as damaged. He is now planning to further investigate the creativity of these children; with the hypothesis that they have particularly strong capabilities with respect to problem solving and finding solutions.

The majority of the findings of this small review indicate that there is a transgenerational transmission of PTSD from parents and this can manifest to the next generation in various ways. There were three studies that did not show any association between transgenerational transmission of PTSD from parents to their children. Therefore further investigations are needed to clarify the pathways through which the transgenerational transmission of PTSD affects children. In particular there is a need for large-scale longitudinal study, which would be better suited in clarifying these pathways, taking into account psychological, familial and social factors during a child’s upbringing.

**Conclusion**

The results in the current study show that transgenerational transmission of PTSD from parents to their children is an important focus area for future research. This is of particular interest as the majority of the studies in the current review show the effects of transgenerational transmission of PTSD from parents to their children. Findings from ten of the studies indicate that children of parents with PTSD showed more secondary traumatization symptoms compared with a comparison group of children. Furthermore three of these studies also showed a difference in cortisol level among children with traumatized parents compared to children without traumatized parents.
A term called salutogenic features might play a protective role in transgenerational transmission of parental PTSD, as some children with traumatized parents have developed resilience against secondary traumatization.

Three studies did not find a correlation between parental PTSD and an impact of it on their children.

Larger scale research is needed to explore the impact transgenerational transmission of PTSD from parents to their children. The current review suggests that the role of familial and social environments in the process of transgenerational transmission of PTSD needs to be further explored.
Reference list:


25. Frank L. Brændt barn skyr ilden Weekendavisen 2015;Sect. Ideer.
Appendix 1

<table>
<thead>
<tr>
<th>Title</th>
<th>Study-design</th>
<th>Aims</th>
<th>Number of participants</th>
<th>Measurements</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childhood trauma and risk for PTSD: Relationship to intergenerational effects of trauma, parental PTSD, and cortisol excretion</td>
<td>Case-control</td>
<td>The aim of this study is to examine associations between childhood trauma and PTSD in adult children of Holocaust survivors and comparison subjects, in consideration of parental trauma exposure and parental PTSD. And additionally to examine these variables in relation to 24-hr urinary cortisol.</td>
<td>51/41</td>
<td>Structured Clinical Interview for DSM-IV</td>
<td>Adult offspring of Holocaust survivors show significantly higher levels of self-reported childhood trauma, particularly emotional abuse and neglect compared to demographically similar comparison subjects. The difference was largely attributable to parental PTSD. Self-reported childhood trauma was also related to severity of PTSD in subjects, and emotional abuse was significantly associated with 24-hr mean urinary cortisol secretion.</td>
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<tr>
<td>Maternal PTSD associates with greater glucocorticoid sensitivity in offspring of Holocaust survivors.</td>
<td>Case-control</td>
<td>This study investigates the relative influence of Holocaust exposure and PTSD in mothers and fathers on glucocorticoid</td>
<td>80/15</td>
<td>Mini-International Neuropsychiatric Interview (MINI) for the DSM-IV</td>
<td>Maternal PTSD was associated with greater glucocorticoid sensitivity in offspring across all three measures of glucocorticoid function. An interaction of maternal and</td>
</tr>
<tr>
<td>Year</td>
<td>Study Title</td>
<td>Study Type</td>
<td>Aim</td>
<td>Measures</td>
<td>Results</td>
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<tr>
<td>2013</td>
<td>Sensitivity in offspring of offspring of mothers with PTSD.</td>
<td>Case-control</td>
<td>To examine cortisol reactivity in response to a laboratory stressor</td>
<td>Urine cortisol</td>
<td>Paternal PTSD on the DST and 24-hr urinary cortisol showed an effect of decreased glucocorticoid sensitivity in offspring with paternal but not maternal PTSD.</td>
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<tr>
<td>2015</td>
<td>Youth offspring of mothers with posttraumatic stress disorder have altered stress reactivity in response to a laboratory stressor.</td>
<td>Case-control</td>
<td>The aim of this study is to examine cortisol reactivity in response to a laboratory stressor among offspring of mothers with a lifetime diagnosis of PTSD and age- and gender-matched control offspring of mothers without PTSD.</td>
<td>36/36 ADIS (Anxiety Disorders Interview Schedule for DSM-IV) CDI (Children’s Depression Inventory) Saliva cortisol</td>
<td>Results were consistent with the hypothesis that offspring of mothers with PTSD would exhibit a dysregulated, blunted cortisol reactivity profile, and control offspring would display the expected adaptive peak in cortisol response to challenge profile.</td>
</tr>
<tr>
<td>2011</td>
<td>The role of infant sleep in Intergenerational Transmission of Trauma.</td>
<td>Case-control</td>
<td>The aim of this study is to investigate whether infant sleep problems predict early behavioural problems indicative of PTSD.</td>
<td>121/63 CSHQ (Child Sleep Habit Questionnaire)</td>
<td>Infants of PTSD+ mothers scored higher on the CSHQ and had more separation anxiety around bedtime than PTSD- and controls. Moher-infant bonding at 4.</td>
</tr>
<tr>
<td>Study Title</td>
<td>Design</td>
<td>Methodology</td>
<td>Sample Size</td>
<td>Outcome Measures</td>
<td>Findings</td>
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<tr>
<td><strong>Mental health in offspring of traumatized refugees with and without Post-traumatic Stress Disorder</strong> 2014</td>
<td>Case-control</td>
<td>The aim of the study is to examine the whether there are differences in psychopathology between adult offspring of refugees with PTSD and without PTSD. 25/25</td>
<td>SCL-90-R to assess psychological distress</td>
<td>Offspring of parents with chronic PTSD did not differ from offspring without PTSD with respect to quality of life and mental health.</td>
<td></td>
</tr>
<tr>
<td><strong>Resilience and vulnerability among refugee children of traumatized and non-traumatized parents.</strong> Atia Daud, Britt af Klinteberg and Per-Anders Rydelius 2008</td>
<td>Case-control</td>
<td>The aim of the present study is to explore resiliency among children who did not develop PTSD-related symptoms despite a history of parental PTSD. 15 families/15 families</td>
<td>DICA-R (Diagnostic Interview for Children and Adolescents) WISC-III (Wechsler Intelligence scales for children) ITIA (I think I am) SDQ (Strength and Difficulties Questionnaire)</td>
<td>Children without PTSD/PTSS in the traumatized parents group had more favourable values (ITIA and SDQ) than the children in the same group with PTSD/PTSS and these values were similar to those children in the comparison group (non-traumatized parents group).</td>
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<tr>
<td><strong>Children in families of torture victims: transgenerational transmission of parents’ traumatic experiences to their children.</strong></td>
<td>Case-control</td>
<td>To test the hypothesis that immigrant children whose parents have been tortured before coming to Sweden 15/15</td>
<td>DICA based on DSM-IV</td>
<td>According to DICA interviews, children of tortured parents had more symptoms of anxiety, depression, posttraumatic stress, attention deficits and behavioural</td>
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<tr>
<td>Study Title</td>
<td>Design</td>
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<td>Tools</td>
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<tr>
<td>Transgenerational consequences of PTSD: risk factors for the mental health of children whose mothers have been exposed to the Rwandan genocide. Maria Roth, Frank Neuner and Thomas Elbert. 2014</td>
<td>Cross-sectional</td>
<td>The aim of the study is to establish whether PTSD in mothers is associated with symptoms of depression, anxiety, and aggressive and antisocial behaviour in their children.</td>
<td>125 HSCL (Hopkins Symptom Checklist) CDI-S (Children’s Depression Inventory) Aggression scale by Buss and Perry CFV (Checklist of Family Violence)</td>
<td>Maternal PTSD was not associated with child’s psychopathology. Instead, child’s exposure to maternal family violence posed a significant risk factor for a negative mental health outcome.</td>
<td></td>
</tr>
<tr>
<td>Secondary traumatization among former prisoners of wars’ adult children: the mediating role of parental bonding Gadi Zerach and Roy Aloni 2014</td>
<td>Cross-sectional</td>
<td>This study examine secondary traumatization (ST) symptoms and the parental bonding among adult children of former prisoners of war (ex-POW’s) children that were compared to adult children of controls’ children.</td>
<td>98/90 Children’s ST symptoms were assessed with the PTSD inventory PBI - the parental bonding instrument Exposure to stress questionnaire</td>
<td>Ex-POW’s children reported a higher number of ST symptoms and lower level of fathers’ care, as compared to controls’ children.</td>
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<td>Study Title</td>
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<tr>
<td>Paternal predictors of the mental health of children of Vietnamese refugees</td>
<td>Longitudinal prospective cohort study</td>
<td>To study the association between the psychological distress of Vietnamese refugee parents and their children after 23 years resettlement. And to analyse paternal predictors for their children’s mental health.</td>
<td>50 families, 88 children</td>
<td>SDQ, SCL-90-R (A self-report questionnaire, covering themes like family and friends)</td>
<td>In spite of the generally low level of child psychopathology, there was an association between probable caseness in offspring and in fathers. A significant paternal predictor was PTSD at arrival, not the general level of psychological distress.</td>
</tr>
<tr>
<td>Is the Holocaust Implicated in Posttraumatic Growth in Second-Generation Holocaust Survivors? A prospective study</td>
<td>Longitudinal prospective cohort study</td>
<td>To examine PTG among Holocaust survivor offspring following their own exposure to trauma.</td>
<td>33/118</td>
<td>PTSD Inventory according DSM-IV</td>
<td>Second-generation veterans reported less PTG than veterans who were not second generation, which was evident in the PTG domains of relations to others, personal strength, and appreciation of life.</td>
</tr>
<tr>
<td>Secondary Traumatization in Children of Vietnam Veterans</td>
<td>Case-report</td>
<td>The study describes changes in a 10 years old boy behaviour after his fathers return from</td>
<td>1</td>
<td>Observation and description of the boy</td>
<td>The case demonstrates the impact of fathers PTSD in his child. Following symptoms were present in the boy’s case: intense</td>
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<tr>
<td>Nathan, M.D. 1985</td>
<td>Vietnam. His father served in the Army in Vietnam and was frequently involved in heavy combat.</td>
<td>involvement in the emotional life of his father, deficient development of his ego, boundaries, high level of guilt, anxiety, and aggressiveness, conscious and unconscious preoccupation with specific events that were traumatic for his father.</td>
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</tr>
</tbody>
</table>

| The adjustment of children of Australian Vietnam veterans: is there evidence for the transgenerational transmission of the effects of war-related trauma? Ann C. Davidson, David J, Mellor 2000 | Pilot-study | This study aims to examine the phenomenon of Intergenerational transfer of PTSD in an Australian context. | 59+55/44 +39 (fathers + children) | FAD (The Family Assessment Device) Rosenberg Self-esteem scale Mississippi scale for PTSD (M-PTSD) | No significant differences were found between the self-esteem and PTSD symptomatology scores for any offspring groups. Unhealthy family functioning is the area in which the effect of the veteran’s PTSD appears to manifest itself. |