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# DISSERTATION

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„Adaptation and Maladaptation in Old Age after Childhood  
Trauma: Correlates of Current Mental Health.“

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Dissertation

Adaptation and Maladaptation in Old Age after Childhood Trauma:  
Correlates of Current Mental Health.

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## Abstract

In the past years, science has acknowledged the relevance of traumatic events for mental health in older age, especially if they were experienced in childhood or adolescence. The aim of this dissertation was to investigate adaptation and maladaptation after different forms of childhood trauma in elderly Austrians. In 5 studies we investigated the prevalence of lifetime trauma, posttraumatic symptoms, current mental health, aspects of resilience and positive adaptation such as the interaction between individual and environmental factors, sense of coherence and mindfulness. The main finding of this dissertation is that trauma and childhood trauma are highly prevalent among elderly Austrians. They still seem to affect their mental health until today. Factors that are associated with positive adaptation after trauma could also be identified. The results are discussed regarding their relevance for future research and implications for practice.

*Keywords:* PTSD, resilience, child abuse, war-related trauma, WWII, institutional abuse, elderly

## Zusammenfassung

In den letzten Jahren hat die Wissenschaft die Bedeutung von traumatischen Erlebnissen für die psychische Gesundheit im Alter erkannt, und begonnen insbesondere die Auswirkungen jener Traumata zu erforschen, die in der Kindheit oder Jugend erlebt wurden. Das Ziel dieser Dissertation war es, Anpassung und Fehlanpassung nach verschiedenen Formen von Kindheits- und Lebenszeittraumata bei älteren Österreichern zu untersuchen. In 5 Studien untersuchten wir die Prävalenz von Lebenszeittraumatisierung, posttraumatische Symptome, die aktuelle psychische Gesundheit und Aspekte Resilienz und positiver Anpassung. Dies beinhaltete auch die Interaktion von individuellen und Umweltfaktoren sowie die Konzepte des Kohärenzgefühls und der Achtsamkeit. Das wichtigste Ergebnis dieser Dissertation ist, dass Trauma und Kindheitstrauma im speziellen unter älteren Österreichern weit verbreitet sind und sich auf ihre psychische Gesundheit bis heute auszuwirken scheinen. Ebenso konnten auch Faktoren, die mit positiver Anpassung nach dem Trauma verbunden sind, gefunden werden. Die Ergebnisse werden im Hinblick auf ihre Relevanz für die zukünftige Forschung und Implikationen für die Praxis diskutiert.

*Schlüsselwörter:* PTBS, Resilienz, Kindesmissbrauch, Kriegstrauma, 2. Weltkrieg, institutioneller Missbrauch, alte Menschen

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## Introduction

By 2050, an increase of over 50 percent in the world population aged over 60 years is expected. This change will enlarge pressure on health care and social protections systems (United Nations, 2015). It will also challenge mental health care for this population. One important aspect when addressing these challenges is to further the knowledge on long-term consequences and correlates of childhood and lifetime trauma in elderly persons to develop and improve psychological interventions that also prevent re-traumatization and re-victimization. With this dissertation I wanted to contribute to the understanding of aspects that influence mental health in elderly persons – positively and negatively – if they experienced traumatic events of varying intensity and duration during their childhood and adolescence.

Childhood trauma is associated with greater impairment in older age compared to traumatic experiences in other developmental stages such as for example adulthood (Ogle, Rubin, & Siegler, 2013). Especially children, who experienced war-related and other manmade trauma are prone for developing PTSD and trauma-related mental health problems in later life (Maschi, Baer, Morrissey, & Moreno, 2012). As such it is not surprising, that in the past fifteen years there has been an increasing interest in the prevalence and phenomenology of PTSD and posttraumatic symptoms in the elderly (Bottche, Kuwert, & Knaevelsrud, 2012; Hiskey, Luckie, Davies, & Brewin, 2008a; Lapp, Agbokou, & Ferreri, 2011; Ogle, Rubin, & Siegler, 2014). Especially in Europe, researchers have started to investigate the long-term effects of the traumatic impact of World War II (WWII) on current mental health in today's elderly survivors (e.g. Bramsen, van der Ploeg, & Boers, 2006; Glaesmer, Gunzelmann, Braehler, Forstmeier, & Maercker, 2010; Mooren & Kleber, 2013). When PTSD and traumatic experiences were assessed in societies with a history of WWII-trauma, epidemiological studies found more PTSD (Maercker, Forstmeier, Wagner, Glaesmer, & Braehler, 2008; Spitzer et al., 2008) and a higher number of lifetime exposure to trauma in elderly persons compared to younger persons (Spitzer et al., 2008). For elderly



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populations in Europe who were less affected by war, this is not the case (Darves-Bornoz et al., 2008). When samples with a high lifetime war-related trauma exposure were examined, PTSD rates from 5% up to 20% in elderly have been reported (Lapp et al., 2011). In recent years, an additional and specifically toxic type of trauma has come to public and scientific attention. The consequences and correlates in elderly persons who experienced or witnessed sexual, physical and emotional abuse in their childhood and adolescence in the context of institutions (institutional abuse – IA) such as foster homes or institutions within the Catholic Church (e.g. Lueger-Schuster et al., 2014) started to be investigated and revealed a strong impact on current mental health.

There is no doubt, that current mental and physical health of grown up persons are severely affected by the events they experienced during childhood (Ogle et al., 2013). It is not clear if these effects have a different phenomenology and symptomatology in elderly (Bottche et al., 2012). Results seem inconsistent whether current PTSD classifications are adequate to describe symptom patterns in older age. Many studies on PTSD in the elderly also report a number of persons with sub-threshold PTSD, ranging from 3.8% in a population-based survey (Glaesmer et al., 2010) up to 25.0% in former WWII-refugees, who reported very heterogeneous traumatic events (Teegen & Meister, 2000). In the context of traumatic experiences, elderly persons also reported various somatic complaints or trauma related somatic symptoms (Freitag, Braehler, Schmidt, & Glaesmer, 2013; Glaesmer, Braehler, Gundel, & Riedel-Heller, 2011; Noll-Hussong et al., 2012). This does not mean that they are necessarily distressed to a lower degree despite that they display fewer symptoms. However, it is also known, that not every trauma must lead to PTSD and maladaptation (Rutter, 2007).

There is also positive adaptation after traumatic events and in the past years a considerable amount of research efforts has focused on concepts such as resilience and other related concepts e.g., sense of coherence (SOC; Kuwert et al., 2008) or mindfulness (B. L.

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Thompson & Waltz, 2010; Vujanovic, Youngwirth, Johnson, & Zvolensky, 2009). For example, R. W. Thompson, Arnkoff, and Glass (2011) suggested in their review that mindfulness and acceptance are associated with greater psychological resilience following traumatic experiences. Resilience has been described as the ability to recover from extreme stress (Bonanno & Mancini, 2012; Rutter, 2007), or as a reflection of general symptom improvement (Davidson et al., 2005), while others see it as capacity to preserve a stable personal equilibrium (Bonanno, 2004). It is unclear whether resilience may be considered as a personality trait or merely depends on context (Agaibi & Wilson, 2005; Connor & Davidson, 2003; Luthar & Zelazo, 2003; Rutter, 2012). All of these mechanisms and processes reflect the human capacity to adapt in the face of adversity. There are only few studies that investigated resilience and positive adaptation in the elderly (e.g. Lamond et al., 2008; Rodin & Stewart, 2012) and it may require a lifespan perspective in the context of ageing (Rutter, 2007). For samples of WWII survivors who experienced various kinds of trauma during their wartime-childhood and adolescence knowledge on resilience is sparse (e.g. Kuwert, Brähler, Glaesmer, Freyberger, & Decker, 2009). Detailed knowledge and a better understanding, however, would bear important implications for the improvement of treatment and care (cf. Maschi et al., 2012).

### **Aims**

The aims of this dissertation were to picture the prevalence of childhood and lifetime trauma and PTSD in different samples of Austria's elderly to find correlates of current mental health – adaptive and maladaptive. This should contribute to the understanding of a differential symptomatology and symptom distress in elderly. It also included a perspective on different types of trauma and their relationship to age-related morbidity. This research should further the understanding of trauma related symptoms in older age and highlight their importance for psycho-gerontological care and practice. There were three main research aims:

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1. Picture the prevalence and symptoms of PTSD and posttraumatic stress-related current mental health in Austria's elderly.
2. Compare different kinds of trauma in elderly survivors of childhood trauma regarding their posttraumatic symptoms and related aspects of current mental health also related to classification and diagnostic issues
3. Investigate aspects of resilience and positive adaptation in today's elderly after a childhood and adolescence with traumatic experiences during WWII and the subsequent time of occupation.

In order to address these aims, five studies were conducted.

### **Studies focussing on maladaptation**

#### **Study 1 – PTSD, correlates of current mental health and trauma in Austria's elderly**

Paper 1 was entitled "*PTSD and trauma in Austria's elderly: influence of wartime experiences, postwar zone of occupation, and life time traumatization on today's mental health status: an interdisciplinary approach*" (Glück, Tran, & Lueger-Schuster, 2012).

Before this study was conducted, there was no knowledge about current mental health and war-related as well as lifetime trauma in Austria's elderly. The focus of this study was to picture with an interdisciplinary approach – historical and psychological – the current mental health status and prevalence of PTSD symptoms and lifetime traumatic events in Austria's elderly. Historians provided data on war-related traumatic events reported for Austria and psychologists, based on the historical data, developed a biographical interview and questionnaire battery to picture trauma and current mental health. For example, historical data suggested that living in Soviet-occupied areas created a potential environmental risk factor (Karner & Stelzl-Marx, 2005). We expected to find high amounts of war-related and general lifetime trauma in Austria's elderly, and that these experiences would influence current mental health. We also expected differences for current mental health and reported trauma

between survivors who had lived in different post-war zones of occupation in Austria. We therefore investigated the impact of wartime-related trauma, traumatic experiences with occupational forces and lifetime traumatic events, on PTSD and psychopathology also with regard to gender differences and zone of occupation (Soviet vs. Western Allied). Furthermore, we also compared the prevalence of PTSD and trauma-related symptoms and traumatic events to studies conducted with German survivors of WWII (Spitzer et al., 2008). We found a high rate of war-related and lifetime trauma, a high prevalence of posttraumatic stress symptoms and mental health problems, and higher distress and more mental health problems for the Soviet zone of occupation.

### **Study 2 – Experience and witness of sexual violence during and after World War II**

Paper 2 had the title “*Sexual violence by occupational forces during and after World War II: influence of experiencing and witnessing of sexual violence on current mental health in a sample of elderly Austrians*” (Lueger-Schuster, Glück, Tran, & Zeilinger, 2012). Wartime rape greatly influences mental and physical health of victims and until today only few studies have investigated this topic in the context of WWII (Kuwert et al., 2014). In this study, we investigated data on experience and witness of sexual violence during WWII and the subsequent occupation (1945–1955). We expected to find higher rates of PTSD and symptom distress in victims of sexual violence compared to persons that had experienced other forms of trauma. We also expected to find more indicators of poorer current mental health such as PTSD symptoms and other mental health aspects, e.g. depression, anxiety or aggression. From the total sample ( $N=316$ ), participants reporting experiences of sexual violence exclusively outside WWII or the postwar time of occupation were excluded. From the 298 remaining participants, for this study 45 persons reported either experience or witness of war- or occupation-related sexual violence. In a next step we analysed the three groups (victim, witness, and non-victim) regarding PTSD symptom prevalence, general symptom distress,

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and in detail symptoms of shame, guilt, feelings of inferiority, worthlessness, and the feeling that one should be punished for one's sins. We found that one third of the victims and one fifth of the witnesses reported PTSD either full or subthreshold. In general victims and witnesses had a higher chance than non-victims to report post-traumatic stress and symptoms of depression and phobic fear. A surprising finding of this study was that persons who witnessed sexual violence were the ones with the highest rates of self-reported aggression and anger.

### **Study 3 - Comparison of ICD 10 and ICD 11 PTSD diagnoses in elderly adults**

Paper 3 was "*PTSD in ICD-10 and proposed ICD-11 in elderly with childhood trauma: prevalence, factor structure and symptom profiles.*" (Glück, Knefel, Tran, & Lueger-Schuster, 2015). The proposed ICD-11 criteria are due to be published in 2017. This will bring major changes for PTSD diagnosis and will most likely affect the prevalence rates of PTSD in general, and especially in elderly. With this exploratory study, we wanted to contribute to the ongoing discussion about the classification of PTSD in ICD-11 with regard to posttraumatic stress in elderly persons. We explored changes in the prevalence rates depending on the criteria applied (ICD-10 vs. ICD-11), the factor structure of ICD-11 PTSD in elderly trauma survivors, and differences in latent symptom profiles depending on what kind of trauma was experienced (WWII vs. IA). We conducted our analyses with a combined sample of now elderly adult survivors of childhood/adolescence trauma (WWII-related vs. IA). The prevalence of PTSD decreased significantly from ICD-10 to ICD-11. We found that a one-factor model of PTSD fitted the data best compared to previously proposed two- or three-factor models. Data revealed three latent severity groups, which also predicted likelihood of a PTSD diagnosis for persons with most severe symptoms and most complex types of trauma.

### **Studies focussing on adaptation**

#### **Study 4 – Influence of personal and environmental factors on current mental health**

Paper 4 was entitled “*Influence of personal and environmental factors on mental health in a sample of Austrian survivors of World War II with regard to PTSD: is it resilience?*” (Tran, Glück, & Lueger-Schuster, 2013). As resilience is a concept that is not yet fully understood, especially in the context of older age and trauma exposure, we aimed to identify aspects of resilience in survivors of WWII. We expected that there would be a difference regarding factors of resilience depending on environmental conditions and applied various methods. We wanted to identify risk factors, correlates, and consequences of posttraumatic symptoms, and to disentangle symptoms of PTSD from personality characteristics and cognitive-behavioural components of resilience. We used a 3-phased approach to analyze the data. (1) We examined correlates of posttraumatic stress using the outcome-oriented approach applied by Bonanno, Galea, Bucciarelli, and Vlahov (2007), which allowed a direct comparisons with previous results. (2) We then re-investigated correlates of posttraumatic stress in a matched sample (sociodemographic characteristics and known risk factors of PTSD) of persons with PTSD and persons without PTSD symptoms. (3) We investigated cognitive-behavioural characteristics persons had used to cope successfully with an environmental risk factor in the past among those who were overall ‘resilient’ in an adaptive sense. We found that fewer lifetime traumatic experiences were associated with better current mental health. Differences of resilience in matched participants were mainly attributable to aspects that were directly related to symptoms of PTSD. Participants with an environmental stressor in the past, but were mentally healthy interpreted stress as a challenge and with a humorous attitude.

### **Study 5 – Sense of coherence and mindfulness in the context of PTSD**

Paper 5 was entitled “*The Influence of Sense of Coherence and Mindfulness on PTSD Symptoms and Posttraumatic Cognitions in a Sample of Elderly Austrian Survivors of World War II*” (Glück, Tran, Raninger, & Lueger-Schuster, in press). This study aimed to investigate the health-maintaining influence of resilience and SOC and their interaction in elderly persons on posttraumatic symptoms. To our knowledge, no previous study investigated the relationship and mechanisms of SOC and mindfulness on posttraumatic symptoms and cognitions in the context of lifetime trauma in a sample of elderly WWII survivors. We expected that both SOC and mindfulness would predict fewer PTSD symptoms and cognitions and that mindfulness would mediate the effects of SOC on posttraumatic symptoms and cognitions. On data from a sample of elderly Austrian survivors of WWII ( $N=97$ ) we used mediation analyses. We were able to show, that mindfulness partially mediated the association of SOC with posttraumatic cognitions, but not with PTSD symptoms. However, when a two-stage mediation model was tested, mindfulness significantly predicted posttraumatic symptoms via its effects on posttraumatic cognitions. This relationship was not clarified in previous studies involving both aspects, SOC and mindfulness, and bears implications for the development of treatments fostering mindfulness in elderly trauma survivors.

### **Discussion**

This dissertation aimed to investigate adaptation and maladaptation in now elderly survivors of different kinds of childhood and lifetime trauma. To assess maladaptation we investigated the prevalence and symptomatology of PTSD and posttraumatic stress-related current mental health in Austria’s elderly. This also comprised the comparison of different kinds of trauma in elderly survivors of childhood trauma and their relevance for diagnostic issues in this special population. To investigate positive adaptation in today’s elderly trauma

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survivors, aspects of resilience and other factors associated with positive current mental health such as SOC and mindfulness were studied.

The main finding of all five studies is that war- and abuse-related childhood trauma is a relevant and prevalent factor influencing current mental health in Austria's elderly that also should be regarded in psychosocial practice. The survivors of WWII, which are comparable to the general Austrian population of elderly, still reported a relevant and high amount of distress caused by post-traumatic symptoms that seem to be connected to war-related childhood trauma. This also means that Austria's elderly survivors of WWII show comparable rates of PTSD and trauma-related symptoms as other European populations of elderly affected by WWII (Darves-Bornoz et al., 2008; Spitzer et al., 2008). Our samples of WWII survivors displayed high levels of sub-threshold PTSD. These were also linked to a high amount of distress and problems with current mental health, such as depressive and anxiety symptoms and symptoms related to interpersonal problems such as mistrust or alienation. When reviewing studies on characteristics and severity of PTSD, Bottche et al. (2012) reported that the course of severity of PTSD symptoms is still inconclusive. Furthermore, a differentiated perspective on symptom profiles seems more informative than the mere reliance on overall symptom severity (Yehuda et al., 2009). It could be that over the lifespan posttraumatic symptoms change and display a different phenomenology such as PTSD, e.g. with somatoform disorders or other trauma-related mental health problems (Freitag et al., 2013; Noll-Hussong et al., 2012). This is also an aspect that was elucidated especially in Study 3 as phenomenological aspects are relevant for the formulation of classification criteria. As previously outlined, it was suggested that trauma and PTSD in older age may also be related to particularities of somatic symptom presentations (Freitag et al., 2013; Hiskey, Luckie, Davies, & Brewin, 2008b) or more somatic health problems are present in older age (Glaesmer et al., 2011; Pietrzak, Goldstein, Southwick, & Grant, 2012). With regard to these aspects, we found that persons with severe symptoms not only had a higher likelihood of



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being diagnosed with PTSD, but also showed the highest amount of comorbid mental health problems such as depressive, somatization or anxiety symptoms. This was especially the case for survivors of very complex and severe childhood trauma such as IA. All these problems add to the general symptom burden, that affects current health of survivors. McFarlane (2010) outlined that negative health outcomes are linked to the ‘allostatic load’, which may be regarded as a core process of stress-related dysregulations across the lifespan, and PTSD must be “superimposed onto the normal biological, psychological, and social changes that are seen concurrently with aging” (Lapp et al., 2011, p. 2). Reviews found that lifetime trauma, including traumatic childhood experiences, and PTSD was not only linked to mental health problems, but also to hypertension, myocardial infarct, and arthritis to name a few problems (Glaesmer et al., 2011; Qureshi, Pyne, Magruder, Schulz, & Kunik, 2009; Sledjeski, Speisman, & Dierker, 2008). For a better understanding, it is important to consider the interaction of these different aspects of posttraumatic development – physiological and psychological – also with regard to developing psychotraumatological treatments.

When we investigated factors that may be associated with positive adaptation, our results confirmed previous research that trauma must not lead to PTSD or adverse health outcomes (Rutter, 2007). Results of studies 4 and 5 give hope and show potential mediators that may buffer against negative consequences of adversity in old age, such as a challenge-oriented approach to stress, or aspects of SOC and mindfulness. We tried to tackle the broad and rather unspecific concept of resilience (cf. Windle, 2010), that sometimes was simply described just as the opposite side of PTSD or mental health problems (Bonanno et al., 2007). When looking at resilience or positive adaptation as the interaction between individual and environmental challenges it becomes clear, that resilience is not a single trait or capacity to thrive but has many faces. For some persons, seeing stress as a challenge and looking at things from the humorous side, this was a valid predictor how they would cope with adversity (Study 4). However, this result only emerged in the context of an environmental risk factor

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(Soviet zone of occupation), that was known to have a negative influence on current mental health. In another sample, we found that SOC was to be regarded as strong predictors for better mental health. It was suggested that SOC may be seen as an inclusive concept of processes of resilience (Almedom, 2005) and within SOC especially a sense of meaning seems important to adapt to trauma (Kuwert et al., 2008). We also found this positive influence for mindfulness on maladaptive cognitive processes that may emerge in the aftermath of trauma. This is also in line with previous research, which suggested that mindfulness especially fosters emotion regulation and decreases avoidance (B. L. Thompson & Waltz, 2010; R. W. Thompson et al., 2011). Although these findings may give the impression, that there are many paths that “lead to the light at the end of the tunnel” (Almedom, 2005), they also suggest that a differential perspective and resource oriented approaches to tackle trauma in the elderly and to foster healthy ageing are needed.

### **Limitations**

The findings presented in the studies are limited in their generalizability by their cross-sectional design and, for some studies, the lack of clinical interview data to obtain valid clinical diagnoses. The use of biological markers could also have added further validity and information for the understanding of the results. Furthermore, an objective disability measure was missing and the elderly and vulnerable samples may have suffered from recall biases as some of the traumatic events reported happened more than 70 years before the time of assessment and also because some of the traumatic events were so complex, that this might also have affected the reporting of participants. A weakness that may also be perceived as strengths is the use of different samples for the 5 studies. On the one hand, this would have enabled better comparability regarding the different measures. On the other hand, this diversity is a realistic representation of the different types of trauma people face over their lives' courses and thus reflect the diversity of reactions – adaptive and maladaptive. As last

point it has to be remarked, that validity of symptom assessment in elderly persons may be biased by recall problems (Kruijshaar et al., 2005). This may lead to a misinterpretation and diagnostic bias of posttraumatic symptoms in elderly survivors of trauma, and complex childhood trauma especially, as posttraumatic stress also impairs cognitive functioning in elderly persons (Schuitevoerder et al., 2013).

### **Future Directions**

Future research with elderly survivors of childhood trauma should include biological markers such as hair cortisol (Stalder & Kirschbaum, 2012) or epigenetic markers (O'Donovan et al., 2011), e.g. to better understand trauma-related inflammatory processes. Functional brain imaging is also a method that has not been used widely with elderly survivors of childhood trauma, but could add significantly to a better understanding of age- vs. trauma-related mental health problems (Lupien, McEwen, Gunnar, & Heim, 2009). Furthermore in this context, it would be of interest to identify the impact of specificity of traumatic events and their time of exposure, respectively age at traumatization, on these biological, and of course psychological, processes which should also incorporate aspects related to gender specificity (Teicher, 2015). This would enhance the understanding of underlying biological mechanisms and processes that lead to negative outcome in older age in this especially vulnerable group and promote the development of psychological treatments.

Another aspect that should be investigated closer is the notion that PTSD symptom patterns may vary between young, middle and older age also with respect to gender. Additionally, it is not clear, whether the number of symptoms for a full diagnosis is the same over the lifespan. We need information and robust research into this matter. Furthermore, focus of research on post-traumatic symptoms, not only in old age, is more or less restricted to PTSD, and only gradually opening up for other health problems (e.g., Noll-Hussong et al., 2012). The aspects mentioned will need scrutiny in longitudinal studies, because otherwise a

full understanding of the underlying mechanisms and processes does not seem possible. This knowledge would also aid the development of psychotrauma-gerontological treatments.

### **Implications**

Cognitive decline and age-related morbidity are great challenges not only for dedicated personnel in gerontological settings. Consequently, as trauma and PTSD greatly impact these processes (e.g. Glaesmer et al., 2011; Schuitevoerder et al., 2013), knowledge on PTSD and trauma in the elderly is important in care and residential settings. Butler, Critelli, and Rinfrette (2011) stated, that trauma informed care is not a treatment, but requires from practitioners to follow the principle of “primum non nocere” that calls for a sensitivity of the various issues and aspects that arise in the context of trauma, and to expand them to the general principles of client-centered practice. Until today, clear trauma-informed operating procedures need to be developed and implemented for Austria and persons working with elderly need to be trained accordingly. It seems that in general, although there are several guidelines and publications on trauma-informed care and practice in different settings (e.g. Capezza & Najavits, 2012; Ko et al., 2008; SAMSHA, 2014) that literature on procedures or procedures themselves for elderly seem sparse. This would need to include knowledge about adaptive and maladaptive processes, specialized training and an inclusion of these topics into education of care personal would reduce distress for both, professionals working with the elderly and the elderly themselves (Butler et al., 2011). Derived from the results of the studies there is a high prevalence of posttraumatic stress-related symptoms in elderly Austrians, and these persons are likely to need more attention in the form of specialized care and treatment in the future. There is a number of highly effective psychological treatments for trauma-related mental health problems (Schnyder et al., 2015). However, in general and in Austria especially, knowledge on the use of these treatments in elderly populations is sparse and thus research on this matter is of high importance.

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To further this process of developing trauma informed care and treatment settings, policy makers and government agencies would need to be involved (Butler et al., 2011; SAMSHA, 2014) as they can act as driving or regulatory forces to foster change. Furthermore, employees working for these institutions would also benefit from this knowledge, to adequately interact with trauma survivors, e.g. for social or pension insurance procedures. IA trauma survivors in our studies reported that it was re-traumatizing when they faced disbelief regarding the traumatic experiences, trivialising, questioning current mental and physical health status, or the causality of childhood trauma and morbidity in old age. It is our responsibility as scientists to overcome this science-practice gaps with workshops, trainings and support for the development of adequate policies.

### **Conclusion**

This dissertation aimed to add to the understanding of war- and institution-related childhood trauma in elderly Austrians. It showed that there is a significant amount of childhood and lifetime trauma in elderly persons in Austria, which still affects them today. This needs to be regarded when working with an elderly population, both in science and practice.

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**Contributions for PhD**

If I was not first author by name, I contributed to the papers as shared first author.

**Study 1**

Glück, T. M., Tran, U. S., & Lueger-Schuster, B. (2012). PTSD and trauma in Austria's elderly: Influence of wartime experiences, post-war zone of occupation and life time traumatization on today's mental health status—an interdisciplinary approach. *European Journal of Psychotraumatology*, 3, 17263.

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## CLINICAL RESEARCH ARTICLE



# PTSD and trauma in Austria's elderly: influence of wartime experiences, postwar zone of occupation, and life time traumatization on today's mental health status—an interdisciplinary approach

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**Background:** While in recent years epidemiological studies on World War (WW) II-related traumatization and prevalence of posttraumatic stress disorder (PTSD) in elderly persons have been conducted for various European countries, for Austria, these numbers are unknown.

**Objective:** The focus of this epidemiologic study was to picture the current mental health status and prevalence of PTSD and lifetime traumatic events in Austria's elderly with respect to WWII and subsequent occupation.

**Method:** In an interdisciplinary approach of psychologists and historians, 316 elderly Austrians (born before 1946) were interviewed for symptoms of PTSD and lifetime traumatization (Traumatic Life Events Questionnaire, PTSD Checklist-Civilian Version), current mental health (Brief Symptom Inventory), wartime-related trauma, and traumatic experiences with occupational forces. These factors were also compared regarding the zone of occupation (Allied vs. Soviet). Data were collected between March and September 2010.

**Results:** 97.5% of the sample reported at least one lifetime trauma. War-related traumata were reported by 92.7% and non-war-related traumata by 82.3%; 40.2% experienced traumatic events with occupational forces. PTSD was present in 1.9% of the sample and up to 13.9% taking subthreshold PTSD into account. Both, the presence of symptoms indicative of PTSD and subthreshold PTSD implied weaker current mental health (regarding General Distress: odds ratios up to 25.51; 95% CI = 9.82 to 66.27). Independent of PTSD diagnosis persons from the Soviet occupied zone showed higher levels of Interpersonal Sensitivity, Global Distress, and Phobic Anxiety. Prevalence of PTSD was independent of gender.

**Conclusions:** Our results corroborate findings from other European countries that PTSD is a common disorder in the elderly due to WWII experience and that PTSD and trauma affect mental health even across long periods of time. Postwar distressing conditions also pose a further risk factor for symptomatology and distress in later years.

**Keywords:** World War 2; epidemiology; subthreshold PTSD; elderly; general population

For the abstract or full text in other languages, please see Supplementary files under Reading Tools online

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Tobias M. Glück and Ulrich S. Tran contributed equally to this work. They wrote the paper and conducted the statistical analysis. Brigitte Lueger-Schuster designed and supervised the project and contributed in writing and revising the paper.

Epidemiological surveys of posttraumatic stress disorder (PTSD) prevalence in community samples for the United States (3.5%) and Europe (1.1%) showed that prevalence rates decrease with older age (Darves-Bornoz et al., 2008; Kessler et al.,

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2005). However, this is not true for societies where the elderly ( $\geq 65$  years) have been exposed to traumatic events of World War II (WWII). In Germany, the elderly show a higher lifetime trauma exposure than younger persons (Spitzer et al., 2008) and a doubled PTSD prevalence rate (3.4%) (Maercker, Forstmeier, Wagner, Glaesmer, & Brahler, 2008). The influence of war trauma becomes even more salient in high-risk populations. Several German studies found PTSD prevalence rates between 4.3 and 11% in samples of former nurses, displaced persons and refugees from the eastern parts of Germany, and survivors of bombings (Fischer, Struwe, & Lemke, 2006; Maercker, Herrle, & Grimm, 1999; Teegen & Cizmic, 2003; Teegen & Handwerk, 2006; Teegen & Meister, 2000). All studies reported prevailing lower quality of life and a variety of psychological symptoms. Among those who experienced WWII related traumata as children or adolescents, PTSD prevalence also surpassed 10% (Kuwert, Spitzer, Träder, Freyberger, & Ermann, 2007a). Comparing these results to a country where today's elderly did not experience war, such as Switzerland, rates range around 0.7% (Maercker & Pielmaier, 2010).

Although subthreshold PTSD is not an accepted DSM diagnosis, it must also be considered a distressing condition (Favaro, Tenconi, Colombo, & Santonastaso, 2006). Taking it into account, prevalence rates of 2.9% have been reported in samples that were highly exposed to WWII-related traumata (Teegen & Meister, 2000). Likewise, in a German community survey, an increase of prevalence rates from 3.4 to 7.2% was reported when taking into account subthreshold PTSD (Glaesmer, Gunzelmann, Braehler, Forstmeier, & Maercker, 2010).

Generally, 25 to 30% of the German elderly population still suffers from mental health problems that are related to traumatic WWII experiences (Fischer et al., 2006). Trauma reactivation (Heuft, 1999) and delayed-onset PTSD have to be considered relevant phenomena in the elderly (Andrews, Brewin, Philpott, & Stewart, 2007).

Results on the influence of gender on the experience of trauma and PTSD are still equivocal. While some studies report higher lifetime trauma exposure in men (Breslau, 2001), others found no such effect (Glaesmer et al., 2010; Hapke, Schumann, Rumpf, John, & Meyer, 2006). Some studies on WWII-related traumata, however, found that men experienced certain types of wartime-related trauma more often than women (Glaesmer et al., 2010; Spitzer et al., 2008; Teegen & Meister, 2000). Under certain circumstances women have a higher risk in developing PTSD (Brewin, Andrews, & Valentine, 2000) and also show higher rates of PTSD (Darves-Bornoz et al., 2008).

Another issue pertains to the influence of severity of traumatic events and related to this, regional differences on the prevalence of posttraumatic symptomatology. Although it is known that severity of trauma is a relevant

factor for later PTSD (Brewin et al., 2000), the historical dimension of trauma severity of WWII survivors was not explicitly integrated into epidemiological research designs. Some studies compared different recent conflict zones regarding prevalence of PTSD and traumatic events (de Jong et al., 2001). In past years, research on PTSD prevalence and other mental disorders among WWII survivors has been conducted for different regions of Europe (Bramsen, van der Ploeg, & Boers, 2006; Favaro et al., 2006; Hautamaki & Coleman, 2001; Kuwert et al., 2007a; Lis-Turlejska, Luszczynska, Plichta, & Benight, 2008). However, to our knowledge, existing studies did not compare different regions with reference to WWII directly. The post-WWII time of occupation (relevant for Germany and Austria) and the effect of different occupational zones (Allied vs. Soviet) on elderly's current mental health was also not considered in previous research.

Austria, a country of some 8.2 million people and birthplace of Adolf Hitler, was incorporated into the *Third Reich* in 1938. It experienced a similar history of WWII as Germany and was occupied by Western allied (British, French, and U.S. troops) and Soviet forces from 1945 until 1955 after the liberation from the Nazi-regime.

In some regions of Austria, heavy bombing and fighting took place during and at the end of WWII. Historical research revealed that people in Austria and Germany also experienced traumatic events during the time of occupation, such as physical and psychological violence, rape, and robbery by soldiers of the occupation forces (Karner & Stelzl-Marx, 2005; Kuwert, Brahler, Glaesmer, Freyberger, & Decker, 2009; Kuwert, Spitzer, Träder, Freyberger, & Ermann, 2007b; Teegen & Meister, 2000). Respectively, fears and rumors also circulated in the population at that time, contributing to wide-spread distress and unease. Findings also suggest that the traumatic load was higher in the Soviet than in the Allied zone (Karner & Ruggenthaler, 2005; Knoll & Stelzl-Marx, 2005; Mulley, 2005).

There is a lack of epidemiologic surveys and screenings in the Austrian population on mental health (Rohrhauser, 2006). Prevalence of PTSD and trauma has not been investigated in Austrian society on a broader scale yet. Even less is known about Austria's elderly and whether a similar prevalence pattern of PTSD, PTSD symptoms, and trauma like in German samples (Spitzer et al., 2008) can be found.

The focus of this study was to picture the current mental health status and prevalence of PTSD symptoms and lifetime traumatic events in Austria's elderly. In an interdisciplinary approach, historians and psychologists worked together to map out high impact trauma areas of WWII for later psychological investigation. The impact of wartime-related trauma, traumatic experiences with



occupational forces, lifetime traumatic events, and gender differences on PTSD and psychopathological symptomatology were investigated. These factors were also compared regarding the zone of occupation (Allied vs. Soviet).

## Method

### Procedure and subjects

Between March and September 2010, 316 persons (see Table 1) were recruited in all nine counties of Austria through announcements in local newspapers and posters in shops, doctors' practices, and pharmacies and by contacting institutions and residences for the elderly. Inclusion criteria were as follows: year of birth before 1946, residency in Austria during WWII and/or the time of occupation (and of the interview), and a Mini-Mental State Examination (MMSE; Folstein et al., 2000) score at or above 22. The common cutoff of 23 was lowered due to the high age of our sample and the large proportion of participants with less than 10 years of education. This approach is supported by empirical data (Crum, Anthony, Bassett, & Folstein, 1993) and was recommended by an advisory board of psychologists and psychiatrists specialized in gerontology. The study was conducted according to the ethical regulations for clinical research in Austria. All participants provided written informed consent and were interviewed at home. Interviews were conducted by master students and a doctoral student of clinical psychology, trained in psychotraumatology and interview techniques for an elderly population. There were weekly supervision

sessions with two clinical psychologists (one was the research group leader). The number of interviews conducted in each county corresponded to the population density of each county (Statistik Austria, 2011), and the number of interviews with respondents from former Allied ( $n = 126$ ) and Soviet ( $n = 184$ ) occupation zones also corresponded to present-day population densities in these regions. Five participants indicated that they had resided post-WWII in more than one zone, and one participant did not provide details. These six participants were not included in analyses regarding different zones. Surveys on population movements between the years 1938 to 1945 are not available; therefore, the sample had to be recruited by the rationale described above.

### Instruments

Instruments and mode of assessment were chosen to picture the *current* mental health and posttraumatic distress status. Epidemiological research suggests that estimating lifetime prevalences has to be considered as problematic (Krujshaar et al., 2005). Especially among the elderly, recall bias and cognitive prolepsis have to be expected (Nyberg, Backman, Emgrund, Olofsson, & Nilsson, 1996). Being read out symptoms, which is done in most clinical interviews (Van Ameringen, Mancini, & Patterson, 2011)—instead of recalling them freely—poses further risks of recall bias and to the validity of the data (Krujshaar et al., 2005; Patten, 2003; Patten, Gordon-Brown, & Meadows, 2010). A recent German study (Spitzer et al., 2008) did not report how lifetime prevalence and possible recall bias were estimated. To arrive at reliable estimates, we assessed 1-month rather than lifetime PTSD prevalence rates and current mental health status.

The interview comprised the following instruments. Cognitive functioning was assessed with the MMSE (Folstein et al., 2000). The Brief Symptom Inventory (BSI; Franke, 2000) was used to determine current clinically relevant ( $T$  values [adult norm]  $\geq 63$ ) psychological and somatic symptoms and distress. Frequency and type of lifetime traumatization were assessed with the Traumatic Life Events Questionnaire (TLEQ; Teegen, 2003; original Kubany et al., 2000). WWII-related traumata or those caused by the occupational forces (subsumed under "war-related traumata" in the following; WRT) were explicitly excluded in this assessment with the TLEQ. Instead, WRTs were assessed in detail with a structured interview that was developed in cooperation with historians of the Ludwig Boltzmann Institute for War-Research. This interview asked for current socio-demographics, wartime experiences, and experiences with occupational forces (Table 2 and Table 4 list the respective assessed categories). The items were designed by the historians, taking into account historical data on traumatic and other relevant events specific to that time.

Table 1. Sociodemographic characteristics ( $N = 316$ )

Characteristic	<i>N</i>	%	General population (%) <sup>a</sup>
Gender			
Female	197	62.3	58.4
Male	119	37.7	41.6
Marital status			
Single	29	9.2	7.6
Married	125	39.6	44.4
Widowed or divorced	162	51.3	48.0
School education <sup>b</sup>			
< 10 years	161	51.1	45.9
10–12 years	115	36.5	40.9
> 12 years	39	12.4	13.2
	Mean (SD)	Range	
Age (years)	81.9 (6.8)	64–99	74.9

<sup>a</sup>According to Statistik Austria (2011), with regard to all persons aged between 65 and 99 years living in Austria.

<sup>b</sup> $N = 315$ .

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Formulations of items pertaining to WRTs were matched to the format of the TLEQ. Experiences with occupational forces assessed in this interview were considered to be traumatic only in accordance with DSM-IV criterion A (1+2); i.e., "robbed by soldiers" was considered traumatic, when persons indicated that they also felt intense shock, horror, or fear, while "occupational force caused fear" did not qualify. Traumatic experiences with occupational forces also entered Table 2 (WRT by occupational forces).

Symptoms of posttraumatic stress and 1-month prevalence of PTSD symptoms were assessed with the Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL-C assesses PTSD symptoms in the past month according to DSM-IV criteria. Respondents are required to rate the five reexperiencing symptoms (criterion B), seven avoidance symptoms (criterion C), and five arousal symptoms (criterion D) on a 5-point-

scale (1 = "none" to 5 = "very"). Symptoms with ratings of 3 or higher were considered clinically relevant. For a probable full-blown PTSD, one symptom of criterion B, three symptoms of criterion C, and two symptoms of criterion D had to be present. For a probable subthreshold PTSD I, criterion B and either criterion C or D had to be fulfilled (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Shelby, Golden-Kreutz, & Andersen, 2008). For a probable subthreshold PTSD II, at least one symptom of criteria B, C, and D had to be present (Stein, Walker, Hazen, & Forde, 1997). The rationale for using both definitions of subthreshold PTSD was to compare more strict (subthreshold PTSD I) with less strict (subthreshold PTSD II) diagnoses with regard to distress and symptomatology.

## Statistical analysis

All analyses were conducted with SPSS 15.0. Categorical variables were investigated with  $\chi^2$  tests. Odds ratios

**Table 2.** Traumatic events in relation to gender and PTSD prevalence

	Total		Women		Men		Univariate statistics		Model adjusted for age		
	N	%	N	%	N	%	$\chi^2$	p	OR	95% CI	P
Any trauma	308	97.5	190	96.4	118	99.2	2.21	0.137	4.40	0.53–36.27	0.169
War-related trauma (WRT)	293	92.7	180	91.4	113	95.0	1.42	0.234	1.88	0.71–4.94	0.201
Bombing	250	79.1	155	78.7	95	79.8	0.06	0.807	1.12	0.63–1.98	0.698
Civilian WRT	64	20.3	42	21.3	22	18.5	0.37	0.544	0.81	0.46–1.45	0.486
By occupation forces	127	40.2	81	41.1	46	38.7	0.19	0.665	0.89	0.56–1.42	0.623
War effort <sup>a</sup>	43	13.6	2	1.0	41	34.5	70.56	<0.001			
Prisoner of war <sup>a</sup>	51	16.1	3	1.5	48	40.3	82.57	<0.001			
Other trauma	260	82.3	159	80.7	101	84.9	0.88	0.348	1.26	0.68–2.35	0.470
Physical assault	22	7.0	10	5.1	12	10.2	2.95	0.086	2.03	0.85–4.89	0.113
Rape	18	5.7	14	7.1	4	3.4	1.89	0.169	0.46	0.15–1.43	0.181
Robbery	8	2.5	5	2.5	3	2.5	0.00	0.998	1.01	0.24–4.33	0.988
<b>Battered child</b>	26	8.3	7	3.6	19	16.2	15.56	<0.001	5.11	2.07–12.62	<0.001
Childhood sexual abuse	10	3.2	6	3.0	4	3.4	0.02	0.877	1.07	0.29–3.87	0.923
<b>Partner violence</b>	13	4.1	12	6.1	1	0.8	5.16	0.023	0.12	0.02–0.95	0.045
Sudden death of loved one	133	42.2	83	42.1	50	42.4	0.00	0.967	0.98	0.62–1.56	0.938
Accident	103	32.6	57	28.9	46	38.7	3.19	0.074	1.50	0.92–2.44	0.109
Natural disaster	130	41.3	80	40.6	50	42.4	0.10	0.758	1.03	0.65–1.65	0.898
Witnessed trauma	35	11.1	18	9.1	17	14.3	2.00	0.158	1.61	0.79–3.27	0.191
Other	51	16.2	33	16.8	18	15.4	0.10	0.751	0.87	0.46–1.63	0.661
PTSD prevalence (1 month) <sup>b</sup>											
Subthreshold I	27	8.8	17	8.9	10	8.5	0.02	0.887	0.96	0.42–2.18	0.920
Subthreshold II	37	12.0	24	12.6	13	11.0	0.18	0.672	0.85	0.42–1.75	0.665
Full	6	1.9	4	2.1	2	1.7	0.06	0.800	0.81	0.15–4.50	0.808
Subthreshold I + Full	33	10.7	21	11.1	12	10.2	0.06	0.808	0.93	0.44–1.96	0.841
Subthreshold II + Full	43	13.9	28	14.7	15	12.7	0.25	0.618	0.84	0.43–1.65	0.614

Note: Significant ( $p < 0.05$ ) traumatic events are printed boldface.

<sup>a</sup>No model adjusted for age was computed because of a significant Hosmer-Lemeshow test statistics ( $p < 0.001$ ).

<sup>b</sup>Percentages refer to those with a positive trauma history ( $N = 308$ ).



(ORs) and 99% confidence intervals (CIs) are provided. Potential confounders were controlled using logistic regression analysis. Continuous variables were analyzed with robust Mann-Whitney-*U*-tests. Tests on the representativeness of the sample were conducted with *z* tests, comparing observed proportions to population values. Figures of effect size—equivalent to Cohen's *d*—are provided, where appropriate. Significance was set to  $p < 0.05$ .

## Results

Table 2 lists the prevalence rates of WRT and non-WRT trauma types, prevalence rates of full and subthreshold PTSD symptoms, and results of statistical tests (controlling for age for better comparability to other studies; e.g., Spitzer et al., 2008), however, men and women did not differ in age,  $z = -1.06$ , two-sided  $p = 0.287$  in the total sample, stratified by gender. MMSE mean score was 27.1 (SD=2.2) and ranged between 23 and 30 (proportion of scores  $\leq 23 = 8.6\%$ ,  $N = 26$ ). The sample was representative of the Austrian population aged 65 years or older, concerning gender distribution, marital status, and education (*z* tests,  $p$ 's  $\geq 0.266$ ; see Table 1).

At least one traumatic event had been experienced by 97.5% of the sample. Experience of some type of WRT was reported by 92.7%, while at least one non-WRT was reported by 82.3%. Traumatized persons ( $N = 308$ ) reported in total on average (mean  $\pm$  SD)  $3.52 \pm 1.75$  different traumatic events (range, 1–10), of which  $1.74 \pm 1.01$  were WRTs (range, 0–5) and  $1.78 \pm 1.36$  were non-WRTs (range, 0–6).

The most frequent WRT was bombing (79.1%), the least frequent traumatic war efforts (13.6%), describing active involvement in acts of war, e.g., as a member of the *Wehrmacht*. Traumata experienced under the occupational forces were reported by 40.2%. Men and women differed in none of the WRT prevalence rates, with the exception of traumatic war efforts and of being a prisoner of war (nearly exclusively reported by men). As expected (Spitzer et al., 2008), men reported on average more WRTs than women ( $2.14 \pm 1.19$  vs.  $1.49 \pm 0.78$ ;  $z = 4.83$ , one-sided  $p < 0.001$ ). Excluding traumatic war efforts and being prisoner of war alleviated this difference ( $z = -0.80$ , two-sided  $p = 0.422$ ).

The most frequent non-WRTs were the sudden death of a loved one (42.2%) and natural disaster (41.3%), the least frequent was robbery (2.5%). Men and women did not differ in non-WRT prevalence rates, with the exception of physical violence during childhood (=battered child; higher among men) and partner violence (higher among women). Contrary to expectation (cf. Spitzer et al., 2008), men and women reported similar numbers of non-WRTs ( $z = 1.11$ , one-sided  $p = 0.134$ ).

Symptoms of a full 1-month PTSD afflicted six persons (1.9% of all traumatized persons), subthreshold PTSD I and II were more frequent (8.8 and 12.0%, respectively). All persons indicating PTSD rated symptom severity consistently higher than 3 (see Instruments) on their relevant symptoms. Thus, PTSD symptomatology was severe in all persons, regardless of a probable full or subthreshold PTSD diagnosis.

Regarding gender and zone of occupation (see Table 4), there was no difference in full and subthreshold PTSD prevalence rates. However, persons with full PTSD reported more WRTs than all other traumatized persons ( $2.50 \pm 0.84$  vs.  $1.72 \pm 1.01$ ;  $z = 2.09$ , exact two-sided  $p = 0.031$ ), but a similar number of non-WRTs ( $z = 1.06$ , exact two-sided  $p = 0.595$ ). Combining full PTSD and subthreshold PTSD I, this specific difference in numbers of reported WRTs vanished; yet, the combined group reported still a slightly higher number of total trauma events ( $3.97 \pm 1.85$  vs.  $3.47 \pm 1.73$ ;  $z = 1.66$ , two-sided  $p = 0.097$ ). This difference became significant when comparing the combined group with full PTSD or subthreshold PTSD II against all other traumatized persons ( $4.16 \pm 1.94$  vs.  $3.42 \pm 1.69$ ;  $z = 2.47$ , two-sided  $p = 0.013$ ).

As expected, cognitive functioning was more impaired in persons with PTSD (full PTSD and subthreshold PTSD I vs. all other traumatized persons:  $26.48 \pm 2.05$  vs.  $27.17 \pm 2.21$ ;  $z = -2.01$ , one-sided  $p = 0.022$ ,  $d = -0.23$ ; full PTSD and subthreshold PTSD II vs. all other traumatized persons:  $26.70 \pm 2.05$  vs.  $27.16 \pm 2.22$ ;  $z = -1.56$ , one-sided  $p = 0.059$ ,  $d = -0.18$ ). These differences were independent of age; diagnosed and non-diagnosed persons were of similar age (two-sided  $p$ 's  $\geq 0.539$ ; details omitted).

Persons with full PTSD or subthreshold PTSD II had heightened probabilities to exhibit current clinically relevant symptoms in all scales of the BSI, controlling for zone of occupation, see Table 3. The highest ORs occurred for Global Distress, Hostility, and Psychoticism, the lowest for Somatization.

Independent of PTSD diagnosis, former residents of the Soviet zone had significantly increased odds for Interpersonal Sensitivity, Global Distress, and Phobic Anxiety, see Table 3. Residents of the Soviet zone also reported higher rates of distressing or traumatic experiences with the occupational forces, see Table 4. They felt less safe, occupational forces caused more fear, and more likely robbed residents. A larger proportion of former residents still felt fear when being reminded of the occupational forces today.

Compared to Table 3, persons with full PTSD or subthreshold PTSD I had even higher ORs of current clinically relevant symptoms, regardless of zone: nearly twofold for Interpersonal Sensitivity (9.17), Depression (9.13), and Anxiety (10.89); somewhat higher for Somatization (3.76), Phobic Anxiety (5.49), Paranoid

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**Table 3.** Prevalence of current clinically relevant psychopathological symptoms in relation to a full PTSD or subthreshold PTSD II diagnosis

Scale	PTSD* (N = 43)		No PTSD (N = 272)		Model adjusted for zone of occupation			Impact of Soviet zone (adjusted for PTSD diagnosis)		
	N	%	N	%	OR	95% CI	P	OR	95% CI	p
Somatization	20	46.5	65	23.9	2.76	1.42–5.37	0.003	1.53	0.90–2.60	0.117
Obsessive-compulsive	5	11.6	8	2.9	4.29	1.33–13.80	0.015	1.15	0.36–3.66	0.809
Interpersonal sensitivity	5	11.6	8	2.9	4.78	1.44–15.86	0.011	9.54	1.21–75.25	0.032
Depression	8	18.6	12	4.4	5.02	1.91–13.22	<0.001	1.77	0.65–4.84	0.266
Anxiety	12	27.9	17	6.2	6.02	2.60–13.94	<0.001	2.11	0.87–5.08	0.097
Hostility	12	27.9	12	4.4	8.47	3.48–20.60	<0.001	1.57	0.62–3.96	0.342
Phobic anxiety	9	20.9	19	7.0	3.88	1.58–9.48	0.003	2.79	1.08–7.24	0.035
Paranoid ideation	9	20.9	16	5.9	4.81	1.93–11.97	<0.001	1.13	0.46–2.75	0.792
Psychoticism	8	18.6	8	2.9	8.40	2.87–24.62	<0.001	0.82	0.28–2.41	0.719
Global distress	15	34.9	12	4.4	13.01	5.35–31.63	<0.001	3.32	1.20–9.16	0.021

\*Either a full PTSD or subthreshold PTSD II diagnosis.

Ideation (7.04), and Psychoticism (12.42); and similar for Obsessive-Compulsive (4.10) and Hostility (8.19; all  $p$ 's < 0.001; Obsessive-Compulsive:  $p = 0.025$ ). The OR of current Global Distress was 25.51 (95% CI = 9.82 to 66.27,  $p < 0.001$ ). The effect of Soviet zone remained constant (Interpersonal Sensitivity: OR = 9.38; Phobic Anxiety: OR = 2.69; Global Distress: OR = 3.30, all  $p$ 's ≤ 0.043).

## Discussion

In the past decade, there has been an increasing interest on WWII-related traumatization and posttraumatic symptomatology in the elderly, especially in European societies (Bramsen et al., 2006; Favaro et al., 2006; Hautamaki & Coleman, 2001; Lis-Turlejska et al., 2008). The purpose of this study was to get an impression of the prevalence of PTSD and comorbid symptoms in a

**Table 4.** Prevalence of distressing and traumatic experiences with members of the occupational forces and PTSD prevalence rates

Kind of experience	Allied		Soviet		$\chi^2$	$p$	OR	95% CI
	N	%	N	%				
Occupational force caused fear	17	13.5	116	63	74.96	<0.001	10.94	6.05–19.78
Robbed by soldiers of occupation forces	8	6.3	87	47.8	59.78	<0.001	13.51	6.24–29.26
Physical and/or psychological violence	11	8.7	47	25.5	13.9	<0.001	3.59	1.78–7.23
Fears related to rumors <sup>a</sup>	31	24.6	108	59	35.71	<0.001	4.41	2.67–7.28
Occupational force gave feeling of safety	55	46.2	48	27.4	10.99	0.001	0.44	0.27–0.72
Today still feelings of fear when reminded of occupational forces	2	1.6	22	12.1	11.43	0.001	8.53	1.97–36.94
Victim (or witness) of sexual violence	8	6.3	31	16.8	7.49	0.006	2.99	1.32–6.74
PTSD prevalence (1 month) <sup>b</sup>								
Full	3	2.4	3	1.7	0.19	0.665	0.7	0.14–3.53
Subthreshold I + Full	13	10.4	20	11.3	0.06	0.805	1.1	0.52–2.30
Subthreshold II + Full	19	15.2	24	13.6	0.16	0.688	0.88	0.46–1.68

Note: Percentages within the subgroups are reported. OR are displayed for Soviet zone.

<sup>a</sup>Such as "The Russians are going to rape all women!"

<sup>b</sup>Percentages refer to those with a positive trauma history and a non-ambiguous allocation to one of the two zones (N = 302).



sample of elderly Austrians who experienced WWII and the occupation by Allied and Soviet forces. We also used a new approach, as psychologists and historians worked together interdisciplinarily.

While previously reported PTSD prevalence rates for the German elderly ranged between 3.4 and 11.0% (Fischer et al., 2006; Glaesmer et al., 2010; Kuwert et al., 2007a; Maercker et al., 1999; Spitzer et al., 2008; Teegen & Cizmic, 2003; Teegen & Handwerk, 2006; Teegen & Meister, 2000), we found a rate of 1.9%. Including also subthreshold PTSD II, this rate increased to 13.9%, which seemed in good accordance with previous community-based findings (Glaesmer et al., 2010). Persons indicated PTSD symptoms as highly distressing and reported poor mental health, regardless of full or subthreshold PTSD (mirroring also previous findings, cf. Spitzer et al., 2008). Thus, our results buttress previous results that persons with subthreshold PTSD seemingly do not suffer less (Favaro et al., 2006). Yet, the more PTSD criteria were fulfilled (subthreshold PTSD I), the worse were mental health outcomes. Hence, we strongly propose to apply subthreshold PTSD (I or II) also in future investigations, as it was clearly found to be clinically relevant.

More than 97% reported at least one life-time trauma. This rate is much higher than in previous epidemiological studies, where rates ranged between 20 and 80% (Hapke et al., 2006; Maercker et al., 2008; Spitzer et al., 2008), but comparable to a small study with elderlies in need of care (Teegen & Cizmic, 2003). Almost 93% reported some type of WRT; 79% of our sample experienced bombings, whereas 20% in a German community sample (Glaesmer et al., 2010). However, prevalence of traumatic experiences with occupational forces was lower (40%) than in another German study (54%) (Kuwert et al., 2007b). Sexual violence was experienced or witnessed by almost 13%, with a higher prevalence in the Soviet zone. This important topic (Kuwert & Freyberger, 2007; Kuwert et al., 2010) will be addressed elsewhere (Lueger-Schuster, Glück, Tran, & Zeilinger, 2012). In total, persons in our study reported less direct involvement in actions of war or experiences in combat zones (apart from bombing) than in other studies (Kuwert et al., 2007b; Maercker et al., 2008; Spitzer et al., 2008). This may be due to differences in assessment, e.g., Spitzer et al. (2008) did not clearly delineate their "combat or war zone experiences" category.

Men and women did not overly differ in type of life-time traumatization and also not in full or subthreshold PTSD prevalence rates. The overall similarity of life-time traumatization of men and women found here is in good accordance with other studies (Hapke et al., 2006), while previously reported sex differences regarding the total number of traumatic events (Spitzer et al., 2008) could not be replicated. Yet, another study

(Glaesmer et al., 2010) found no differences in relation to war-related experiences such as war effort that was observed here. Regional differences may account for these findings. Intriguingly, persons with full PTSD reported a higher number of WRTs. Thus, war may confront persons with most distressing and hardest to handle experiences (Glaesmer et al., 2010; Kuwert et al., 2007a).

Previous studies also reported higher rates of distress and trauma, caused by the Soviet forces in Germany (Kuwert et al., 2007a; Teegen & Meister, 2000). Here, former residents of the Soviet zone reported more distressing and traumatizing experiences with the occupational forces as well. However, our study is the first to highlight that living under Soviet occupation was more adverse, with regard to mental health in general, and social and phobic anxiety in particular. These results seem remarkable, given the time spans involved (Glaesmer et al., 2010; Kuwert et al., 2007a, 2007b) and correspond with historical reports (cf. Karner & Stehl-Marx, 2005).

As previously discussed (Floyd, Rice, & Black, 2002; Hiskey, Luckie, Davies, & Brewin, 2008; Ullman, 2000), PTSD symptomatology and traumatization likely influence cognitive impairment and various neurocognitive functions (Menning, Renz, Seifert, & Maercker, 2008; Sailer et al., 2008). We observed a small but significant effect of PTSD diagnosis on cognitive impairment, independent of age and gender. It remains to be seen whether this effect is amenable to treatment (König, Lueger-Schuster, & Kryspin-Exner, 2008).

Limitations to the generalizability of our findings are the reliance on data from a—yet rather large and representative—convenience sample and assessing PTSD with a self-report measure and not a clinical interview. This may have biased some of our findings regarding the prevalence of PTSD and mental health indicators in the elderly population.

Our results corroborate findings from Germany and other European countries (Bramsen & van der Ploeg, 1999; Fischer et al., 2006; Maercker et al., 1999; Teegen & Cizmic, 2003; Teegen & Handwerk, 2006; Teegen & Meister, 2000) that PTSD is a common disorder in the elderly due to their experience of WWII and that PTSD and trauma seem to affect mental health even across long periods of time. Postwar adverse and distressing conditions, like in the former Soviet zone, pose also further risk for posttraumatic symptomatology and distress in later years. With a growing proportion of older people in Europe's societies, we affirm previous claims (Spitzer et al., 2008) that screenings for PTSD should be integrated in regular examinations of the elderly. Sequelae of WRTs need to be considered in treatment and care. Furthermore, we recommend interdisciplinary



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collaboration for future research on historical traumatization and on the different aspects and effects of traumatization.

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There is no conflict of interest in the present study for any of the authors.

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**Study 2**

Lueger-Schuster, B., Glück, T. M., Tran, U. S., & Zeilinger, E. L. (2012). Sexual Violence by Occupational Forces during and after World War II: Influence of Experiencing and Witnessing of Sexual Violence on Current Mental Health in a Sample of Elderly Austrians. *International Psychogeriatrics*, 24(8), 1354-1358

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## Sexual violence by occupational forces during and after World War II: influence of experiencing and witnessing of sexual violence on current mental health in a sample of elderly Austrians

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### ABSTRACT

**Background:** Wartime rape is an atrocity with long-lasting impacts not only on victims but whole societies. In this brief report, we present data on experience and witness of sexual violence during World War II (WWII) and subsequent time of occupation and on indicators of mental health in a sample of elderly Austrians.

**Methods:** Interviews of 298 elderly Austrians from a larger epidemiological study on WWII traumatization were analyzed for the impact of experience and witness of sexual violence during the wartime committed by occupational forces. Interviews comprised a biographical/historical section and psychological measures (BSI, TLEQ, PCL-C). Participants were recruited in all nine provinces of Austria with respect to former zones of occupation (Western Allied/Soviet).

**Results:** Twelve persons reported direct experience of sexual violence, 33 persons witnessed such atrocities. One third of the victims and 18.2% of the witnesses reported post-traumatic stress disorder (PTSD full/subthreshold). Sexual violence occurred more often in the former Soviet zone. Victims and witnesses displayed higher odds of post-traumatic symptoms and symptoms of depression and phobic fear than non-victims. Furthermore, witnesses displayed higher levels of aggression compared to victims and non-witnesses.

**Conclusions:** Our results corroborate previous findings that wartime rape has long-lasting effects over decades on current mental health and post-traumatic distress in victims and witnesses. We recommend integration of psychotraumatological knowledge on consequences of sexual violence on mental health into geriatric care and the education of dedicated personnel.

**Keywords:** war trauma, war childhood, sexual assault, PTSD, psychopathology

### Introduction

It is well documented in psychotrauma research that sex- and violence-related traumatization is especially associated with higher risk of post-traumatic stress disorder (PTSD) (Brewin *et al.*, 2000) and other mental health problems (Faravelli *et al.*, 2004; Rees *et al.*, 2011). Furthermore, women are especially vulnerable to sexual victimization in their lifetime (Hapke *et al.*, 2006). However, sexual violence is and has been a taboo in our societies (Henry, 2010). After experiencing sexual violence, most victims feel shame, guilt, and embarrassment, which are often responsible for non-reporting of

these crimes (Sable *et al.*, 2006; Tjaden and Thoennes, 2006). These feelings, along with anger and hostility, are also present in witnesses of sexual violence, especially at younger age (Lehmann, 2000). Consequently, it is not surprising that the psychological consequences of rape during World War II (WWII) and subsequent occupation in today's elderly population are largely unknown (Kuwert and Freyberger, 2007).

Rape in wartime is not merely an act of individual atrocity but has been applied as strategic weapon to demoralize and destabilize whole societies (Hargreaves, 2001; Shanks *et al.*, 2001; Zawati, 2007; Sjöberg and Peet, 2011). Reports of mass rape date from more recent conflicts, such as the Balkan wars during the 1990s (Loncar *et al.*, 2006), back to mass rapes conducted by the Red Army after WWII (Messerschmidt, 2006). While rape as trauma has been mentioned among other

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traumatic experiences in recent studies of WWII-related traumatization and current mental health (Teegen and Meister, 2000; Kuwert *et al.*, 2007), so far only one study has focused explicitly on the suffering of (female) victims of rape during WWII (Kuwert *et al.*, 2010).

In this brief report, we present data on experience and witness of sexual violence during WWII and the subsequent occupation (1945–1955), along with indicators of mental health, that were assessed as part of a larger study on WWII-related trauma in a sample of elderly Austrians.

## Methods

From a larger epidemiological study on WWII and postwar-related trauma in elderly Austrians ( $N = 316$ ; Glück *et al.*, 2011) we excluded 18 participants reporting experiences of sexual violence that took place solely outside WWII and the subsequent period of occupation, yielding a sample of 298 participants for this study. Of these, 45 persons reported either experience or witness of war- or occupation-related sexual violence. Age ranged between 64–99 years ( $M = 81.9$ ,  $SD = 6.75$ ) at the time of the interviews (March–September 2010). The interviews were conducted by trained interviewers in all nine Austrian provinces. During the time of postwar occupation, 58.7% of the participants resided in the Soviet zone and 39.6% in the Western allied zone (comprising the French, UK and US sector). The number of persons interviewed in the regions corresponded to population densities. The interview comprised a biographical and historical section, which also contained items regarding experiencing or witnessing sexual violence by occupational forces. Other sections comprised the Brief Symptom Inventory (BSI; Franke, 2000) and the Traumatic Life Event Questionnaire (TLEQ; Teegen, 2003). The TLEQ was used to assess other than war-related traumatic experiences and to cross-validate reports on sexual violence in the historical section of the interview. Post-traumatic Stress Disorder (PTSD) was assessed with the PTSD Checklist–Civilian Version (PCL-C; Blanchard *et al.*, 1996). PTSD was diagnosed according to DSM-IV-criteria A–F (American Psychiatric Association, 2000) after experiencing or witnessing a life-threatening event, in which fear, shock or horror was felt (A). For a positive PTSD-diagnosis, persons had to display at least one re-experiencing symptom (B), three avoiding symptoms to trauma related cues (C), and two symptoms of hyperarousal (D) out of 17 possible symptoms, which have caused negative impact (F) and lasted for at least one month (E). Participants with at least one relevant symptom

in clusters B to D were diagnosed with subthreshold PTSD (Stein *et al.*, 1997).

Data were analyzed using SPSS 19.0 (SPSS Inc., Chicago IL), using  $\chi^2$  tests and independent  $t$  tests ( $p \leq 0.05$ , two-tailed). Odds ratios (OR) and Cohen's  $d$  with 95% confidence intervals (CIs) are reported. To examine shame and guilt in victims of sexual violence, current presence (item ratings  $> 0$ ) of symptoms and feelings of inferiority (Item 22), worthlessness (Item 50), guilt (Item 52), and that one should be punished for one's sins (Item 34), were examined in detail. As sample size (persons who experienced or witnessed sexual violence) was relatively small and statistical power was low, we opted mainly for an effect size based approach with regard to the interpretation of results, and did not rely solely on statistical significance.

## Results

Of 45 participants (23 men) who reported acts of sexual violence committed by the occupational forces, 12 (4.0%) persons were directly affected victims and 33 (11.1%) persons were witnesses. Relevant frequencies and results are reported in Table 1. Compared to witnesses, victims were more often women. Compared to non-victims, witnesses were more often men. Sexual violence tended to occur more frequently in the Soviet zone ( $OR = 7.29$ ,  $p = 0.060$ ).

Victims met the criteria of a full PTSD, as well as the criteria of a full and sub-threshold PTSD more often than non-victims. These findings were even more prominent in the subsample of women (victims vs. non-victims; full PTSD:  $OR = 20.00$ ,  $p = 0.005$ , 95%  $CI = [2.49, 160.83]$ ; full and subthreshold PTSD:  $OR = 5.33$ ,  $p = 0.016$ , 95%  $CI = [1.37, 20.71]$ ).

Compared to non-victims, victims were more often afflicted by current clinically relevant levels ( $T$  score  $\geq 63$ ; gender-specific adult norm) of both depression and phobic anxiety. Although not clinically significant, witnesses reported significantly higher levels ( $T$  scores) of aggression than non-victims and by trend than victims ( $p = 0.085$ ). Victims reported higher levels of psychoticism than both witnesses and non-victims. Victims also reported higher levels of global distress than non-victims.

Compared to non-victims, victims more often reported that they felt they should be punished for their sins (BSI Item 34;  $OR = 8.23$ ,  $p = 0.016$ , 95%  $CI = [1.47, 46.01]$ ). All other comparisons failed to reach significance ( $ps \geq 0.097$ ).

Correcting for multiple testing (sequential Bonferroni correction) rendered four formerly



Table 1. Frequency of experienced or witnessed sexual violence in relation to occupational forces and PTSD criteria

	VICTIMS (1)	WITNESSES (2)	NON-VICTIMS (3)	(1) vs. (3) <sup>b</sup>	(1) vs. (2) <sup>b</sup>	(2) vs. (3) <sup>b</sup>
<i>N</i>	12	33	253			
Women	10 (83.3%)	13 (39.4%)	162 (64.0%)	2.81[0.60, 13.10]	7.69*[1.45, 40.91]	0.37**[0.17, 0.77]
Soviet zone	10 (90.9%)*	26 (78.8%)	144 (57.8%)*	7.29[0.92, 57.84]	2.69[0.29, 24.75]	2.71[1.13, 6.48]
Full PTSD	2 (16.7%)	0 (0.0%)	3 (1.2%)	16.67**[2.5, 111.16]	—	—
Full and subthreshold PTSD	4 (33.3%)	6 (18.2%)	27 (10.7%)	4.19*[1.18, 14.83]	2.25[0.51, 9.99]	1.86[0.71, 4.91]
Clinically relevant						
Depression	3 (25.0%)	1 (3.0%)	15 (5.9%)	5.29*[1.30, 21.60]	10.67[0.99, 115.36]	0.50[0.06, 3.88]
Phobic anxiety	3 (25.0%)	3 (9.1%)	18 (7.1%)	4.33*[1.08, 17.43]	3.33[0.57, 19.48]	1.11[0.31, 3.93]
Mean (SD) T scores						
Aggression	44.00 (10.24)	50.03 (10.11)	44.72 (8.87)	-0.08[-0.32, 0.16]	-0.59[-1.21, 0.02]	0.59**[0.35, 0.83]
Psychoticism	54.67 (9.04)	47.24 (5.88)	48.15 (7.46)	0.87**[0.61, 1.12]	1.09**[0.45, 1.73]	-0.12[-0.36, 0.11]
Distress (GSI)	52.83 (9.75)	48.27 (10.64)	46.30 (10.64)	0.62*[0.37, 0.86]	0.44[-0.17, 1.04]	0.19[-0.05, 0.42]

\*One victim and four non-victims did not indicate zone of occupation (frequencies based on valid cases). <sup>b</sup>OR or Cohen's *d* with 95% CI in brackets. \*  $p < 0.05$ , \*\*  $p < 0.01$ .

PTSD = post-traumatic stress disorder; GSI = Global Severity Index.

significant comparisons nominally insignificant: that women were more often victims than witnesses; that full and subthreshold PTSD occurred more often among victims than witnesses; and that among victims the rates of clinically relevant levels of depression and phobic anxiety were higher than that among non-victims. However, the respective ORs still pointed toward substantial (medium to large) effects.

## Discussion

This study set out to evaluate the impact of experience and witness of war- and postwar-related sexual violence on mental health in a sample of elderly Austrian survivors of WWII. Our results corroborate previous findings on high prevalence of post-traumatic distress symptoms among victims of sexual violence committed during WWII (Kuwert *et al.*, 2010). Additionally, we found a higher prevalence of sexual violence in the former Soviet occupation zone, which has also been suggested by historical reports (Kuwert and Freyberger, 2007). We further expanded on the impact of sexual violence on witnesses: even after six decades, witnesses of sexual violence reported higher levels of aggression than non-victims and victims (cf. Lehmann, 2000). These findings may be supportive of the claim that wartime rape is a strategic weapon, used to destabilize and demoralize societies (Hargreaves, 2001; Shanks *et al.*, 2001; Zawati, 2007; Sjöberg and Peet, 2011) with a long-lasting impact. Compared to non-victims, victims had more than four-fold odds to display post-traumatic distress symptoms. Overall, female victims and witnesses in our study were generally more likely to display post-traumatic distress (see Brewin *et al.*, 2000; Hapke *et al.*, 2006). Victims were more likely to show clinically relevant levels of depression and phobic fear and also reported higher levels of distress than non-victims, although not in a clinically relevant range. Moreover, victims displayed higher levels of psychoticism than witnesses and non-victims, which may reflect victims' social isolation, and were also more likely to feel that they should be punished for their sins, which could reflect the shame and guilt aspect of sexual victimization (Sable *et al.*, 2006; Henry, 2010).

Interpretation of our results requires recognition of some limitations. Participants were recruited by looking specifically for persons with WWII-related traumas. Along with possible recall bias (Nyberg *et al.*, 1996), prevalence rates may thus not be unbiased. Furthermore, this study analyzed data from a larger epidemiological study on WWII traumatization that did not explicitly focus on

sexual trauma. Yet, this may also be conceived as one of the strengths of the study design, as these experiences were assessed along with others. An additional and explicit call in the recruitment phase for female victims of rape during WWII and the occupation time remained unanswered. Bearing in mind that high prevalence rates of sexual violence during and after WWII have been reported (see Kuwert and Freyberger, 2007), and given that in our study 12 persons directly experienced sexual violence compared to 33 witnesses, one might ask: Where are the “missing” victims? However, only a small number of victims may still be alive, either because of their age when assaults occurred or as a consequence of worse health and mortality outcomes after victimization (Golding, 1994; Clum *et al.*, 2000). Yet, Kuwert and colleagues (2010) argued that highly traumatized victims might also actively avoid study participation, which may likewise be the case here. Emotional consequences of rape, such as feelings of shame, guilt, and embarrassment could account for this (Sable *et al.*, 2006), which was also partially reflected by our results. Interpretation of our results is limited by the small sample size and lack of statistical power. However, given that WWII victims of sexual violence are difficult to reach or may no longer be alive, effect sizes reported here were substantial.

Our results corroborate previous findings that wartime rape has lasting influences over decades on current mental health (Kuwert *et al.*, 2010), both in victims and witnesses. In this context, possible trauma reactivation in elderly persons with a history of sexual violence has to be considered. Physical memories elicit the strongest sense of the traumatic event as it happened at the time (Hiskey *et al.*, 2008). Gynecological examinations or hygienic care in genital areas by nursing home personnel may thus act as trauma triggers (Heuft, 1999). With a growing proportion of elderly persons in Europe's post-WWII societies, geriatric care and the education of dedicated personnel could thus benefit from the integration of more psychotraumatological knowledge on consequences of sexual violence on mental health.

#### Conflict of interest

None.

#### Description of authors' roles

B. Lueger-Schuster designed and supervised the study. B. Lueger-Schuster and T. Glück equally wrote the paper and contributed to planning the

data analysis. U. Tran and E. Zeilinger planned and performed the statistical analysis, and contributed to writing the paper. All authors contributed in revising the paper.

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### **Study 3**

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PTSD in ICD-10 and proposed ICD-11 in elderly with childhood trauma: prevalence,  
factor structure and symptom profiles

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## Abstract

**Background:** The proposal for ICD-11 postulates major changes for PTSD diagnosis, which needs investigation in different samples.

**Aims:** Investigate differences of PTSD prevalence and diagnostic agreement between ICD-10 and ICD-11, factor structure of proposed ICD-11 PTSD, and diagnostic value of PTSD symptom severity classes.

**Method:** Confirmatory factor analysis and latent profile analysis were used on data of elderly survivors of childhood trauma (> 60 years,  $N = 399$ ).

**Results:** PTSD rates differed significantly between ICD-10 (15.0%) and ICD-11 (10.3%,  $z = 2.02$ ,  $P = 0.04$ ). Unlike previous research, a one-factor solution of ICD-11 PTSD had the best fit in this sample. High symptom profiles were associated with PTSD in ICD-11.

**Conclusions:** ICD-11 concentrates on PTSD's core symptoms and furthers clinical utility. Questions remain regarding the tendency of ICD-11 to diagnose mainly cases with severe symptoms and the influence of trauma type and participant age on the factor structure.

**Declaration of interest:** None.

**Keywords:** Latent class analysis, childhood abuse, World War II, institutional abuse, long term consequences, trauma severity

## CORRELATES OF CHILDHOOD TRAUMA IN ELDERLY

The proposed ICD-11 classification for posttraumatic stress disorder (PTSD) aims to increase diagnostic specificity, practical reliability, and clinical utility<sup>1,2</sup>. Six core symptoms are evenly distributed on three symptom clusters (3x2): re-experiencing, avoidance, and hyperarousal. For a diagnosis, at least one symptom is required in each cluster. For elderly adults with a history of childhood trauma, it remains unclear whether (1) the proposed ICD-11 PTSD criteria and (2) the underlying factor structure also apply, and (3) how symptom severity influences classification. From a developmental perspective, childhood trauma is associated with more PTSD symptoms and greater impairment in older age compared to trauma in adult age<sup>3</sup>. It was also reported that symptom configuration may differ in elderly persons<sup>4</sup>. Only few studies investigated the influence of different trauma types on DSM-IV PTSD<sup>5</sup> symptom profiles: accidents, sexual abuse and sudden death in student samples<sup>6,7</sup> and war- and crime-related trauma<sup>8</sup>. No studies investigated these patterns in the elderly or used ICD criteria. Studies also did not use probabilistic methods, such as latent profile analysis (LPA) that increases validity<sup>9</sup>, and models symptom severity as a latent variable.

With this study, we contribute to the ongoing discussion of the proposed ICD-11 PTSD classification by investigating the PTSD symptom configuration in two samples of now elderly survivors of childhood trauma (war-related vs. institutional childhood abuse). We replicate and extend previous studies on differences of PTSD prevalence and diagnostic agreement between ICD-10<sup>10</sup> and the ICD-11 proposal<sup>11,12</sup>, re-test the factor structure of ICD-11 PTSD<sup>13,14</sup> in elderly persons, and explore latent symptom profiles of PTSD<sup>15</sup>.

### **Method**

#### **Participants**

We combined samples from three research projects into one dataset ( $N = 399$ ). For the sample of survivors of institutional abuse (IA), data from two studies on IA in institutions of the Catholic Church in Austria and IA in institutions in Lower Austria ( $n = 83$ )<sup>11,16</sup> were

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included. For the sample of survivors of war-related childhood trauma, data from a study with now elderly survivors of World War II ( $n = 316$ ) were used<sup>17</sup>. For this study only participants of 60 years of age or older at the time of testing were included in the analysis. All studies were conducted according to the ethical regulations for clinical research in Austria. The IRB of the University of Vienna Studies allocated reference numbers for studies with survivors of IA (00011 and 00071). All participants provided written informed consent.

In total, 182 men (45.6%) and 217 women (54.4%) participated in the study; the WWII study sample was predominantly female, whereas the IA study sample was predominantly male (female: 62.3% vs. 24.1%, respectively; Pearson  $\chi^2(1) = 38.76$ ,  $P < 0.001$ ). Age ranged from 60 to 99 years (mean = 78.6 years, s.d. = 9.2); participants of the WWII sample were older than participants of the IA sample (mean = 81.9 years, s.d. = 6.84 vs. mean = 66.01, s.d. = 5.72, resp.;  $t(397) = 19.44$ ,  $P < 0.001$ ).

### Measures

**Posttraumatic Stress Disorder Checklist – PCL-C.** The PCL-C<sup>18</sup> assesses symptoms of PTSD in the past month according to DSM-IV criteria, but can also be used to derive an ICD-10 and ICD-11 PTSD preliminary diagnosis. The 17 items of the scale ask for the 5 re-experiencing symptoms (criterion B), 7 avoidance symptoms (criterion C) and 5 arousal symptoms (criterion D). These symptoms are rated on a 5-point-scale from “none” (1) to “very” (5), and are considered symptomatic when indicated 3 or above. For this study, we only used items 1-8, and 13-17 as they are the symptoms included in the ICD-10 diagnosis of PTSD. For ICD-11 PTSD, items 2 and 3, 6 and 7, and 16 and 17 were used (see Figure 1 for item contents). In this sample, algorithms for ICD-10 PTSD yielded a Cronbach’s  $\alpha = 0.89$  and for ICD-11, Cronbach’s  $\alpha = 0.81$ .

**Brief Symptom Inventory – BSI.** The BSI is a 53 item measure to assess current somatic and psychological symptoms and general distress<sup>19</sup>. Persons rate different symptoms

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they experienced over the last seven days on a 5-point rating scale (0= *not at all* to 4= *extremely*). Nine subscales and a Global Severity Index can be computed. The cut-off for clinically relevant symptoms is at the T-value of 63. For this study we only used the dimensions depression, anxiety and somatization. Psychometric properties are very good (Cronbach's  $\alpha = 0.96$ ).

### Data Analysis

First, we calculated proportions of individuals meeting the PTSD diagnosis according to ICD-10 and the ICD-11 proposal in both samples, as well as for all three criteria for both diagnostic systems. We used two-tailed binomial approximation  $z$  tests to compare proportions and Cohen's kappa to evaluate diagnostic agreement. We calculated proportions of clinically relevant comorbid depressive, anxiety, and somatic complaints for all PTSD groups. Secondly, we tested three factor models of the ICD-11 PTSD structure (one-, two-, and three-factors) for goodness of fit. The one-factor model was a general factor model, in which all items assessing the six ICD-11 PTSD symptoms were specified to load on a single factor. In the two-factor model, the items assessing symptoms of 're-experiencing' and 'avoidance' were specified to load on one factor and the items assessing symptoms of 'hyperarousal' were specified to load on the other factor<sup>13</sup>. Finally, we tested the proposed factor structure of PTSD in ICD-11 with a three-factor model, where symptoms of 're-experiencing', 'avoidance', and 'hyperarousal' presented one factor each. In the two- and three-factor models the latent factors were allowed to correlate.

We conducted all confirmatory factor analyses (CFAs) with Mplus<sup>20</sup>. Since the symptom ratings are ordered categorical variables, parameters were estimated using the weighted least square mean- and variance-adjusted estimator (WLSMV), to provide robust parameter estimation, standard errors, and tests of model fit<sup>21</sup>. The comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation

(RMSEA) were used to assess the model fit (CFI and TLI: good fit:  $\geq 0.95$ , acceptable fit:  $\geq 0.90$ ; RMSEA: good fit:  $< 0.06$ , acceptable fit:  $< 0.08^{22}$ ). In order to compare the fit of the different models with the Bayesian Information Criterion (BIC), we re-ran the analyses using robust maximum likelihood estimation (MLR).

Thirdly, we determined the optimal number of latent classes in this sample based on the thirteen ICD-10 PTSD symptoms. We applied LPA, which is based on a latent variable model that aims to find homogeneous groups of individuals in a given sample. We evaluated the model fit of a one-, two-, three-, and four-class solution using the BIC (based on the log-likelihood value), the likelihood ratio test statistic ( $L^2$ ), and the percentage of classification error. LPA was conducted using Latent GOLD<sup>23</sup>. In order to examine the possible relationship of age, gender, and sample, we used a multinomial regression model predicting class membership.

Finally, we combined results from the diagnostic algorithms with those from the CFAs and the LPA using cross tabulation to investigate to what extent the confirmatory and exploratory approaches matched the proposed ICD-11 diagnostic algorithm.

### Results

The PTSD prevalence in the total sample according to ICD-10 was significantly higher than according to the ICD-11 proposal (Pearson  $\chi^2(1) = 189.38$ ,  $P < 0.001$ ; Table 1); diagnostic agreement was 92.7% ( $\kappa = 0.67$ , 95% CI 0.56 to 0.78]; Significantly fewer individuals met the re-experience criterion according to ICD-11 than according to ICD-10. The avoidance symptoms do not differ between ICD-10 and the ICD-11 proposal, thus agreement was perfect here. While a similar proportion of individuals met the hyperarousal criterion, detailed analysis showed that about one fourth of those who fulfilled the ICD-10 criterion failed to fulfill the ICD-11 criterion. Consequently, another fourth of those with ICD-11 hyperarousal did not fulfill this criterion in ICD-10.

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The prevalence of PTSD varied across the samples; IA survivors had significantly higher rates of PTSD compared to WWII survivors according to ICD-10 (49.4% vs. 6.0%; Pearson  $\chi^2(1) = 96.84, P < 0.001$ ) and according to the ICD-11 proposal (39.8% vs. 2.5%; Pearson  $\chi^2(1) = 98.81, P < 0.001$ ).

Rates of comorbid conditions (clinical relevant symptoms in the domains of depression, anxiety, and somatization) were consistently higher for PTSD according to the ICD-11 proposal than according to ICD-10, albeit not significant (Table 1).

--- TABLE 1 ABOUT HERE ---

--- TABLE 2 ABOUT HERE ---

All three specified confirmatory factor models demonstrated good fits to the data (Table 2). The fit of the one-factor was not improved substantially in the larger factor models. The obtained BICs, using MLR estimation, showed superior fit of the one-factor model over the two other models. Thus, our data did not support the two-factor model proposed by Forbes et al.<sup>13</sup>. On that account and with regards to parsimony, we adapted the analysis strategy and did not include the proposed two-factor structure of ICD-11 PTSD in further analyses.

In a third step, we aimed to identify latent groups of individuals with specific symptom profiles using LPA. We estimated a one-, two-, three-, and four-class model (Table 2). We estimated also a three-class model that allowed correlated residuals for Items 14 and 17 (see Figure 1 for item contents). The four-class model had the lowest BIC value. However, the classification error was considerably lower in the three-class model with correlated residuals and the additional fourth class did not provide further information. Therefore, the three-class model with correlated residuals was selected. Mean posterior assignment probabilities for all three classes were high, indicating high classification certainty (Class 1: 92.5%; Class 2: 93.0%; Class 3: 96.2%).

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Based on the symptom severity profiles of the three classes, we assigned descriptive labels to each class. Class 1 was labeled “Low Symptoms”, Class 2 was labeled “Mild Symptoms”, and Class 3 was labeled “Severe Symptoms”. Mean symptom severity levels for each class are shown in Figure 1. Multinomial regression analysis predicting class membership using gender, age, and study-group (Table 3) had a significant fit on the data ( $\chi^2(6) = 175.54, P < 0.001$ ) and explained 42.1% of the variance (Nagelkerke  $R^2 = 0.421$ ). Female gender was associated with the Mild Symptoms class rather than the Low Symptoms class. IA survivors were more likely to be in the classes with more severe symptoms than WWII survivors throughout all combinations.

--- FIGURE 1 ABOUT HERE ---

--- TABLE 3 ABOUT HERE ---

Finally, we combined the results from the LPA and the diagnostic algorithms (Table 1). None of those who met either ICD-10 or ICD-11 PTSD was assigned to the Low Symptoms class. A significantly higher proportion of individuals with ICD-10 PTSD were assigned to the Mild Symptoms class, whereas a significantly higher proportion of individuals with ICD-11 PTSD were assigned to the Severe Symptoms class.

## Discussion

### Main Findings

In this study, we investigated three different perspectives regarding the classification of PTSD in ICD: First, we found that the prevalence of PTSD decreased significantly from ICD-10 to ICD-11; however, the decrease in the re-experiencing criterion mostly explains this change. Secondly, in our sample a one-factor model of PTSD had better data fit compared to previously proposed two- or three-factor models. Nonetheless, two- and three-factor models showed also very good fit. Thirdly, three latent severity groups of individuals emerged when

we analyzed symptom profiles in the whole sample. Symptom severity group membership was a good predictor for PTSD diagnosis and type of trauma.

### **PTSD in ICD-10 and ICD-11**

Significantly fewer individuals met PTSD criteria in ICD-11 than in ICD-10. Very similar to our results, other studies found higher prevalence rates of PTSD in ICD-10 vs. ICD-11 in different samples (9.0% vs. 3.3% in adult injury patients<sup>12</sup>, 13.0% vs. 6.0% in West-Papuan refugees<sup>14</sup>, and 4.4% vs. 3.2% in the general population<sup>24</sup>). The prevalence decrease in our study is mainly attributable to the stricter definition of the re-experiencing criterion in ICD-11: while 42.1% met this criterion in ICD-10, only 20.6% met it in ICD-11. Individuals who fulfilled the ICD-11 re-experiencing criterion were a complete subgroup of those fulfilling the re-experiencing criterion in ICD-10. This is in line with previous research<sup>12,14</sup> and the pattern seems to be unspecific for type of trauma and culture. ICD-11 proposes to restrict criteria only to the core-elements specific for PTSD<sup>1</sup>. This entails that the re-experiencing criterion includes only re-living the trauma in form of nightmares or flashbacks, accompanied by fear and horror<sup>25</sup>. It is controversial whether this approach is valid as 21.5% of our sample suffer from clinically relevant intrusive symptoms, but do not fulfill the ICD-11 re-experiencing criterion. The exclusion of other re-experiencing related symptoms, such as intrusive images without dissociative character, may not adequately capture the phenomenology and the needs of individuals suffering from symptoms following exposure to a traumatic event<sup>26</sup>. The DSM-5 definition of re-experiencing in PTSD<sup>27</sup> did not follow this approach<sup>28</sup> and remains similar to DSM-IV and ICD-10. For the re-experiencing criterion to be fulfilled, DSM-5 require one symptom out of five symptoms that cover various forms of re-experiencing symptoms focusing on the intrusive nature in contrast to ruminative processes. Consequently, individuals who suffer from symptoms of re-experiencing not



defined as core symptoms of ICD-11 PTSD need to be studied with regard to comorbidity, treatment needs, and treatment responsiveness.

The hyperarousal criterion also differs from ICD-10 to ICD-11 and we found partly overlapping subgroups. The ICD-11 working group aimed to focus on trauma-specific types of hyperarousal (i.e., hypervigilance and exaggerated startle response) and excluded more unspecific types of hyperarousal (e.g., difficulties with sleep or concentration)<sup>1</sup>. Sleeping difficulties for example, are highly prevalent in the general population and increase with older age<sup>29</sup>. In elderly samples this may likely bias PTSD prevalence rates.

### **Factor structure of PTSD in ICD-11**

All factor models tested in the current sample had a good fit on the data. A one-factor model was superior compared to the two-factor model proposed by Forbes et al.<sup>13</sup>, and compared to the three-factor model proposed by the ICD-11 working group<sup>1</sup>. A one factor-solution appears unusual for PTSD, regardless of the classification system used – ICD<sup>13</sup> or DSM<sup>30</sup>. Various reasons might explain the difference between our results and the results of Forbes et al.<sup>13</sup>: (1) the assessment of the relevant symptoms differed between the two studies. While we used a self-report measure for PTSD with one item per symptom, Forbes et al. used the CAPS<sup>31</sup> that includes two items (frequency and intensity) for each of symptom. (2) Results may depend on trauma type or age at traumatization. We studied elderly persons with partially severe and long-lasting experiences of childhood trauma. Forbes et al. investigated PTSD symptoms in injury survivors with an average age of 40 years. Symptom presentation after prolonged trauma in childhood might differ from that after a single traumatic event in adulthood which may influence the factor structure<sup>30</sup>. (3) Time since trauma may be an additional influencing factor<sup>30</sup>. While participants in our study were exposed to traumatic events that took place decades ago, Forbes et al. analyzed data from a six year follow-up study. (4) Age at assessment may also affect symptom presentation. These aspects call for

further investigation, testing for the invariance of the ICD-11 PTSD factor model across various age groups and groups of persons with different types of trauma.

### **Symptom severity, comorbidity, and type of trauma**

No person with a PTSD diagnosis (ICD-10 or ICD-11) was allocated to the Low Symptoms class. PTSD diagnosis was associated with class membership differentially for ICD-10 and ICD-11: persons who met criteria for PTSD in ICD-10 had almost equal chances to be allocated to the Mild and Severe Symptoms class. In contrast, persons who met criteria for PTSD in ICD-11 were much more likely to be allocated to the Severe Symptoms class. In our sample, ICD-11 appears thus more specific to persons with severe symptoms of PTSD and excludes those with milder symptoms. Persons suffering from less-than-severe trauma-related distress may thus remain undiagnosed according to ICD-11 PTSD criteria.

We did not find a decrease in comorbid conditions in our sample with ICD-11, compared to ICD-10. This was unexpected, because the focus on core-elements of PTSD in ICD-11 aimed to reduce comorbidity with other mental disorders, and this was a major critique of ICD-10<sup>1</sup>. In our sample, ICD-11 excluded individuals with milder PTSD-symptoms from a PTSD diagnosis, which was not the case for ICD-10. The individuals with severe symptoms were also those who displayed the most comorbid conditions in ICD-10. Thus, ICD-11 diagnosed specifically individuals with severe symptoms and high comorbidity rates with PTSD (Table 1).

The strongest predictor for symptom severity class and PTSD was type of trauma, which in our study is mostly equivalent to the study group (IA vs. WWII). The Severe Symptoms class included mainly IA survivors, and the experience of complex childhood trauma is a major risk factor for PTSD<sup>32,33</sup>. Although war-related experiences are similarly considered complex and adverse, especially when they happen in younger age<sup>34</sup>, it seems that in our sample long-lasting effects on current mental health have either faded over the life-

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span, were buffered by unknown factors or have not been as detrimental in comparison to the effects of IA<sup>35</sup>. There was a partial gender effect: women were more likely in the Mild than in the Low Symptoms class, however, no gender effects were present for the Severe Symptoms class. However, this might be a result of the distribution of study groups to the severity classes. Current age had no effect on the allocation of individuals to symptom severity classes. Future research needs to elucidate the factors that are mainly responsible for high symptom distress for these trauma types and whether there is a critical threshold of trauma complexity which makes remission over the life span unlikely.

### **Limitations**

The generalizability of the current findings is limited by the following aspects: (1) the data were combined from studies that assessed different and specific types of childhood trauma (WWII-related and IA) and current posttraumatic symptoms with a cross-sectional design. Although it was a strength and an aim of the current study to compare different types of trauma in different samples, we cannot rule out that our results were confounded by variables that could not be controlled for. (2) We used self-report questionnaires and not clinician administered interviews. The questionnaires were originally designed to assess DSM-IV PTSD symptoms as a validated measure for ICD-11 PTSD symptoms is still lacking. Furthermore, the ICD-11 proposal of PTSD includes functional impairment, which was not assessed with our measures. (3) The reporting of traumatic events may be biased by recall problems in the elderly. Future investigations on the structure and symptom configuration of ICD-11 PTSD should be performed in large samples assessing different trauma types, thus accounting for potential biases to all over prevalence. Furthermore, as soon as there is final agreement on the ICD-11 core diagnostic features of PTSD, studies need to replicate findings using validated measures designed for ICD-11.

### Implications

This study addresses important issues regarding the diagnostic and clinical utility of the proposed ICD-11 criteria of PTSD, to be published in 2017. As expected, the prevalence of PTSD decreases significantly with the ICD-11 proposal as it aims to assess only PTSD core symptoms and to lower the inflation bias by comorbid symptoms that are better explained by other mental disorders. However, comparing ICD-10 and ICD-11, we did not find a specific profile of trauma related symptoms, but rather a grading of severity classes. ICD-11 PTSD seems much more specific to persons with severe trauma-symptoms. Rates of comorbid conditions did not change from ICD-10 to ICD-11 in our sample, failing to support the aim of ICD-11 to reduce comorbidity of PTSD with other mental disorders. In our study, a one-factor model of PTSD showed the best fit, which is in contrast to previous research<sup>13,30</sup>. This result calls proposed factor structures into question, at least for elderly persons with a history of complex trauma. With a change of PTSD criteria in classification systems, individuals who suffer from less-than-severe symptoms might lose their access to mental health services. More investigations are needed regarding key issues such as symptom configuration, comorbidity, factor structure, and trauma specificity to support and consolidate the proposed criteria for PTSD in ICD-11.

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Table 1. Prevalence and agreement of PTSD criteria according to ICD-10 and ICD-11 proposal, comorbidity, and agreement of classes with diagnostic status.

Variable	ICD-10 PTSD		ICD-11 PTSD		<i>z</i>	<i>P</i>	<i>κ</i>	ICD-11 from ICD-10					
	n	%	n	%				Absent		Unchanged		Newly present	
Full PTSD	60	15.0	41	10.3	2.02	.043	.67	24	6.0	370	92.7	5	1.3
Re-experience criterion	168	42.1	82	20.6	6.56	< .001	.53	86	21.6	313	78.4	0	0.0
Avoidance criterion	125	31.3	125	31.3	-	-	1.0	-	-	-	-	-	-
Hyperarousal criterion <sup>a</sup>	121	30.3	122	30.6	-0.08	.936	.64	30	7.5	338	84.7	31	7.8
BSI GSI T ≥ 63 <sup>b</sup>	41	70.7	32	78.0	-0.82	.412		10	45.5	68	19.0	1	20.0
Depression	31	51.7	25	61.0	-0.92	.358		8	33.3	56	15.1	2	40.0
Anxiety	36	60.0	32	78.0	-1.90	.057		6	25.0	62	16.8	2	40.0
Somatization	42	70.0	32	78.0	-0.90	.368		12	50.0	122	33.0	2	40.0
Class													
Low Symptoms	0	0.0	0	0.0	-	-		0	0.0	216	58.4	0	0.0
Mild Symptoms	26	43.3	7	17.1	2.76	.006		21	87.5	119	32.2	2	40.0
Severe Symptoms	34	56.7	34	82.9	-2.76	.006		3	12.5	35	9.5	3	60.0

ICD-10, International Classification of Diseases - 10<sup>th</sup> revision; ICD-11, International Classification of Diseases - 11<sup>th</sup> revision; PTSD, posttraumatic stress disorder; BSI GSI, Brief Symptom Inventory: Global Severity Index.

a. avoidance symptoms do not change from ICD-10 to ICD-11 proposal, thus the same individuals met this criterion in both systems.

b. n=384, full data unavailable for 15 participants.

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Table 2. Fit indices for ICD-11 PTSD factor models and fit of latent class models for ICD-10 PTSD symptoms.

CFA	Model	$\chi^2$ (d.f.)	CFI	TLI	RMSEA [95%-CI]	BIC <sup>a</sup>
	1-factor	18.678 (9)*	.991	.985	.052 [.016,.086]	6671.309
	2-factor	16.135 (8)*	.992	.986	.051 [.010,.087]	6673.889
	3-factor	6.875 (6)	.999	.998	.019 [.000,.070]	6677.937
LPA	Model	BIC	L <sup>2</sup>	d.f.	<i>P</i>	Classification error, %
	1-class	11111.58	6600.16	52	<.001	0.00
	2-class	10089.06	5493.79	66	<.001	2.59
	3-class	9882.44	5203.33	80	<.001	6.92
	3-class with correlated residuals <sup>b</sup>	9867.85	5182.75	81	<.001	6.98
	4-class	9856.32	5093.36	94	<.001	10.05

CFA, confirmatory factor analysis, using WLSMV estimation; CFI, comparative fit index; TLI, Tucker-Lewis index; RMSEA, root mean square error of approximation; 95%-CI, 95% confidence interval; BIC, Bayes information criterion; LPA, latent profile analysis; L<sup>2</sup>, likelihood ratio test statistic.

a. based on robust ML estimation.

b. model allowed correlated residuals for Items 14 (irritability/anger) and 17 (exaggerated startle response).

\*  $P < 0.05$ .

## CORRELATES OF CHILDHOOD TRAUMA IN ELDERLY

Table 3. Multinomial regression model predicting class membership using gender, age, and study-group.

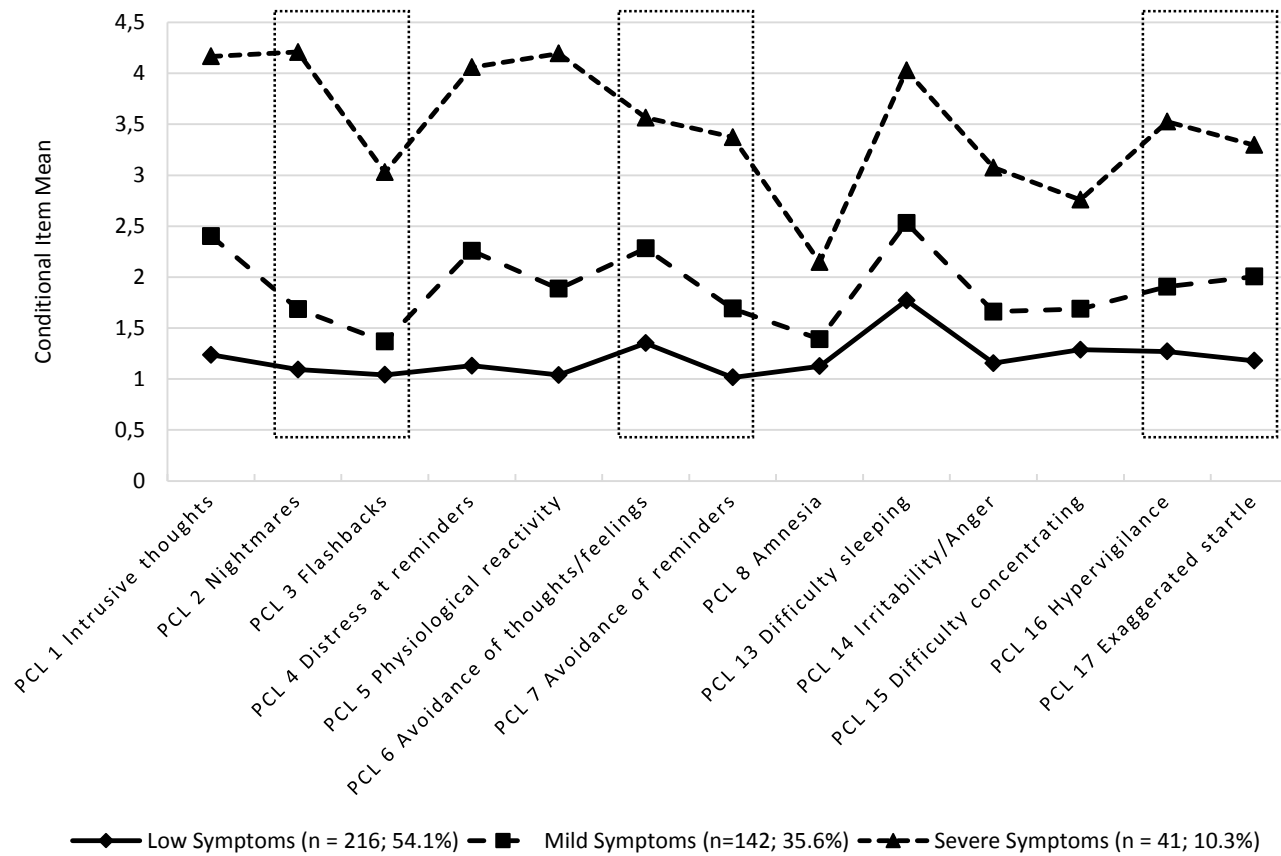
	Mild- vs. Low Symptoms	Severe- vs. Low Symptoms	Severe- vs. Mild Symptoms
Age	1.01 [0.98–1.04]	0.95 [0.88–1.02]	0.94 [0.87–1.01]
Gender (female vs. male)	1.70 [1.04–2.76]*	1.25 [0.44–3.57]	0.74 [0.28–1.96]
Study-group (IA vs. WWII)	15.38 [5.59–41.67]***	250.00 [38.46– >200]***	18.52 [2.98–111.11]**

Numbers are odds ratios (ORs) with 95% confidence intervals.

\*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .

## CORRELATES OF CHILDHOOD TRAUMA IN ELDERLY

Figure 1. Conditional symptom severity means by cluster.



Symptoms in boxes are proposed ICD-11 PTSD symptoms.

PCL, Posttraumatic Stress Disorder Checklist – Civilian Version.

**Study 4**

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## RESEARCH ARTICLE

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# Influence of personal and environmental factors on mental health in a sample of Austrian survivors of World War II with regard to PTSD: is it resilience?

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## Abstract

**Background:** War-related traumata in childhood and young-adulthood may have long-lasting negative effects on mental health. The focus of recent research has shifted to examine positive adaption despite traumatic experiences, i.e. resilience. We investigated personal and environmental factors associated with resilience in a sample of elderly Austrians (N = 293) who reported traumatic experiences in early life during World War II and subsequent occupation (1945–1955).

**Methods:** After reviewing different concepts of resilience, we analysed our data in a 3-phased approach: Following previous research approaches, we first investigated correlates of PTSD and non-PTSD. Secondly, we compared a PTSD positive sample (sub-threshold and full PTSD, n = 42) with a matched control sample regarding correlates of resilience and psychometrically assessed resilience (CD-RISC). Thirdly, we examined factors of resilience, discriminating between psychologically healthy participants who were exposed to a specific environmental stressor (having lived in the Soviet zone of occupation during 1945–1955) from those who were not.

**Results:** A smaller number of life-time traumata (OR = 0.73) and a medium level of education (OR = 2.46) were associated with better outcome. Matched PTSD and non-PTSD participants differed in psychometrically assessed resilience mainly in aspects that were directly related to symptoms of PTSD. Psychologically healthy participants with an environmental stressor in the past were characterized by a challenge-oriented and humorous attitude towards stress.

**Conclusions:** Our results show no clear picture of factors constituting resilience. Instead, most aspects of resilience rather appeared to be concomitants or consequences of PTSD and non-PTSD. However, special attention should be placed on a challenge-oriented and humorous attitude towards stress in future definitions of resilience.

## Background

There is evidence to suggest that children and persons of younger age are at greater risk of developing PTSD after exposure to war-related and other trauma [1]. In particular, research has found long-lasting effects of childhood and early adult trauma during World War II (WWII) on the mental health of elderly survivors studied decades after exposure, e.g., [2–8].

The emphasis of past research has been on adverse mental health outcomes following trauma but in recent years, there has been a shift towards a focus on resilience [9], the notion that survivors can manifest positive adaptations after traumatic experiences [10]. So far, resilience has been investigated in different contexts [11–15], and also among elderly persons with traumatic experiences during WWII [16–18].

## Concepts of resilience

Although resilience has received considerable attention in recent years, no strict consensus exists on how to define and operationalize it. Some authors conceive resilience as

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the ability to recover from extreme experiences [19], some as a reflection of general symptom improvement [15], others as the capacity to preserve a stable personal equilibrium [9]. Scholarly opinion even diverges on whether resilience may be considered as a—relatively—stable personality trait or not [10,19-21].

Resilience may incorporate different and also opposing dimensions and constructs on a trait level, like, e.g., hardness, self-enhancement, repressive coping, or positive emotion [9] (for a 'multiple pathways' view on resilience; see also [22]). However, it may also depend largely on context [21]. Furthermore, resilience may also require a life-span perspective on the processes involved, as these may vary across age groups [13]. Aggravating this conceptual confusion is the sheer number of psychometric inventories of resilience currently available. Windle et al. [23] identified 15 scales that may measure each as "an entirely different experience" (p. 1). Overall, the quality of most instruments was rated at best moderate. Alternative, outcome-oriented definitions to tackle this conceptual problem, like equating "resilience = absence of PTSD symptoms" [24], may thus appear both simple and elegant. Currently, it is mostly unclear to which extent specific outcome-oriented and psychometric definitions and approaches agree and match with one another. Systematic investigation is needed to gain more insight into commonalities and differences.

#### **Risk and protective factors: or just correlates, concomitants, and consequences of PTSD?**

Some researchers [9,25] called for the investigation of factors promoting or vitiating resilience to examine the interaction of personal and situational characteristics [22].

Research so far suffers from failing to delineate risk factors (also subsuming protective factors here) from correlates, concomitants and consequences [26] strictly enough, and from failing to disentangle different outcomes (i.e., PTSD and non-PTSD) from the components of the psychometric construct of resilience that may promote a better outcome. Any factor that shows an association with an outcome is a correlate. Risk factors precede and alter the risk of an outcome, and may be fixed or variable. They are causal if their manipulation is shown to alter the risk. If a factor does not precede the outcome, it is a concomitant or consequence.

Across studies, some putative risk factors were not consistently found to alter the risk of the outcome. Effects of personal characteristics, like, for example, age (variable marker) or sex (fixed marker) on PTSD, non-PTSD, and psychometrically assessed resilience have been equivocal and inconsistent [1,27,28]. Symptoms of depression were also reported to pose a risk for PTSD [24], when equating "resilience = absence of PTSD symptoms". However, in the cross-sectional study of

Bonanno et al. [24] precedence of depression among those who reported symptoms of PTSD was not ascertained empirically. Symptoms of depression are also characteristic of PTSD itself or may co-occur with PTSD. Hence, they may rather constitute a concomitant. This ambiguity highlights a possible drawback of the otherwise simple definition "resilience = absence of PTSD symptoms" and calls for adequate measures to guard against confounding in cross-sectional studies when using an outcome-oriented approach of research.

Environmental factors that possibly promote positive mental health despite traumatic experiences and protect against PTSD are social acknowledgement [29,30], social support [31], relationships and relationship quality [32], and stable living conditions during adolescence [27]. Among the elderly, greater social engagement, defined as visiting with friends and family, was also reported to be associated with psychometrically assessed resilience [13]. Yet, with regard to the sequence of events and the definition of a risk factor [26], aspects of social support that did not clearly precede the outcome after adversity may not be considered true protective factors. Moreover, PTSD is also associated with relationship problems [33]. As a consequence, this could effectuate lower social support in PTSD. Social support could thus constitute a concomitant of non-PTSD instead of representing a protective factor against PTSD. Research needs to guard against such artefacts.

Factors relevant for coping, like humour [34] and spirituality [12], are probably best interpreted as components of the psychometric construct of resilience [9] that promote a better outcome. If individual cognitive-behavioural characteristics were present before the experience of a traumatic event and were shown to alter the risk of the outcome, they are protective factors. Otherwise, they have to be regarded as correlates (concomitant or consequence) of non-PTSD.

#### **Mental health in WWII survivors**

A number of studies so far have investigated factors promoting or vitiating resilience in WWII survivors. Displacement during WWII was found to contribute (causally) to psychopathology [16], while for veterans and former child soldiers positive social recognition, social support and acknowledgement, as well as a positive personal evaluation of war efforts were repeatedly reported to exert beneficial effects on posttraumatic outcome [18,35,36]. The impact of a lack of social support on posttraumatic symptoms was also documented in victims of WWII mass rapes [37]. Again, these effects of social support on a better outcome may be a result of relationship problems in PTSD (see above) or are probably more indicative of posttraumatic growth than resilience [38], when they did not clearly precede traumatic events.



A causal environmental risk factor, which has not been thoroughly investigated so far may lie in differences of traumatic load in different occupational zones post-WWII. Historical data suggest that people faced a higher risk of adversity in the Soviet occupied zones than in the Western allied (France, UK, and USA) zones in Germany and Austria [39]. Austria was incorporated into the 3<sup>rd</sup> Reich in 1938 and liberated in 1945. Occupation by Western Allied and Soviet troops lasted from 1945 to 1955. In a sample of civil survivors of WWII [40], now 65+ years old, who experienced various kinds of trauma during their wartime-childhood and adolescence, over 92% reported experiences of war-related traumata or traumatic experiences with the occupational forces (termed generically WRTs in the following), and over 97% reported at least one lifetime-trauma. Prevalence of PTSD was 1.9% in this sample, but this rate increased to 14% taking into account sub-threshold PTSD. Specifically, even though not indicative of higher rates of PTSD, traumatic experiences with the occupational forces were reported more often by residents of the former Soviet occupied zone (56.5% vs. 16.7%).

#### This study

Resilience has been studied in samples of elderly persons with specific war-time histories such as veterans but to our knowledge, not in more general samples of WWII survivors who experienced various kinds of trauma during their wartime-childhood and adolescence. In this study, we asked for differences and correlates between PTSD and non-PTSD individuals in such a general sample of WWII survivors. Correlates might be specific personal and situational features and characteristics like, for example, active coping, humour or social support, that may enhance the individual cognitive and behavioural capacity to cope with adverse events and to adapt to a given environment [34,41].

We contrasted and combined outcome-oriented and psychometric approaches to disentangle symptoms of PTSD from personality characteristics and cognitive-behavioural components of the psychometric construct of resilience that may promote a better outcome. This strategy allowed us to arrive at a clearer picture of risk factors, correlates, and consequences of PTSD and non-PTSD. It also enabled the investigation of the impact of environmental variables and individual coping strategies on PTSD and non-PTSD to be examined in more detail. Data previously presented [40] were used.

A 3-phased approach was used in analyzing the data. First, we examined correlates of PTSD and non-PTSD utilizing the outcome-oriented approach applied by Bonanno et al. [24], allowing thereby direct comparisons with previous results. Specifically, we examined effects of social support and acknowledgment on coping with

WRTs in this phase. Moreover, we assessed whether a short and reliable psychometric measure, the 10-item Connor-Davidson Resilience Scale (10-item CD-RISC; [42]), also discriminated between the different levels of outcome according to the criteria of Bonanno et al. This allowed us to examine the extent to which the outcome-oriented and psychometric approaches overlapped.

In a second phase, correlates of PTSD and non-PTSD were re-investigated in a matched sample of PTSD cases and non-PTSD controls, matched with regard to socio-demographic characteristics and known risk factors of PTSD (e.g. number of life-time traumata). An examination of CD-RISC total and item scores in this matched sample was also undertaken to delineate more clearly positive components of resilience from negative outcomes in this psychometric instrument implied by the presence of PTSD symptoms.

In the third phase, we investigated which cognitive-behavioural characteristics were indicative of having successfully coped with an environmental risk factor in the past among those who were overall 'resilient' in a positive outcome-oriented sense [9]; i.e., able to preserve a stable personal equilibrium. Residents of the Soviet occupation zone post-WWII had a higher risk of adversity than residents of the Western zones [39]. Thus we compared CD-RISC scores of persons whose psychological health was above average at the time of the assessment (whose self-reported overall symptom severity did not exceed the 50th percentile of the population norm) from the two occupational zones (i.e., the West and Soviet zones).

#### Methods

##### Participants and procedure

Three-hundred-and-sixteen participants were recruited for a study on PTSD in the elderly in Austria between March and September 2010 by local announcements and through referral by institutions and residences for the elderly [40]. Participants were born before 1945 and had resided in Austria during the war and time of occupation (1945–1955). More participants were recruited from the former Soviet controlled regions. This was in accordance with population density statistics of Austria (more people live in the eastern parts of the country) [43]. Moreover, corresponding to historical reports [39], a higher traumatic load was expected there. The study was conducted according to the Austrian ethical regulations for clinical research and approved by the committee of the funding organization (Future Fund of the Republic of Austria). All participants provided informed written consent and were interviewed in their homes by expert interviewers trained in psychotraumatology and gerontology (psychology masters/PhD students).



Part of this interview (see Instruments) was a Mini-Mental State Examination (MMSE; [44]). Persons with a score below 22 were excluded. The slightly lowered cut-off (22 instead of 24) was deemed more suitable for this sample where education was mostly expected to be low [45].

For this study, only the data of 293 participants, who had experienced at least one WRT, were used. Among these, MMSE scores had a mean of 27.1 ( $SD = 2.2$ , Range = 22–30). Twenty (6.8%) participants had a MMSE score < 24. Further sample characteristics are given in Table 1.

#### Instruments

The interview comprised the MMSE, a biographical and historical section created in cooperation with historians from the Ludwig Boltzmann Institute for War-Research in Graz, Austria, and a battery of standardized psychological instruments, see [40] for details.

The MMSE is a widely used screening instrument for dementia and cognitive impairment with high inter-rater and test-retest reliability, and high sensitivity and specificity [44]. MMSE scores range from 0 to 30. Lower educational levels were reported to impact MMSE scores [45]. Hence, a lower cutoff of < 22 (compared to < 24)

was used in this study where participants had predominantly only lower levels of education.

In the biographical section of the interview, three single items (scored yes/no) assessed whether participants had received social support and acknowledgement with regard to their war-time experiences. They were used to investigate the impact of social support and acknowledgement on the successful coping specifically with WRTs. Participants were asked (1) whether they had had the opportunity to talk openly about their war-time experiences with someone, (2) whether family and/or friends were sympathetic towards their war-time experiences and (3) considered their war-time experiences as important. Questions (1)–(3) had a Cronbach's alpha of .60 in our sample. We constructed an ad-hoc scale by adding together respective ratings, assigning 0 = *no* and 1 = *yes*. A fourth item assessed (4) whether the occupational forces had given participants a feeling of safety. We also used this item to investigate any positive contributions made by occupational troops towards their coping with WRTs.

Additionally, as indicators of social engagement and support [13], we used data from the biographical section on whether participants were currently involved in voluntary work, their marital status, and on whether they had children and were still in contact with them.

**Table 1 Sample characteristics**

Sex	Male	Female	
N (%)	113 (38.0)	180 (61.4)	
Age	Mean (SD)	Range	
Years	82.1 (6.6)	66–99	
Education <sup>a</sup>	< 10 years <sup>b</sup>	10–12 years <sup>c</sup>	> 12 years <sup>d</sup>
N (%)	144 (48.1)	109 (37.2)	39 (13.3)
Marital status	Single	Married	Widowed or divorced
N (%)	24 (8.2)	123 (42.0)	146 (49.8)
Trauma <sup>e</sup>	War-related <sup>f</sup>	Other lifetime <sup>g</sup>	Total lifetime
Mean (SD)	1.8 (1.0)	1.8 (1.4)	3.6 (1.7)
Zone <sup>h</sup>	Western Allied	Soviet	Both
N (%)	117 (40.1)	170 (58.2)	5 (1.7)
Status <sup>i</sup>	Resilient	Mild-to-moderate trauma	PTSD (full or sub-threshold)
N (%)	170 (58.0)	81 (27.6)	42 (14.3) <sup>h</sup>
<b>With respect to status</b>			
<b>Symptoms of depression</b>			
N (%)	6 (3.5)	5 (6.2)	8 (19.0)
<b>Voluntary work</b>			
N (%)	49 (28.8)	18 (22.2)	4 (9.5)
<b>CD-RISC total score</b>			
Mean (SD)	31.29 (6.89)	28.59 (6.71)	25.93 (6.66)

<sup>a</sup> N = 292. Attained degree of education: <sup>b</sup> primary education or lower secondary education; <sup>c</sup> upper secondary education or vocational education and training; <sup>d</sup> university. <sup>e</sup> Includes bombing, civilian WRTs, WRTs by occupational forces, war effort, prisoner of war. <sup>f</sup> As determined with the TLEQ. <sup>g</sup> Based on Bonanno et al.'s [24] criteria. <sup>h</sup> Full PTSD was present in 6 (2.0%) participants.

The life-time frequency of 17 different DSM-IV A-criterion traumatic experiences was assessed with the Traumatic Life Event Questionnaire (TLEQ; [46]). The TLEQ is a 19-item broad-spectrum measure of trauma exposure covering natural disasters to physical assaults and rape. It demonstrated good content validity and discriminative validity with regard to PTSD status, and good test-retest reliability [47]. For the purposes of this study, WRTs were not assessed with the TLEQ. Instead, the experience of five different categories of WRT (i.e., bombing, civilian WRTs, WRTs by occupational forces, war effort, and prisoner of war) were assessed with the biographical and historical sections of the interview. The items were designed by the historians, taking into account historical data on traumatic and other relevant events specific to that time. Formulations of items pertaining to WRTs were matched to the format of the TLEQ. For the purpose of this study, the total number of experienced WRTs was used.

The Posttraumatic Stress Disorder Checklist – Civilian Version (PCL-C; [48]) was used for the assessment of symptoms of posttraumatic stress according to DSM-IV criteria. The PCL-C asks for the occurrence and severity of 17 PTSD symptoms in the past month, scored from 1 = *not at all* to 5 = *extremely*. The PCL-C was reported to show overall good validity and reliability (see [49], and references therein). Ratings in the PCL-C were used for referencing PTSD (1+ symptoms of criterion B, 3+ symptoms of criterion C and 2+ symptoms of criterion D) and sub-threshold PTSD (1+ symptoms out of criterion B, C and D; [50]). The PCL-C was also used to place participants into the categories proposed by Bonanno et al. [24]: 'PTSD' (according to the above criteria but also including sub-threshold PTSD in the current study), 'mild-to-moderate trauma' (2+ PTSD symptoms but no full or sub-threshold PTSD), and 'resilient' (one PTSD symptom at most). 'Mild-to-moderate trauma' and 'resilient' may be regarded as two gradations of non-PTSD in the current context. Bonanno et al. used the National Women's Study PTSD module to assess symptoms of PTSD but otherwise the same criteria. The only other deviance of the current study from Bonanno et al. [24] lay in including also probable sub-threshold PTSD in the 'PTSD' category. Research suggests that the symptom burden and distress implied by sub-threshold PTSD also affects mental health to a great extent [51,52]. Hence, sub-threshold PTSD was also considered in the current study.

A psychometric measure of resilience was obtained with the 10-item CD-RISC [42]. Items pertain to tolerance of change, coping with stress and personal problems, illness and recovery, as well as dealing with challenges, pressure, failure and painful feelings in the last month, scored from 0 = *not true at all* to 4 = *true*

*nearly all of the time*. The 10-item CD-RISC was shown to be a reliable, valid, and one-dimensional measure and is thought to capture the core features of resilience, defined as the ability to cope with stress [23]. In the comprehensive review of Windle et al. [23] the 10-item CD-RISC was rated as one of the better short instruments currently available.

Current general distress and depressive symptoms were assessed with the German version of the Brief Symptom Inventory (BSI; [53]). The Global Severity Index (GSI; mean of all 53 items) was used to identify participants whose psychological health was above average at the time of the assessment (T scores < 51, based on the adult norm). Being able to preserve a stable personal equilibrium [9] applies to a healthy and normal functioning as a whole and hence implies a lack of symptoms across the entire spectrum. The GSI is a highly reliable measure of global symptom distress [53]. Thus, it also appeared to be suited as an indirect indicator of overall healthy functioning. Symptoms of depression as assessed with the BSI depression subscale (6 items) were regarded as clinically relevant in participants with T scores > 62.

#### Analyses

In the first phase of analysis, multinomial logistic regression was used, in analogy to [24]. The current status of participants (resilient/mild-to-moderate trauma/PTSD) was used as outcome and 'PTSD' was set as the reference category. Current status was regressed on participant sex, age, education, number of life-time traumata (combining WRTs and non-WRTs), and current depression, comparable to [24]. Furthermore, voluntary work and marital status served as indicators of social engagement and support. Current residence (nursing home/own home) was included in our model to control for further possible confounding (107 [36.5%] participants resided in nursing homes). The association of social support and acknowledgement with regard to WRTs with status was tested by including the ad-hoc scale of questions (1)–(3). Respective scores ranged from 0 to 3 with  $M = 1.81$  ( $SD = 1.08$ ). Question (4) on positive contributions of occupational troops (approved by 95 [32.4%] participants, 15 missings) was added to the model as a categorical regressor. Differences in CD-RISC total scores between the three status groups were investigated with analysis of covariance, controlling for age and total number of life-time traumata.

For the second phase of analysis, we created a matched case-control sample, wherein the 42 participants with full or sub-threshold PTSD were matched with 42 non-PTSD controls of our sample (matching criteria: sex, age, education, residence during WWII [city/countryside], number of life-time traumata, and MMSE score). Of the matching criteria, sex, age, education, and



number of life-time traumata were known risk factors of PTSD [1]. We (re-)analysed in this matched case-control sample all predictors that were examined in the first part of our analysis that were not matching criteria (i.e., symptoms of depression, voluntary work, marital status, current residence in nursing home), but also effects of zone of occupation, whether participants had children, and differences in CD-RISC total and single item scores using *t* tests, Fisher's exact tests, and likelihood ratio tests.

For the third part, we selected participants whose psychological health was at the time of assessment above-average (GSI T score < 51). Residents of the Soviet occupation zone post-WWII had a higher risk of adversity than residents of the Western zones [39]. CD-RISC item and total scores were compared between participants who had resided in the Soviet occupied zone (cases) and those who had resided in the Western Allied zone (controls) with *t* tests. Significance was set at  $p < .05$  for all analyses.

## Results

### Correlates of resilience in the total sample

The multinomial regression model had a significant fit on the data ( $\chi^2(24) = 53.22, p < .001; N = 277$  because of partially missing data). A medium level of education, a lower number of lifetime traumata, the absence of symptoms of depression, and involvement in voluntary work were associated with non-PTSD ('resilient') compared to PTSD (see Table 2). In contrast, mild-to-moderate trauma was associated with a lower probability of being married and a higher probability of being involved in voluntary work compared to PTSD. We also checked on differences between the 'resilient' and 'mild-to-moderate trauma' groups by setting the latter as reference category in the regression model (reporting only significant

results here,  $p < .05$ ): non-PTSD ('resilient') was specifically associated with a smaller number of life-time traumata (OR = 0.81, 95% CI = [0.68, 0.98]) compared to mild-to-moderate trauma. Age, sex, residing in a nursing home, social support and acknowledgement on WRTs, and positive contributions of the occupational forces on the coping with WRTs showed no significant association with any status group.

Current status had a significant impact on CD-RISC total scores (see Table 2) with a medium effect size,  $F(2, 283) = 12.04, p < .001, \eta^2 = .078$ . Bonferroni-corrected, non-PTSD ('resilient') participants differed significantly from mild-to-moderate traumatized participants ( $p = .011$ ) and from participants with probable PTSD ( $p < .001$ ). Mild-to-moderate traumatized participants and participants with probable PTSD did not differ ( $p = .105$ ). The covariates had no significant impact (age:  $F(1, 283) = 0.03, p = .874$ ; number of life-time traumata:  $F(1, 283) = 1.20, p = .274$ ).

### Comparison of PTSD cases with matched controls

Cases and controls matched perfectly with regard to sex, educational level, and residence during WWII. They were comparable regarding all other matching criteria (age:  $M = 82.05$  vs.  $81.98, t(82) = 0.06, p = .952$ ; total number of life-time traumata:  $M = 4.24$  vs.  $4.07, t(82) = 0.43, p = .668$ ; MMSE score:  $M = 26.64$  vs.  $27.21, t(82) = -1.28, p = .205$ ). 13 of the controls were classified as mild-to-moderate trauma. This was inevitable, as a larger number of traumata (which served as a matching criterion) raised the probability of showing symptoms of PTSD (see above).

Cases and controls differed in none of the examined variables that were no matching criteria (marital status: likelihood ratio = 3.27,  $df = 2$ , exact  $p = .157$ ; symptoms of depression: OR = 3.06, 95% CI = [0.75, 12.46],  $p = .194$ ; current residence in nursing home: OR = 1.22, 95% CI = [0.51, 2.96],  $p = .822$ ; voluntary work: OR = 0.39, 95%

**Table 2 Multinomial logistic regression predicting outcome (reference category = PTSD)**

		Resilient vs. PTSD <sup>a</sup>	Mild-to-moderate trauma vs. PTSD <sup>a</sup>
Age		0.95 [0.94, 1.07]	1.03 [0.96, 1.10]
Female Sex		0.98 [0.23, 1.46]	0.72 [0.26, 1.99]
Education (compared to < 10 years)	10-12 years	<b>2.46 [1.01, 6.05]</b>	2.59 [0.98, 6.82]
	> 12 years	1.57 [0.43, 5.72]	0.93 [0.20, 4.25]
Marital status (compared to widowed or divorced)	Married	0.99 [0.22, 1.59]	<b>0.26 [0.07, 0.80]</b>
	Single	0.84 [0.14, 5.09]	1.74 [0.30, 10.24]
Living at own home (compared to nursing home)		1.02 [0.41, 2.49]	0.91 [0.35, 2.37]
Number of lifetime traumata		<b>0.73 [0.59, 0.91]</b>	0.90 [0.71, 1.14]
Symptoms of depression		<b>0.21 [0.06, 0.71]</b>	0.29 [0.08, 1.04]
Engaged in voluntary work		<b>4.86 [1.42, 16.70]</b>	<b>4.34 [1.12, 16.79]</b>
Social support on WRTs		0.91 [0.64, 1.29]	1.00 [0.68, 1.47]
Positive contribution of occupational forces		0.82 [0.37, 1.80]	0.49 [0.21, 1.19]

Odds ratios (ORs) and 95% confidence intervals. Significant ( $p < .05$ ) ORs are printed boldface. <sup>a</sup> Full and sub-threshold PTSD.

CI = [0.11, 1.37],  $p = .227$ ). They also did not differ with regard to zone of occupation (Soviet zone: OR = 0.74, 95% CI = [0.31, 1.78],  $p = .658$ ). However, cases more often had children ( $n = 38$  vs. 29, OR = 4.26, 95% CI = [1.26, 14.43],  $p = .028$ ). The mean number of children among those with children did not differ between cases and controls ( $M = 2.11$  vs. 1.90;  $t(65) = 0.70$ ,  $p = .489$ ). All cases and 26 of the controls reported that they also had regular contact with their children.

Total CD-RISC scores differed between cases and controls by a large amount (see Table 3). With regard to items, differences were significant in Items 6, 10, 7, 8, 2 and 5 (in descending order with regard to effect size) and there at least of medium size. No significant differences were found for Items 1, 3, 4, and 9.

#### Successful coping with an environmental risk factor in the past

In our sample we identified 173 participants whose psychological health was above average (GSI T score < 51) at the time of the assessment, 94 (54.3%) of whom had resided in the Soviet zone (cases) and 79 (45.7%) in the Western Allied zone (controls). Cases differed from the controls in CD-RISC total scores by  $d = 0.39$  ( $M = 32.86$  vs. 30.49,  $t(170) = -2.57$ ,  $p = .011$ ); i.e., the cases had higher scores. In single item analyses, this difference could be traced to Items 3 ('humour';  $M = 2.98$  vs. 2.29,  $t(171) = 3.51$ ,  $p < .001$ ,  $d = 0.54$ ) and 4 ('stress strengthens';  $M = 2.23$  vs. 1.54,  $t(171) = 3.03$ ,  $p = .003$ ,  $d = 0.46$ ). The cases and controls did not differ in any of the other items ( $ps \geq .088$ ). Ratings in Items 3 and 4 were in both the cases and controls slightly positively correlated, but this was significant only with regard to the cases (Spearman rho = .21 and .18,  $ps = .040$  and .120). Dichotomizing items at a rating of 2 (*sometimes true*), the cases had a more than eightfold chance to rate one item at least *sometimes true*, provided they had also rated the

other item at least *sometimes true* (OR = 8.07, 95% CI = [2.07, 31.47],  $p = .002$ ). No such association was observable among controls (OR = 1.98, 95% CI = [0.77, 5.14],  $p = .235$ ).

#### Discussion

Our study shows that outcome oriented and psychometric research approaches on resilience converged to some extent. Yet, each was deficient in its own way. By using different research vistas and diligent control for confounding, we were able to avoid bias and to identify more clearly predictors and correlates of positive mental health despite trauma. Our findings corroborate some previous results but also expand these findings with regard to the elderly who had traumatic experiences during their childhood and adolescence.

With regard to the outcome oriented approach, comparing persons with mild-to-moderate trauma or PTSD with non-PTSD ('resilient') persons, a higher number of life-time traumata and current depressive symptoms were found to be associated with current symptoms of post-traumatic stress, corroborating previous results [24,54]. While the number of previous traumata may be reliably regarded as a variable risk factor, analyses with our matched case-control sample suggest that depression is most likely no true risk factor but rather a concomitant of PTSD and its symptoms. Evidence substantiating this conclusion in the elderly was recently reported by Chaudieu et al. [55]. Symptoms of depression may thus indicate current posttraumatic stress rather than pose a risk factor of PTSD in the elderly. This needs consideration in clinical treatment.

A medium level of education, compared to a low level, also appeared beneficiary for non-PTSD in our study. Previous studies reported conflicting evidence on this issue [11,24]. Judging from our data, a high level of education does not impede adaptation to trauma [24]. It

**Table 3 Differences in CD-RISC item and total scores in the matched case-control sample**

Item	Cases	Controls	t	p	d
1. Able to adapt to change	3.23 (1.10)	3.36 (1.14)	-0.53 <sup>a</sup>	.595	-0.12
2. Can deal with whatever comes	2.66 (1.10)	3.21 (0.93)	-2.48 <sup>b</sup>	.015	-0.54
3. Tries to see humorous side of problems	2.05 (1.30)	2.45 (1.44)	-1.34 <sup>b</sup>	.184	-0.29
4. Coping with stress can strengthen me	1.27 (1.38)	1.81 (1.57)	-1.67 <sup>b</sup>	.099	-0.37
5. Tend to bounce back after illness or hardship	3.15 (0.91)	3.60 (0.73)	-2.43 <sup>a</sup>	.018	-0.54
6. Can achieve goals despite obstacles	2.56 (1.42)	3.40 (0.91)	-3.24 <sup>b</sup>	.002	-0.71
7. Can stay focused under pressure	2.58 (1.28)	3.24 (1.06)	-2.57 <sup>a</sup>	.012	-0.57
8. Not easily discouraged by failure	2.68 (1.25)	3.31 (1.05)	-2.50 <sup>a</sup>	.015	-0.55
9. Thinks of self as strong person	2.95 (1.32)	3.33 (0.85)	-1.57 <sup>b</sup>	.120	-0.35
10. Can handle unpleasant feelings	2.63 (1.22)	3.38 (1.06)	-2.98 <sup>b</sup>	.004	-0.65
Total score	25.93 (6.65)	31.10 (6.12)	-3.65 <sup>a</sup>	< .001	-0.81

<sup>a</sup>  $dI = .80$ , <sup>b</sup>  $dI = .81$ .



rather seemed to have no specific beneficial effect compared to a lower level of education. The effects of education need to be investigated more specifically in future research.

Sex did not emerge as a risk factor in our study, corroborating findings by Spitzer et al. [7] in a community sample of elderly Germans. However, full and sub-threshold PTSD was more frequent among married persons in our study, compared to persons with some symptoms of PTSD but no probable diagnosis. Matching with regard to marital status and a number of other sociodemographic characteristics, persons with full or sub-threshold PTSD were also more likely to have children. These findings are somewhat at odds with previous results on higher levels of perceived social support [18,24,27] and greater social engagement [13] in resilient persons. Yet, our findings may reflect an aspect of help-seeking behaviour in persons with PTSD. Recent research suggests that spouses' emotion-focused coping strategies may have a beneficial impact on victims' PTSD symptoms [56]. Stronger familial ties and an increased likelihood to rear children may be a consequence of this kind of help-seeking behaviour. Marital status and a higher likelihood to rear children may in this respect be regarded as consequences of PTSD in the elderly. More research is, however, needed on this topic.

Voluntary work in old age was also associated with a lower probability of full or sub-threshold PTSD. In absence of longitudinal data, we suggest that this may be inversely interpreted as a consequence of the debilitating symptoms of PTSD: persons with PTSD may be less able — because of their symptomatology — to involve themselves in such activities [57]. Volunteerism may thus be understood as an indicator (i.e., a concomitant or consequence) of non-PTSD but not as a protective factor against PTSD.

In contrast to other reports on positive posttraumatic outcome [30,35], PTSD and non-PTSD were not characterized by differences in social acknowledgement or of having had the opportunity to talk openly about war-time experiences with someone. These conflicting results may be due to sampling differences: Forstmeier et al. [35] investigated former WWII child soldiers, whereas Maercker and Müller [30] studied survivors of political imprisonment in former Eastern Germany and recently traumatized crime victims. These samples may have been representative of persons who had some 'special' or uncommon traumatic experience. Most civilian WWII child-survivors are not recognized as having a special or in some way outstanding history to tell. Consequently, social acknowledgement and the seeking of such may be generally lower in the cohorts of civilian WWII child-survivors. While social acknowledgement could have been beneficial to them, they might not have had the chance to acquire it.

With regard to the psychometric approach, the 10-item CD-RISC was found to discriminate reliably between PTSD and non-PTSD persons in our study. In the matched case-control sample, differences were accordingly also greatest in items that were related to PTSD symptoms of clusters B and D (Items 6, 7, and 10). Thus, resilience as measured with the CD-RISC evidently mirrored to a large extent only PTSD symptom severity, calling the utility of the CD-RISC somewhat into question [54]. Moreover, being able to adapt to changes (Item 1), considered an essential indicator of psychometrically defined resilience [15], did not discriminate between matched PTSD and non-PTSD persons. Yet, among those whose psychological health was above average, seeing the humorous side of problems (Item 3) and maintaining the impression that coping with stress can be strengthening (Item 4) were found to be indicative of having dealt successfully with an environmental risk factor in the past. This study thus corroborated that humour is an important component of resilience and coping [34,58]. Yet, our study also shows that it is complemented by a challenge-oriented attitude towards life. We suggest that these two inter-related cognitive-behavioural characteristics should be regarded as protective factors. Fostering these two factors could thus be important for prevention programmes that seek to boost resistance against posttraumatic stress and PTSD. Experimental and longitudinal research is needed here.

With regard to the initially posed question ('Is it resilience?'), our study provides no definite answer. We obtained evidence of a risk and a protective factor (number of life-time traumata, medium education), and of a number of likely correlates and consequences of PTSD and non-PTSD in the elderly (symptoms of depression, voluntary work, marital status, likelihood to rear children). From this perspective, only fewer traumata and a medium level of education appeared to promote better mental health and resilience (i.e., showing less likely symptoms of PTSD), replicating previous results [24]. Humour and a challenge-oriented attitude towards life were found to be important aspects in coping successfully with an environmental risk factor in the past. However, these characteristics did not discriminate PTSD from non-PTSD. Thus, our study's main contribution may lie in pointing out that the question 'What is resilience?' needs reformulation. Studies need to examine in more detail which specific factors contribute to good mental health in which specific way. Likewise, studies need to differentiate more systematically between different levels of outcome (e.g., PTSD and non-PTSD), types of correlates (i.e., risk factors, concomitants and consequences), and cognitive-behavioural characteristics of psychometric definitions and operationalizations of resilience that may promote a better outcome. In conclusion,



our results underline that the psychometric assessment of resilience needs improvement and should be based on a stringent definition of resilience that avoids too large an overlap with the symptomatology of PTSD. Such an instrument should incorporate — in a 'multiple pathways' approach — different and various components that are thought to bring resilience about or for which ample evidence already exists (i.e., humour).

Limitations of our study pertain to its cross-sectional character, which precludes direct inference on causality, problems of reporting bias given the old age of the participants and the large time spans covered, and only limited control over confounding variables that may have introduced further bias, like sampling. In the absence of normative data with regard to the base population of war-exposed Austrians, it is unclear whether our sample was truly representative. The use of ad-hoc scales and single items with regard to social support and acknowledgement on WRTs may have biased results. Associations with the Big Five personality traits and specific coping styles [32,59], which may help in mapping out the terrain of resilience as a personality trait [22], were also not considered in this study.

## Conclusions

Our results show no clear picture of factors constituting resilience. Rather, most aspects of resilience appeared rather to be concomitants or consequences of PTSD and non-PTSD. Clearer definitions of resilience and longitudinal studies are needed in future research. Special attention should be laid on a challenge-oriented and humorous attitude towards stress in order to further knowledge on resilience and on risk or protective factors that contribute to its effects.

## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

UST and TMG contributed equally to this manuscript. UST and TMG wrote the paper, planned and conducted the statistical analysis. BLS designed and supervised the project and contributed to writing and revising the paper. All authors read and approved the final manuscript.

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**Study 5**

Glück, T. M., Tran, U. S., Raninger, S., & Lueger-Schuster, B. (in press). The Influence of Sense of Coherence and Mindfulness on PTSD Symptoms and Posttraumatic Cognitions in a Sample of Elderly Austrian Survivors of World War II. *International Psychogeriatrics*. doi:10.1017/S104161021500143X

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# The influence of sense of coherence and mindfulness on PTSD symptoms and posttraumatic cognitions in a sample of elderly Austrian survivors of World War II

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## ABSTRACT

**Background:** Sense of Coherence (SOC) and mindfulness are known protective factors against psychopathology, also in older age. We set out to investigate the influence of SOC and mindfulness on posttraumatic symptoms and cognitions in the context of lifetime trauma in elderly persons with a history of childhood war-experiences.

**Methods:** Elderly Austrians ( $N = 97$ ) filled in questionnaires on traumatic lifetime experiences and posttraumatic symptoms (ETT), posttraumatic cognitions (PTCI), SOC (SOC-13) and mindfulness (FFMQ). We expected the influence of SOC scores on posttraumatic symptoms and cognitions to be on one hand influenced by mindfulness. On the other hand, we expected that both aspects would uniquely explain fewer posttraumatic symptoms and cognitions.

**Results:** Participants reported various lifetime trauma ( $M = 2.42$ ), including experiences during World War II (WWII) as children and adolescents. Mindfulness partially mediated the association of SOC scores with posttraumatic cognitions, but not with posttraumatic symptoms. However, in a two-stage mediation model, mindfulness significantly predicted posttraumatic symptoms via its effects on posttraumatic cognitions.

**Conclusion:** Although SOC was the strongest predictor of posttraumatic symptoms, mindfulness influenced the severity of posttraumatic symptoms via its effects on posttraumatic cognitions. We discuss implications for mindfulness-based interventions on trauma-related cognitions in the elderly.

**Key words:** resilience, coping, war-related trauma, childhood trauma, adaptation, mediation model, FFMQ

## Introduction

A higher number of various traumatic experiences over the lifespan and posttraumatic stress disorder (PTSD) are associated with poorer general physical health and more chronic medical conditions (Krause *et al.*, 2004; Sledjeski *et al.*, 2008). Especially traumatic and adverse experiences in childhood are associated with greater impairment in older age compared to traumatic experiences in other developmental stages such as, for example, adulthood (Ogle *et al.*, 2013). In addition to this, the type of trauma, the severity and the development of posttraumatic symptoms are associated with negative cognitions towards the trauma or oneself, which emerge after or during the event (cf. Lapp *et al.*, 2011). As a consequence elderly persons

who experienced WWII during childhood report higher current PTSD prevalence (e.g. Spitzer *et al.*, 2008) compared to elderlies from countries without a history of WWII (Maercker and Pielmaier, 2010). These WWII survivors display various impairing effects in older age, such as more cognitive impairment and different mental and physical health problems (e.g. Kuwert *et al.*, 2009; Glück *et al.*, 2012; Alastalo *et al.*, 2013).

However, there is also research that shows that not all persons affected by trauma develop mental health problems in the direct aftermath or later in life (cf. Rutter, 2007). There have been a few studies that investigated resilience (e.g. Kuwert *et al.*, 2009; Tran *et al.*, 2013) and other related factors of positive adaptation such as posttraumatic growth and SOC in now adult survivors of WWII (Kuwert *et al.*, 2008; Forstmeier *et al.*, 2009).

In particular SOC was reported a protective factor against the development and/or exacerbation of posttraumatic symptoms related to different

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61 kinds of lifetime traumata – war-related (e.g. Kuwert  
62 *et al.*, 2008) and non-war-related (e.g. Streb  
63 *et al.*, 2014). Antonovsky (1996) proposed SOC  
64 as a cognitively, behaviorally and motivationally  
65 expressed orientation toward the world that enables  
66 the individual to perceive it as comprehensible,  
67 manageable, and meaningful. This orientation  
68 facilitates health (Antonovsky, 1987). However,  
69 the specific mechanisms through which SOC  
70 exerts its beneficial effect and potentially mediating  
71 factors that influence this effect are still subject to  
72 investigation. One of these mediating factors could  
73 be mindfulness.

74 In the past years, there have been a growing  
75 number of studies on mindfulness and mental  
76 health. Mindfulness can be defined as the ability  
77 to focus attention on the experiences and actions  
78 of the present moment in a non-judging, open  
79 and curious manner that involves detaching from  
80 the identification with these experiences – such  
81 as psychological or somatic symptoms or negative  
82 emotions (Bishop *et al.*, 2004). Many psychological  
83 symptoms, such as distress or depression and  
84 anxiety, are inversely related to mindfulness  
85 (Baer *et al.*, 2006). In the context of trauma  
86 and posttraumatic symptoms, mindfulness, and  
87 acceptance seem to influence the development and  
88 maintenance of symptoms positively (Thompson  
89 and Waltz, 2010; Thompson *et al.*, 2011). The  
90 positive influence of mindfulness on symptoms of  
91 anxiety and depression could be attributed to its  
92 facets *Acting with awareness* and *Non-judging* (e.g.  
93 Tran *et al.*, 2014). These facets also seem to  
94 influence posttraumatic symptoms positively, albeit  
95 with a likely smaller effect size (Vujanovic *et al.*,  
96 2009).

97 Results from studies on the stress buffering  
98 and health-promoting effects of mindfulness  
99 interventions also suggested that mindfulness may  
100 influence SOC positively (e.g. Gimpel *et al.*, 2014).  
101 SOC and mindfulness have both been placed in  
102 the broader context of resilience (cf. Almedom,  
103 2005; Thompson *et al.*, 2011) that buffers against  
104 negative outcome after adversity (Rutter, 2007), but  
105 mindfulness should still be considered a distinct  
106 psychological aspect (Bishop *et al.*, 2004). It may  
107 contribute to the effects of SOC in the sense that it  
108 gives individuals a feeling of control and meaning  
109 independent of the circumstances: the individual  
110 controls the allocation of attention and on how to  
111 react to ensuing experiences (Bishop *et al.*, 2004).  
112 Yet, it remains unclear how SOC and mindfulness  
113 influence one another.

114 The identification of health-maintaining aspects  
115 in elderly persons is particularly important for  
116 improving care, and maintaining and fostering  
117 health in older age. To our knowledge, no

118 previous study has investigated the relationship  
119 and mechanisms of SOC and mindfulness on  
120 posttraumatic symptoms and cognitions in the  
121 context of lifetime trauma in a sample of  
122 elderly WWII survivors before. In this study, we  
123 investigated how SOC and mindfulness influence  
124 posttraumatic symptoms and cognitions. We  
125 expected that both SOC and mindfulness would  
126 predict fewer PTSD symptoms and cognitions. We  
127 also expected that mindfulness would mediate the  
128 effects of SOC on posttraumatic symptoms and  
129 cognitions and investigated to what extent this was  
130 the case.

## 131 Methods

### 132 Participants and procedure

133 For this study, a non-clinical sample of elderly  
134 Austrians ( $N = 97$ ; see Table 1) born before  
135 1945 was recruited between February and May  
136 2011 by contacting organizations and residences  
137 for the elderly and through further word of  
138 mouth advertising within these organizations.  
139 All had experienced WWII and the subsequent  
140 time of occupation in Austria as children or  
141 adolescents. Participants were tested for cognitive  
142 impairment with the MMSE (exclusion cut-off 25  
143 >; Folstein *et al.*, 2000). Only data of persons  
144 scoring above the cut-off of 25 were included  
145 in this study. Participants filled in questionnaires  
146 regarding mental health problems, posttraumatic  
147 stress symptoms, traumatic lifetime experiences  
148 (war-related and general lifetime events), SOC and  
149 mindfulness. A trained master student of clinical  
150 psychology administered the questionnaires and  
151 was present at all sessions to support the participants  
152 and answer questions. All participants provided  
153 written informed consent before they filled in the  
154 questionnaires. We expected to find a medium  
155 effect of the main measures in the data with a  
156 power of 0.80 and  $p = 0.05$  and calculated a sample  
157 size of at least  $N = 85$ . The study was conducted  
158 according to the regulations and legal standards  
159 for non-invasive clinical research in Austria and  
160 the European Union and adhered to the ethical  
161 principles of APA and the ethical guidelines of the  
162 University of Vienna.

### 163 Measures

164 ESSEN TRAUMA – INVENTORY (ETI)  
165 The ETI (Tagay *et al.*, 2006) measures different  
166 kinds of criterion. A traumatic events and assesses  
167 symptoms of PTSD in the past month according  
168 to DSM-IV criteria. It can also be used to screen  
169 the severity of posttraumatic symptoms. The 27



**Table 1.** Sociodemographic characteristics ( $N = 97$ )

CHARACTERISTIC	N	%	GENERAL POPULATION% <sup>†</sup>
Gender			
Female	66	68.0	57.7
Male	31	32.0	42.3
Marital status			
Single	7	7.2	5.6
Married	48	49.5	56.1
Widowed or divorced	42	43.3	38.3
School education*			
<10 years	36	37.1	42.1
10–12 years	54	55.7	43.5
>12 years	7	7.2	14.4
Age (years)	Mean (SD) 73.6 (6.9)	Range 66–95	75.7

Note. \*  $N = 97$ . <sup>†</sup>According to Statistik Austria (2014), with regard to all persons of 65 years of age and older living in Austria.

170 items of the scale measures the 5 re-experiencing  
171 symptoms (criterion B), 7 avoidance symptoms  
172 (criterion C), and 5 arousal symptoms (criterion  
173 D). Additionally, persons report physiological  
174 symptoms related to the traumatic experience  
175 and the duration and onset of symptoms. These  
176 symptoms are rated on a 4-point-scale from "not at  
177 all" (0) to "very often" (3). Cronbach  $\alpha$  for this study  
178 was  $\alpha = 0.93$ .

#### 179 POSTTRAUMATIC COGNITIONS INVENTORY 180 (PTCI)

181 The PTCI is a 33 item self-rating scale that assess  
182 on a 7-point Likert scale (1 = *totally disagree* to 7 =  
183 *totally agree*) cognitions that influence posttraumatic  
184 psychopathology negatively (Foa *et al.*, 1999).  
185 It assesses three kinds of cognitions that can  
186 occur after the experience of a traumatic event:  
187 (1) negative cognitions about self, (2) negative  
188 cognitions about the world, and (3) self-blame.  
189 All subscales predict the severity of posttraumatic  
190 symptoms, anxiety, and depression in traumatized  
191 individuals. Cronbach  $\alpha$  for this study was  $\alpha = 0.95$ .

#### 192 BRIEF SYMPTOM INVENTORY-18 ITEM 193 VERSION (BSI-18)

194 The BSI-18 measures psychological symptoms of  
195 anxiety, depression, and somatization on a 5-point  
196 scale (0 = *not at all* to 4 = *extremely*) and also allows  
197 the computation of a global measure of symptom  
198 distress (Derogatis, 2001). Cronbach  $\alpha$  for this  
199 study was  $\alpha = 0.93$ .

#### 200 SENSE OF COHERENCE SCALE (SOC-13)

201 The SOC-13 is a widely used questionnaire to assess  
202 how people manage stressful situations and stay  
203 well. It measures the three aspects of the concept

of SOC: (1) comprehensible, (2) manageable, and  
(3) meaningful with 13 items on a 7-point scale with  
different responses (Antonovsky, 1987). Cronbach  
 $\alpha$  for this study was  $\alpha = 0.82$ .

#### FIVE FACET MINDFULNESS

##### QUESTIONNAIRE (FFMQ)

The FFMQ (Baer *et al.*, 2006) is one of the most  
utilized mindfulness questionnaires. It was factor  
analytically derived from five different mindfulness  
questionnaires resulting in a 39-item questionnaire  
with a five factorial structure loading on a higher-  
order general factor of mindfulness. It incorporates  
both state-like and trait-like aspects of mindfulness.  
Its five facets, measured on a 5-point scale (1 =  
*never or very rarely true* to 5 = *very often or always*  
*true*), are: (1) *Observing* of internal and external  
sensations, thoughts and experiences, (2) verbally  
*Describing* these experiences, (3) the *Non-judging* of  
occurring thoughts, feelings and experiences, (4)  
the *Non-reactivity* towards these experiences, and  
(5) *Acting with Awareness* in the present moment.  
Cronbach  $\alpha$  of the subscales were  $\alpha = 0.76$ – $0.85$   
and  $\alpha = 0.84$  for the total scale.

#### Data analysis

Two path models were fitted to the data. In  
the first model, the saturated model, SOC scores  
were used as the exogenous variable, mindfulness  
as a mediator and posttraumatic cognitions and  
symptoms as endogenous variables, which were  
allowed to correlate. This model tested the  
mediating effect of mindfulness, simultaneously  
with regards to the associations of SOC with  
posttraumatic cognitions and symptoms. In the  
second model, the two-stage mediation model,  
posttraumatic cognitions served as a second

**Table 2.** Intercorrelations and descriptive statistics

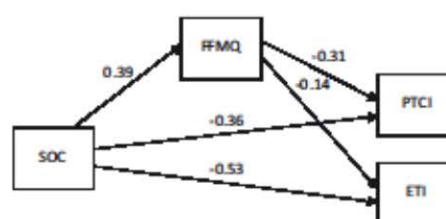
MEASURES	SOC (1)	FFMQ (2)	ETI (3)	PTCI (4)
1				
2	-0.39			
3	-0.58	-0.34		
4	-0.48	-0.45	-0.66	
<i>M (SD)</i>	69.62 (13.14)	141.27 (17.53)	12.47 (12.08)	2.22 (0.94)

Note.  $n = 91$ . SOC = Sense of Coherence, FFMQ = Mindfulness, ETI = PTSD symptoms, PTCI = posttraumatic cognitions. All  $ps \leq 0.001$ .

mediator for the effects of SOC and mindfulness on posttraumatic symptoms. Both SOC and mindfulness had direct paths to posttraumatic cognitions, but only SOC had also a direct path to PTSD symptoms. Mediation analyses were cross-sectional and did not investigate the temporal relationships of the investigated variables. Mplus 6.11 was used for the path analyses, using the robust maximum likelihood estimator (MLR) that allows and corrects for non-normality and provides robust standard errors. Model fit was evaluated, utilizing widely-used benchmarks, with the comparative fit index (CFI), the Tucker-Lewis index (TLI; CFI and TLI: good fit:  $>0.95$ , acceptable fit:  $>0.90$ ), and the root mean square error of approximation (RMSEA; good fit:  $<0.06$ , acceptable fit:  $<0.08$ ). Ninety percent confidence intervals of the RMSEA are also reported.

## Results

The participants' sociodemographic characteristics were comparable to those found in the Austrian general population of elderly (see Table 1). Of  $N = 97$  persons, 91 (88.3%) who reported at least one specific traumatic event in their lifetime were included in the analysis. The mean number of these lifetime trauma was 2.42 ( $SD = 1.33$ ; range = 1–5). Despite having experienced WWII and the subsequent time of occupation during their childhood or adolescence, participants experienced various kinds of specific lifetime trauma. The most distressing experiences reported were the traumatic death of a loved one, e.g. by an accident, crime or other unnatural causes of sudden death (30.8%), illnesses (27.5%), and accidents (18.7%) followed by childhood abuse (7.7%; physical, sexual, and neglect), more specific WWII-related trauma during childhood and adolescence, e.g. witnessing shooting or atrocities (6.6%), violence in adulthood, stalking/mobbing, and natural disasters (all 2.2%). One person reported a suicide attempt in young adulthood and one person did not indicate a single worst event.



**Figure 1.** Saturated mediation model. SOC = Sense of Coherence; FFMQ = Five Facet Mindfulness Questionnaire total score; PTCI = Posttraumatic Cognitions Inventory; ETI = PTSD symptoms. Numbers are standardized path coefficients. PTCI and ETI were allowed to correlate,  $r = 0.51$ . All  $ps < 0.001$ , except for the path of mindfulness to ETI,  $p = 0.149$ .

Table 2 displays descriptive statistics and intercorrelations of the investigated variables. Standardized path coefficients in the saturated mediation model are depicted in Figure 1. SOC had large direct effects on both posttraumatic cognitions and PTSD symptoms. Mindfulness mediated part of the effect of SOC on posttraumatic cognitions, but not on PTSD symptoms. The total standardized effect of SOC on posttraumatic cognitions was  $-0.48$  ( $p < 0.001$ ), of which  $-0.12$  ( $p = 0.002$ ) was mediated through mindfulness. The direct effect of SOC on PTSD symptoms was  $-0.53$  ( $p < 0.001$ ). In the model, SOC and mindfulness explained 31% of the variance of posttraumatic cognitions, and 35% of PTSD symptoms.

Figure 2 depicts a two-stage mediation model, wherein posttraumatic cognitions were modeled as a further mediator of posttraumatic symptoms (cf. Foa et al., 1999). Building on the previous results, which showed that the path of mindfulness to PTSD symptoms was not significant, this model included no direct path of mindfulness to PTSD symptoms. The two-stage mediation model had a very good fit on the data (Satorra-Bentler  $\chi^2(1) = 0.05$ ,  $p = 0.830$ , CFI = 1.000, TLI = 1.000, RMSEA = 0.000 [0.000–0.165]). The total standardized effect of SOC on posttraumatic cognitions, and its mediation through mindfulness,



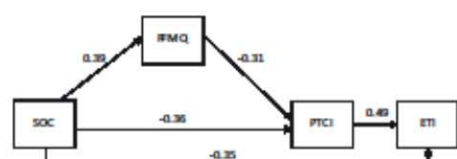


Figure 2. Two-stage mediation model. SOC = Sense of Coherence; FFMQ = Five Facet Mindfulness Questionnaire total score; PTCI = Posttraumatic Cognitions Inventory; ETI = PTSD symptoms. Numbers are standardized path coefficients. All  $p$ s < 0.001.

remained unchanged, compared to the saturated mediation model. The direct effect of SOC on PTSD symptoms was now  $-0.35$  ( $p < 0.001$ ), the indirect effect of SOC on PTSD symptoms, mediated through the posttraumatic cognitions, was  $-0.23$  ( $p < 0.001$ ). The indirect effect of mindfulness on PTSD symptoms, mediated through the posttraumatic cognitions, was  $-0.15$  ( $p = 0.004$ ). This model explained 31% of the variance of posttraumatic cognitions, but 52% of PTSD symptoms (compared to 35%, above).

When total FFMQ scores in the two-stage mediation model was substituted by scale scores of either *Acting with Awareness* or *Non-judging*, overall model fit and parameter estimates remained broadly unchanged. However, the indirect effect of mindfulness on PTSD symptoms was slightly decreased, using *Acting with Awareness*,  $-0.12$  ( $p = 0.009$ ), and slightly increased using *Non-judging*,  $-0.16$  ( $p = 0.006$ ).

## Discussion

In our ageing societies, the study of health promoting and sustaining factors is of importance to improve psychosocial care and treatment for the elderly. We found that in a sample of elderly Austrians mindfulness partially mediated the association of SOC scores with posttraumatic cognitions, but not with posttraumatic symptoms. Moreover, mindfulness significantly predicted posttraumatic symptoms via its effects on posttraumatic cognitions. All persons included in the analyses had experienced WWII and/or the subsequent time of occupation as children or adolescents and reported at least one traumatic experience in their lifetime.

In our sample, more than 88% of the participants reported to have experienced at least one traumatic event in their lifetime. This rate is comparable to another study on trauma in Austria's elderly (Glück *et al.*, 2012), but far higher than the 55% reported for a representative community sample of German

elderly (Spitzer *et al.*, 2008). The average number of traumatic lifetime events in our study was also higher than in the representative German sample, but similar to a number reported for a sample of US elderly (Krause *et al.*, 2004). The intercorrelations and means of the main measures reported in Table 2 were comparable to results reported in other studies (cf. Foa *et al.*, 1999; Baer *et al.*, 2006; Tagay *et al.*, 2006; Kuwert *et al.*, 2008; Thompson and Waltz, 2010). SOC showed a medium-large correlation with mindfulness (cf. Gimpel *et al.*, 2014).

In the saturated mediation model (Figure 1), SOC had, as expected, large effects on both posttraumatic symptoms and cognitions; however, mindfulness mediated only part of the effect of SOC on posttraumatic cognitions and not on the symptoms. Still, the model explained a large proportion of the variance on both symptoms and cognitions. In our sample, mindfulness had no independent effect on posttraumatic symptoms. However, prior research in the context of PTSD and trauma (e.g. Vujanovic *et al.*, 2009; Thompson and Waltz, 2010) and on the effects of mindfulness interventions for posttraumatic symptoms (e.g. Thompson *et al.*, 2011) suggested that such an effect might exist. In the framework of both mindfulness and SOC, it is assumed that the successful coping and dealing with the stressor, and not the stressor itself, is important for a beneficial outcome and the facilitating of health (cf. Richardson, 2005; Thompson *et al.*, 2011).

Fitting the notion that the way one actually deals with cognitions and appraisals of a situation is particularly important for mental health, we found that posttraumatic cognitions mediated posttraumatic symptoms, as was suggested by Foa *et al.* (1999). Mindfulness indirectly affected posttraumatic symptoms via its effects on posttraumatic cognitions. Thus, the effect of mindfulness interventions for posttraumatic symptoms (cf. Thompson *et al.*, 2011) may be rather indirect, than direct. Although the indirect effect of mindfulness on posttraumatic symptoms was not overly large, the explained variance of posttraumatic symptoms increased by almost 20% including also mindfulness into the model. SOC and mindfulness together explained over 50% of the variance in posttraumatic symptoms in our sample. Studies showed that mindfulness interventions also increase SOC in participants (e.g. Gimpel *et al.*, 2014) and it seems promising to focus on fostering these two aspects when working with elderly persons negatively affected by trauma.

Unlike previous research, we found no strong indication of a differential effect of the facets *Non-judging* and *Acting with Awareness* with respect to mental health and posttraumatic symptoms



(Vujanovic *et al.*, 2009; Thompson and Waltz, 2010; Tran *et al.*, 2014), compared to overall mindfulness scores. This means that in our data, no single facet of mindfulness explained more symptom variance than overall mindfulness itself, suggesting that in the development of interventions for fostering mindfulness in elderly persons with a history of trauma no focus on specific facets of mindfulness needs to be set.

#### Limitations and future directions

The reliance on data from a rather small convenience sample may limit the generalizability of our findings. However, the sample showed representative sociodemographic characteristics compared to the general population of Austria's elderly. Due to the limited sample size and thus lack of power, statistical analyses including all facets of SOC, mindfulness and posttraumatic cognitions, respectively, were not possible. Although all participants reported to have experienced WWII and the subsequent time of occupation as children or adolescents, more specific war-related and other more general traumatic experiences reported over the lifespan were quite heterogeneous. However, this may also be perceived as a strength of this study as it allows generalizing results to various traumatic events found in the general population of elderly Austrians. The data is cross-sectional and thus no conclusions on dynamic effects of mindfulness on SOC and/or posttraumatic symptoms and cognitions may be drawn and what levels of both may have developed over time.

Future research should investigate in larger samples which specific facets of posttraumatic cognitions and symptoms in elderly are primarily affected by mindfulness and which mindfulness-related mechanisms underlie the improvements in SOC. This would also include the investigation to what extent mindfulness and SOC can be developed over the life span. This would be of primary interest for intervention studies. Future research should also focus clinical samples of elderly PTSD patients, in order to elucidate the influence of mindfulness and SOC in the presence of psychopathology on outcome. Finally, effects of different trauma types and developmental aspects of trauma need to be considered.

#### Conclusion

We present novel data on the mechanisms of how SOC positively influences posttraumatic symptoms among the elderly. We found that mindfulness partially mediated the association of SOC scores with posttraumatic cognitions, but not

with posttraumatic symptoms. Taking into account the ameliorating effect of posttraumatic cognitions on posttraumatic symptoms, mindfulness had also a small but significant effect on posttraumatic symptoms. In this model, SOC and mindfulness explained more than half of the posttraumatic symptoms variance. These findings suggest a promising role of mindfulness in improving SOC and especially posttraumatic cognitions and suggest the utility of mindfulness-based interventions for traumatized elderly persons.

#### Conflict of interest

None

#### Description of authors roles

T. M. Glück and S. Raninger designed the study. T. M. Glück and U. S. Tran drafted and wrote the paper. U. S. Tran and T. M. Glück developed and carried out the statistical analyses. S. Raninger coordinated and conducted the data collection. B. Lueger-Schuster supervised the data collection and assisted with writing the paper.

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## **Curriculum Vitae**

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### **Academic Work Experience**

- Since 2014 Vienna University of Economics and Business, University lecturer
- 2011 – 2012 University of Zurich, Institute of Psychology, Pre-doc
- Since 2008 University of Vienna, since 2008 several positions (assistant, lecturer, admin)

### **Academic Training**

- Since 2011 University of Vienna, PhD student, Psychology
- 2012 University of Zurich, PhD student, LIFE-International Max Planck Research School
- 2004 – 2010 University of Vienna, M.Sc. Psychology

### **Clinical Training**

- Since 2014 ÖGVT, Training as CBT-Psychotherapist
- 2013 – 2014 ÖAGG, Propaedeutic studies in psychotherapy
- 2012 – 2013 University of Vienna, Postgradual diploma as clinical and health psychologist

### **Reviewer**

- Annals of Behavioral Medicine
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### **Relevant Prizes and Grants**

- Annual young scientist prize 2013 of the German society of psychotraumatology (DeGPT)
- Poster prize, 30. clinical psychology symposium , DGP, 2012, Luxembourg.
- Scholarship funded by the Jacobs Foundation, full stipend 3-year fellowship for the International Max Planck Research School for LIFE, University of Zurich, 2012. Rejected to continue education in Vienna.
- Master thesis research grant (1572,- €), University of Vienna, 2009