CHAPTER 1

General Introduction
In this dissertation I address various aspects associated with the influence of the Holocaust experiences on child survivors (now in their elderly age) and their adult offspring. The introduction provides an overview and background for four empirical papers. The main part of the thesis consists of these papers, reporting the effects of the Holocaust on psychological and physiological outcomes in survivors and their offspring. We also tested the moderating role of specific genetic polymorphisms in the association between early Holocaust experiences and stress regulation during adulthood and old age. The discussion chapter integrates the various findings and offers new directions for further research.

Overview of Holocaust research

More than six decades have past since the Holocaust of the Jews in Europe. Those who survived the horrifying atrocities were children during the war, and are now in their seventies and eighties. The study of the enduring effects of this childhood trauma is most relevant in informing public policy regarding financial compensation, rehabilitation for handicapped, and other issues regarding the legitimacy of any type of compensation to both survivors and their offspring. Furthermore, Holocaust survivors are now facing new challenges as they are reaching old age, and understanding their coping strategies is most important since such insights may help us to gain a better understanding of the adaptation of victims of recent genocides and childhood traumatic experiences around the globe.

During the first few decades after the Holocaust only few studies on child survivors were conducted. Some have suggested that child survivors of the Holocaust were too young to remember and that they were able to adapt easily to their new countries and families (Durst, 2003). Others suggested that war experiences were radically different for adults and children because of their different developmental stages (Kellermann, 2001). Children may however at the same time be more vulnerable and more resilient than adults. In a pioneering study Keilson found that developmental age at the time of the persecution was associated with later difficulties (Keilson 1992). The main reason, however, for the recent upsurge of studies on outcomes of child survivors was that those who were adult survivors passed away during the years (Solomon & Chatin, 2007).

Studies of the possible consequences of the Holocaust have shifted over the years from focusing on the psychological and psychiatric effects to additionally include neurobiologically enduring effects of the trauma. Moreover, there is a shift from focusing on survivors’ dysfunctioning and maladaptation to their potential resilience and strengths, as these children survived the war and its atrocities against all odds (Barel, Van IJzendoorn, Sagi-Schwartz, & Bakermans-Kranenburg, 2010).
The findings however vary largely and are sometimes even contradictory (Barel et al., 2010; Bar-on et al., 1998; Van IJzendoorn, Bakermans-Kranenburg, & Sagi-Schwartz, 2003). Many studies found that Holocaust survivors suffer from severe and enduring psychological effects of the massive trauma, manifested in chronic anxiety (De Graaf, 1975), depression, disturbances in cognition and memory, tendencies to isolation (Nederland, 1968), sense of guilt (Chodoff, 1968), low psychological well-being, and difficulties in emotional expression (Amir & Lev-Wiesel, 2003; Nadler & Ben-Shushan, 1989). In addition, physical health problems have been documented (e.g., Antonovsky, Maoz, Dowty, & Wijsenbeek, 1971; Landau & Litwin, 2000); in particular cancer morbidity (Keinan-Boker, Vin-Raviv, Lipshitz, Linn, & Barchana, 2009). Alongside those findings of maladaptive outcomes and psychopathology, there is a growing body of evidence that Holocaust survivors' psychological adjustment is within the normal range (e.g., Leon, Butcher, Kleinman, Goldberg, & Almagor, 1981; Barel et al., 2010). Survivors managed to build families and to establish regular social relationships (Harel, Kahana, & Kahana, 1993).

The most updated findings that attempt to address such discrepancies have been reported recently in a series of meta-analyses involving 12,746 participants from 71 samples, in which Holocaust survivors were found to be less well-adjusted than their comparisons who did not experience the Holocaust. In particular they showed substantially more posttraumatic stress symptoms. At the same time, they also were found to be as adapted as their counterparts in areas of physical health and cognitive functioning, suggesting remarkable resilience (Barel et al., 2010).

According to a number of studies, marks of the extreme trauma of parents were also displayed in their offspring, even though they themselves were not directly exposed to the traumatic source. Holocaust survivors' offspring were found at risk for developing post traumatic symptomatology (Felsen, 1998; Yehuda, Schmeidler, Wainberg, Binder-Brynes, & Duvdevani, 1998), especially under extreme stress conditions (Baider et al., 2000; Solomon, Kotler, & Mikulincer, 1988). Nonetheless, meta-analytic results suggest that intergenerational transmission of the Holocaust trauma to the next generation is observed in particular in studies with clinical samples, and in studies with weaker designs, based on convenience samples (Sagi-Schwartz, Van IJzendoorn, & Bakermans-Kranenburg, 2008; Van IJzendoorn et al., 2003). In second-generation studies with non-clinical samples that used better designs transmission of trauma seems absent, which suggests remarkable resilience of the first generation in their role of parents.

In this thesis we tested possible psychological difficulties in Holocaust survivors and their adult offspring more than 60 years after the Holocaust (Chapter 2).
New research directions

In a further attempt to clarify contrasting findings and to elucidate the long-term effects of early childhood trauma researchers have recently begun to explore biological mechanisms of stress regulation. Differences in these mechanisms might reflect neurobiological effects of trauma over the years; traumatization may be expressed not only in psychological symptoms, but also in neurobiological dysfunctioning. One of the possible consequences of trauma is dysregulation of the stress system. Stress regulation is indexed by, e.g., HPA-axis functioning and its end-product cortisol. The hypothalamic-pituitary-adrenal (HPA) axis is a central regulatory and control system that connects the central nervous system (CNS) with the endocrine system (Chrousos & Gold, 1992; Kudileka, Hellhammer, & Kirrschbaum, 2007), and the diurnal rhythm of the cortisol hormone production serves both the promotion of sleep-wake cycles and the regulation of stress responses (Dozier et al., 2006). The development of HPA axis functioning was found to be modified by early environmental factors both in rats and in humans (Liu et al., 1997; Meaney et al., 1991; Tarullo & Gunnar, 2006). In this thesis we tested the effects of the Holocaust on HPA-axis functioning on both Holocaust survivors and their adult offspring (chapters 3 and 4).

Moreover, alongside the neurobiological effects of the trauma, there may be genetic predispositions placing some survivors at increased risk to develop psychological difficulties than others. In a recent study of civil war refugees, the deletion variant of the \( \text{ADRA2B} \) gene, for instance, has been associated with more vividly re-experiencing traumatic events (De Quervain et al., 2007), suggesting that variants of the \( \text{ADRA2B} \) gene may moderate the processing of traumatic memories, and may also be implicated in long-term effects of traumatic experiences on stress regulation. This genetic moderation of the long-term effects of trauma is the focus of chapter 5.

In sum, more than 60 years after the end of World War II, we continue to explore whether childhood trauma is still manifested in adult psychology and neurobiology and we examine possible genetic-based attributes that might characterize some survivors as being at higher risk for long-term negative effects of the Holocaust.

In the present set of studies we rely on an Israeli sample that was first studied some 15 years ago (see details below). Considering the results that were found with this particular sample (Sagi-Schwartz et al., 2003), and also in light of the non-invasive technologies that are available nowadays, in the current set of studies we addressed four major questions: First, is more maladjustment observed in Holocaust survivors than in their comparisons? Second, are there differences in various psychological outcomes between second generations' individuals with a
parental Holocaust background as compared to second generation subjects with no Holocaust background (Sagi-Schwartz et al., 2003; Van IJzendoorn et al., 2003)? Third, is neurobiological stress reactivity affected by childhood traumatic experiences such that we find differences between women who experienced versus those who did not experience the Holocaust as children? And does the offspring of Holocaust survivors show different stress reactivity than offspring without Holocaust background? We study physiological measures in the context of both routine daily circumstances and under stress conditions. Fourth, are there differences in the vulnerability or susceptibility to Holocaust experiences that can be explained in terms of genetic make-up?

These series of studies were conducted in a sample that was recruited 15 years ago from population-wide demographic information provided by the Israeli Ministry of the Interior (Sagi-Schwartz et al., 2003). Participants belonged to one of two carefully matched groups: Holocaust survivors and their daughters (second generation), and matched comparison participants according to criteria of age and place of birth, and their daughters (second generation). For the purpose of the current follow-up, we contacted 106 first-generation participants (mean age 77 years) and 104 second-generation participants (mean age 47 years) who took part in the original sample. On the basis of this sample we conducted the four studies presented in this thesis. Each of them focuses on an aspect of the question whether the Holocaust leaves its marks on psychological and neurobiological functioning over the years of the survivors and their offspring.
References


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