

# Chronic pain and PTSD: the Perpetual Avoidance Model and its treatment implications

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## Abstract

Posttraumatic Stress Disorder (PTSD) and chronic pain are frequently seen in the aftermath of a traumatic experience. Torture survivors have an increased risk to suffer from these two disorders. Although many studies report high comorbidity, there is still insufficient knowledge on the mechanisms of the development and maintenance of PTSD and chronic pain.

After providing an overview of the current literature concerning the comorbidity of these two disorders, we will present the “Perpetual Avoidance Model” (PAM). This model provides an explanation of the reciprocal maintenance of both disorders and offers treatment implications.

*Keywords:* torture survivors, chronic pain, PTSD, comorbidity, Perpetual Avoidance Model

## Introduction

*Chronic pain as a posttraumatic disorder  
in torture survivors*

The experience of torture is related to a wide array of psychological and somatic

consequences. A frequently diagnosed disorder in the aftermath of these man-made traumatic experiences is Posttraumatic Stress Disorder (PTSD). PTSD is characterized by symptoms of reexperiencing the traumatic event, avoiding reminders of the trauma and hyperarousal. According to a review of PTSD in civilian adult survivors of war trauma and torture from Johnson and Thompson,<sup>1</sup> the prevalence of PTSD in refugee torture victims ranges from 14 to 92%.

Besides PTSD, the experience of pain is one of the most frequent complaint of torture survivors. In a study with Buthanese refugees Van Ommeren et al.<sup>2</sup> found that 84% of the tortured group reported one or more somatic complaints. The most common pain is headache, from 39%<sup>3</sup> to 93%<sup>4</sup> and back/neck pain from 60%<sup>5</sup> to 87%.<sup>3</sup> Frequently, patients suffer from multiple pain sensations<sup>6</sup> lasting over decades. In a follow-up study with torture survivors in Denmark, Olsen et al.<sup>7</sup> even showed an increase of prevalence over 10 years: 58% still reported pain in the head (compared to 48% at baseline) and 76% in the back (compared to 48% at baseline).

For an understanding of the high prevalence of chronic pain in torture survivors, several factors have to be taken into account. Rasmussen et al.<sup>8</sup> examined in their study the chronic pain and associated symptoms

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and the possible torture techniques causing them. One typical consequence from suspension by the arms, for example, is pain in the shoulder, upper arms and neck. Not surprisingly, pain is a direct result of the pain-inflicting torture experiences. Besides pain as a direct sequel of torture, many survivors suffer from another type of chronic pain. Due to their traumatic experiences they live with a persistent state of high arousal, because of flashbacks (also nightmares) and memories of the traumatic event. In addition, the health status of tortured refugees is influenced by multiple stressors such as leaving family members behind, an insecure asylum status and the exile situation. Clinical experience has shown that these persons respond with a heightened psychophysiological response (e.g. heart rate, muscle tension) to trauma-related as well as more general environmental stimuli. This contributes to increased pain mainly in the neck, shoulders or in the back.

As many traumatized suffer from both disorders, we will now give an overview of the comorbidity-rates of PTSD and chronic pain.

#### *Comorbidity of chronic pain and PTSD*

The comorbidity of chronic pain and PTSD was repeatedly shown across different populations. In studies with war veterans up to 80% of those suffering from PTSD also reported symptoms of chronic pain.<sup>9,10</sup> In a study with psychiatric outpatients Villano et al.<sup>11</sup> found that 46% met the criteria for PTSD (according to DSM IV), 40% reported chronic severe pain and 24% had both disorders.

In a large community sample with N = 36,984 Sareen et al.<sup>12</sup> showed a considerable discrepancy with regard to chronic pain between patients with and without a PTSD diagnosis. In patients suffering from PTSD

46% also reported chronic back pain (compared to 21% without PTSD) and 33% reported migraine (compared to 10%).

The prevalence of pain in PTSD samples is, according to Otis, Keane and Kerns,<sup>13</sup> 34-80% substantially higher than the PTSD prevalence in pain patients ranging between 10% and 50%. This difference may be explained by the fact that many traumatic events are associated with physical injury. Norman et al.<sup>14</sup> examined 115 patients at the Trauma Center of the University of California San Diego. It emerged that peri-traumatic pain is a risk factor for PTSD. According to the authors, the relationship can be explained by a mediation effect: peri-traumatic pain may lead to more negative evaluations of the trauma memory and more distress associated with the traumatic event.

Dirkzwager et al.<sup>15</sup> investigated the way in which PTSD may influence the development and the chronification of pain symptoms. With a longitudinal study on survivors of a firework disaster in the Netherlands, the authors conclude that PTSD may be a potential risk-factor in the development of physical health problems: 18 months in the aftermath of the disaster PTSD survivors reported more pain symptoms and more restrictions in their daily life because of physical problems compared to those who show no PTSD symptoms.

For a better understanding of the relationship and the reciprocal maintenance of PTSD and chronic pain it is necessary to take a closer look at the risk factors for the development of the two disorders.

#### *Risk factors for PTSD and chronic pain*

Brewin et al.<sup>16</sup> identified in a meta-analysis with 85 studies the following variables as predictors for PTSD: the intensity of the traumatic event and posttraumatic factors like missing social support and additional

life stress. In addition being female, prior trauma and history of psychopathology emerged as risk factors. Empirical evidence shows that the substantial discrepancy between the lifetime-prevalence of a traumatic experience (over 50%) and the lifetime-prevalence of PTSD (about 7%) can be largely explained by the nature of the traumatic event: individuals who experience a man-made traumatic event (e.g. rape) are more likely to develop PTSD than victims of natural disasters (e.g. earthquake or hurricane).<sup>17</sup>

Furthermore, individuals who experience a trauma that included bodily injury like torture survivors show an eight times higher risk for development of PTSD than individuals who experienced traumatic events without physical injury.<sup>18</sup> Similar results were found in a study with Iraq war veterans.<sup>19</sup> Of those veterans who were wounded or injured 32% met PTSD criteria, compared to only 14% of those who were not injured. Besides the aforementioned trauma related aspects, cognitive factors have become a key focus in the development of PTSD: the perceived uncontrollability, negative appraisals of the trauma and its consequences and inadaptable control strategies such as avoidance are of crucial importance.<sup>20,21</sup>

As in PTSD, cognitive processes prove to play an important role in the development and maintenance of chronic pain. Empirical evidence suggests that pain related fear is a significant predictor for chronification in pain symptoms. Picavet, Vlaeyen and Schouten<sup>22</sup> investigated the influence of catastrophizing and kinesiophobia (fear of movement/fear avoidance beliefs) on chronic back pain. It emerged that high levels of catastrophizing and fear-avoidance beliefs predicted lower back pain with significant disability at a six months follow up. Woby et al.<sup>23</sup> examined the influence of cognitive fac-

tors on perceived pain intensity in chronic pain patients. It turned out that self-efficacy and catastrophizing explained 30% of the variance in pain intensity. In addition, research revealed that it was not the severity of injury which was associated with back pain but rather psychological and social factors such as stress that predicted chronic pain. These aspects increase the likelihood for the development of pain up to 13 times.<sup>24, 25</sup> As refugees have a higher risk for psychosocial problems, these results may be especially relevant to this group.

The fact that all studies mentioned above are cross-sectional implicates that the direction of causality stays ambiguous. Although the chronification of pain is a very complex and multifactorial problem with interrelationships of somatic, psychological and social factors, cognitive factors and the avoidance aspect emerged as crucial aspects in the development of chronic pain and PTSD.

To specify the mechanisms of PTSD and chronic pain development after a traumatic event, below we will discuss the most important models concerning PTSD and pain development. Furthermore empirical data examining the development of pain after traumatic events will be presented.

#### *Development and maintenance of PTSD and chronic pain*

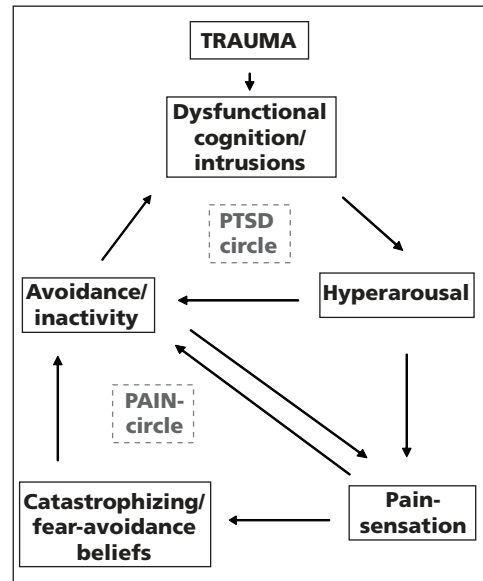
One of the most cited PTSD models is the well-established and validated model of Ehlers and Clark<sup>21</sup> which attributes cognitive processes a crucial role. According to this model, negative appraisals of the trauma and its consequences and certain characteristics of the trauma memory (such as poor elaboration and integration, strong priming and associative learning) predict the development of PTSD in the aftermath of a traumatic event. For the maintenance of PTSD, the authors suggest cognitive and behavioural

aspects such as avoidance of trauma reminders or safety behaviours that individuals use to control the threat and symptoms.

For chronic pain, the fear avoidance model<sup>26</sup> is one of the most important models. It offers a mechanism of how the development from acute pain to chronic pain can be explained and how the avoidance aspect plays a crucial role. The model stresses the role of catastrophic interpretations following a pain experience and subsequent fear and hypervigilance. The fear that physical activity will cause harm and therefore worsen the pain problem leads to avoidance of activity. Research supports that fear avoidance beliefs are strongly related to chronic pain and disability.<sup>27</sup>

Concerning the development of pain in the aftermath of a traumatic event, it is important to note that the crucial factor, and a better predictor for the development of pain, is not the trauma alone but PTSD.<sup>24,28</sup> Tagay et al.<sup>29</sup> found in a study (N=483), that patients suffering from PTSD showed significantly more somatoform symptoms than traumatized patients without a PTSD diagnosis. Hoge et al.<sup>19</sup> examined the association of PTSD with somatic symptoms among Iraq war veterans and found that all health measures (e.g. poor self related health, two or more sick call visits, somatic symptoms) were strongly associated with PTSD, even after controlling injury sustained in combat. One third of the soldiers who screened positive for PTSD had high somatic symptom severity. Campbell and colleagues<sup>30</sup> revealed in their study with female veterans (N=268) that PTSD fully mediated the relationship between violence and physical health symptomatology.

On the basis of the well-established models and the aforementioned findings, we developed the Perpetual Avoidance Model (PAM)<sup>31</sup> which provides an explanation for



**Figure 1.** *The Perpetual Avoidance Model (Liedl & Knaevelsrud).*

the development and mutual maintenance of PTSD and chronic pain. The single components and their interaction will be presented in the following section.

#### *The Perpetual Avoidance Model*

As can be seen in Figure 1, the PAM consists of two circles: the PTSD and the PAIN circle.

According to the PTSD model of Ehlers and Clark<sup>21</sup> cognitive, affective and behavioural aspects are taken into consideration in the PTSD circle. Dysfunctional cognitive processing during and in the aftermath of the traumatic event leads to an increase of psychological and physical arousal. Flashbacks or intrusive memories with a “here and now” quality increase the (bodily) arousal in form of increased heart rate, blood pressure, muscle tension and gastrointestinal activity. These physiological

symptoms result in avoidance. Moreover, hyperarousal may directly increase pain sensation and reinforce negative beliefs and fears that activities will be painful. The consequence of these misinterpretations (fear avoidance beliefs) is the avoidance of movements or activities. The inactivity responds on the perceived pain sensation and vice versa. The PAIN circle results in increased avoidance and eventually leads to inactivity and depression.

To empirically validate the PAM, we will subsequently present a number of studies which examine the interactions of the different components of the PAM.

The link between PTSD and psychophysiological variables such as hyperarousal indicated by muscle tension, heart rate, skin conductance or blood pressure is well proven (for a review see Pole<sup>32</sup>). According to Blechert et al.<sup>33</sup> PTSD related hyperarousal is significantly related to high sympathetic activity (e.g. increased heart rate) with parallel low parasympathetic cardiac control. The important role of the sympathetic nervous system in pain patients is also well known. A study with chronic back pain patients (N=39) conducted by Gockel et al.<sup>34</sup> revealed a significant association between heart rate variability and perceived physical impairment. As McFarlane<sup>35</sup> pointed out in his article about stress related musculoskeletal pain, protective muscular activity can emerge after a traumatic event and escalate into a cycle of neck pain and headaches. Wall & Melzack<sup>36</sup> argued that the association between emotional stress and increased pain severity can be explained by increasing activity in the central nervous system, autonomic nervous system and musculoskeletal system.

The key aspect of avoidance in the development and maintenance of PTSD is discussed in the review by Nemeroff et al.<sup>37</sup> on the basis of a study conducted by North et

al.: North and colleagues examined psychiatric disorders among survivors of the Oklahoma City bombing (N=182). They showed that despite the fact that only 36% met the criteria for avoidance symptoms (over the first six months after the disaster), 94% of those had a diagnosis of PTSD.

Taking into consideration the dysfunctional cognitions, there is much evidence for their influence on pain-sensation (for review see Tunks, Weir & Cook<sup>38</sup>). In a study with chronic pain patients (N=156) Turner et al.<sup>39</sup> found that cognitive variables such as changes in pain beliefs, catastrophizing, pain self-efficacy and perceived controllability turned out as mediators for the improvement in pain and activity one year after a cognitive behavioural therapy. Furthermore a substantial body of empirical evidence emphasizes the crucial role of fear avoidance beliefs in chronic pain patients (e.g. Leeuw et al., 2007). Grotle, Vollestad & Brox<sup>40</sup> showed in a prospective cohort study (N=173) of acute and low back pain that patients with chronic low back pain had more fear avoidance beliefs than patients with acute low back pain.

The Perpetual Avoidance Model offers different treatment implications. Based on these components of the PAM that are assumed to be responsible for the maintenance of both disorders the authors propose specific interventions that might be useful to integrate into the treatment of PTSD and chronic pain.

#### *Treatment implications*

An important and one of the first components in treating traumatized patients with chronic pain should be a theoretical model educating them about the relationship between chronic pain and PTSD. The understanding of the function of cognitive and behavioural avoidance and the interaction of

hyperarousal, catastrophizing, avoidance and pain perception is of crucial importance.

Cognitive and behavioural avoidance/ inactivity as part of the PTSD circle and as part of the PAIN circle play a significant role in the PAM. Therefore an important aim in treating PTSD and chronic pain should be to break the vicious circle of mutual maintenance by reducing the avoidance. Well-tested and standard treatment methods for PTSD are exposure strategies. In confronting patients with their traumatic and feared experiences patients learn to reinterpret the situation and see it as part of their past. The “here and now” quality of the reminders will be changed and integrated in the autobiographical memory.

Exposure strategies are also helpful in treating chronic pain: pain patients are invited to engage in physical activities that were previously avoided because of fear of causing more pain. The exercises should be designed to help patients focus and cope with uncomfortable physiological sensations and reduce fear avoidance beliefs (e.g. “Physical activity might harm my back”). These experiences help patients to restructure misinterpretations and catastrophizing and get out of the inactivity. Maquet and colleagues<sup>41</sup> highlighted in their review the vicious cycle of pain and avoidance/ inactivity behaviours. Based on several studies they affirmed the benefits of physical exercises for pain patients on parameters like pain-threshold, well-being, self-confidence and feelings of helplessness. Consequently physical activity can help to break the vicious circle of chronic pain and inactivity.

For reducing the general high somatic arousal, relaxation techniques such as Progressive Muscle Relaxation or diaphragmatic breathing are helpful treatment approaches. In combination with biofeedback, a well established treatment method with pain

patients, patients learn to influence internal physiological responses. Thereby they gain control over their body and increase the sense of self-efficacy. One of the most common types of biofeedback is Electromyography (EMG): the muscle tension in the pain area is measured and recorded back (visual or auditory) to the patients. In a first step they become aware of internal biological activity such as muscle tension and body reactions in different situations (stressful/ trauma situations versus relaxed situations). In a second step, patients learn to reduce their high tension and thus to control their pain experience. Moreover the positive effects should be supported by physical activation: fitness exercises can help patients to improve body awareness and general well being.

With these treatment methods all crucial elements of the PAM PAIN circle will be addressed: hyperarousal and pain sensation (relaxation techniques), catastrophizing and avoidance (biofeedback, physical activation). Because of the overlapping elements in the PTSD and PAIN circle (hyperarousal and avoidance) the aforementioned treatment methods are also helpful for the improvement of the PTSD symptomatic.

An effective therapy for traumatized patients suffering from PTSD and chronic pain should therefore combine psychoeducation of the development and maintenance of PTSD and chronic pain and biofeedback with exposure-strategies, relaxation techniques and physical activation.

The advantage of a physiologically oriented intervention such as biofeedback can be very helpful in treating refugees from non-Western cultures. These patients tend to have a rather somatic understanding of illness. It is essential to take this into account by applying a physiologically oriented intervention. The presented treatment methods



– a combination of biofeedback, exposure strategies and relaxation techniques – is therefore a very promising therapy for tortured refugees, suffering from PTSD and chronic pain. The Treatment Center for Torture Victims in Berlin – in cooperation with the University of Zurich, the University of Dresden and the University of Southampton – is examining a biofeedback-based cognitive behavioral therapy for traumatised refugees with chronic pain that combines the mentioned components.<sup>42</sup> Preliminary data of a pilot study show promising results.<sup>43</sup>

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# Asylum seekers in Denmark

*A study of health status and grade of traumatization of newly arrived asylum seekers*

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This article is translated from the report “Asylansøgere i Danmark – en undersøgelse af nyankomne asylansøgers helbredstilstand og traumatiseringsgrad” published by Amnesty International Danish Medical Group, Amnesty International, [www.amnesty.dk](http://www.amnesty.dk).

## Abstract

**Background:** An unknown number of asylum seekers arriving in Denmark have been exposed to torture or have experienced other traumatising events in their country of origin. The health of traumatised asylum seekers, both physically and mentally, is affected upon arrival to Denmark, and time in asylum centres leads to further deterioration in health.

**Methods:** One hundred forty-two (N=142) newly arrived asylum seekers were examined at Center Sandholm by Amnesty International Danish Medical Group from the 1st of September until the 31st of December 2007.

**Findings:** The asylum seekers came from 33 different countries, primarily representing Afghanistan, Iraq, Iran, Syria, and Chechnya. Of the asylum seekers, 45% had been exposed to torture – approximately one-third within the year of ar-

rival to Denmark. Unsystematic blows, personal threats or threats to family, degrading treatment, isolation, and witnessing torture of others were the main torture methods reported. The majority of the asylum seekers had witnessed armed conflict, persecution, and imprisonment. The study showed that physical symptoms were approximately twice as frequent and psychological symptoms were approximately two to three times as frequent among torture survivors as among non-tortured asylum seekers. However, even the health of non-tortured asylum seekers was affected. Among the torture survivors, 63% fulfilled the criteria for post-traumatic stress disorder, and 30-40% of the torture survivors were depressed, in anguish, anxious, and tearful in comparison to 5-10% of the non-tortured asylum seekers. Further, 42% of torture survivors had torture-related scars.

**Interpretation:** Torture survivors amid newly arrived asylum seekers are an extremely vulnerable group, hence examination and inquiry about the torture history is extremely important in order to identify this population to initiate the necessary medical treatment and social assistance. Amnesty International Danish Medical group is currently planning a follow-up study of the present population which will focus on changes in health status during their time in Denmark.

**Keywords:** torture; health status; post-traumatic stress disorder; physical examinations; interview; Denmark; survivors

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## Introduction

In recent years, the number of asylum seekers arriving in Denmark has decreased. Currently, around 2,000 asylum seekers come to Denmark each year.<sup>1</sup> An unknown number of these asylum seekers has been tortured or experienced other traumatising events in their country of origin. Several studies show that the health of traumatised asylum seekers, both physically and mentally, is affected upon arrival in Denmark, and that the waiting time in asylum centres leads to further deterioration of their health.<sup>2-8</sup>

As a result of this knowledge, Amnesty International Danish Medical Group conducted a study, where all newly arrived asylum seekers, who arrived at Center Sandholm, were offered a health examination within the first few days after arrival. The study had two objectives, one was to identify the number of asylum seekers having been exposed to torture, severe war trauma, or other traumatising events prior to their arrival. The second objective was to assess the asylum seekers general health status upon arrival and the health related consequences of exposure to torture. Amnesty International Danish Medical Group consists of doctors, who document torture, both nationally and internationally. The Medical Group has more than 30 years of experience and its members have received specific training enabling them to examine potential torture survivors. The project was conducted in collaboration with the Danish Red Cross. All medical examinations were performed at Center Sandholm.

## Materials and methods

From the 1st of September until the 31st of December 2007, Amnesty International Danish Medical Group offered a health examination to all newly arrived asylum seekers at Center Sandholm. Center Sandholm

is responsible for the registration of all newly arrived asylum seekers in Denmark, except for unaccompanied children under the age of 18 years. Two project coordinators were employed by Amnesty International and worked at Center Sandholm. The project coordinators were responsible for making contact with the newly arrived asylum seekers and for providing general information about the project including information about voluntary participation, anonymity of identity, and confidentiality of data collected by Amnesty International Danish Medical Group. Written information about the project had been prepared in seven different languages (available on request), with the intention that most asylum seekers should be able to read the information in their mother tongue. During the medical examination the asylum seeker received additional information about the project and if they wished to participate they gave their written informed consent.

If written material or consent form was not available in the mother tongue of the asylum seekers, a translator was used and an English or Danish consent form was used. The routinely used Red Cross' telephone translators in the Center Sandholm were used during the vast majority of the medical examinations. Translators were not used if the asylum seeker and the examiner were able to communicate in the same language. The study intended to include all newly arrived asylum seekers regardless of age, however all children under the age of 18 were required to have a parent or a guardian present during information and examination. Unaccompanied children were not examined.

The medical examination lasted on average one hour and took place in Center Sandholm's medical examination rooms. The medical examination consisted of a structured interview (questionnaire available

on request), which sought to disclose the following information:

- Background (age, country of origin etc.)
- Imprisonment, torture and other traumatizing events
- Health status prior to traumatizing event
- Current physical and psychological symptoms
- Self rated psychological health status
- Current use of medicine and abuse
- Objective physical and psychological health status

The definition of torture and the medical examination were based on the principles described in the United Nation's "Istanbul Protocol: Manual on the Effective Investigation and Documentation of Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment".<sup>9</sup> The World Health Organization's (WHO) International Classification of Disease Codes (ICD-10)<sup>10</sup> was used for diagnosing Posttraumatic Stress Disorder (PTSD).

The WHO's General Health Questionnaire was used for the self-judged psychological health status.<sup>11,12</sup> Scores vary by study population. Scores about 11-12 are typical. A score >15 is evidence of distress. A score >20 suggests severe problems and psychological distress.

In both the physical and psychological examination of the asylum seekers, emphasis was placed on finding a connection to torture sequel.

No advanced investigations, such as for example gynaecological examinations or radiological examinations, were carried out.

#### *Ethics*

The project was reported to the local ethical committee in June 2007. The committee had no objection to the execution of the project.

The project was also reported to the Danish Data Protection Agency. The considerations of Amnesty International Danish Medical Group in relation to the present project are based on the following ethical codes and protocols: The International Code of Medical Ethics,<sup>13</sup> the Helsinki Declaration,<sup>14</sup> and the ethical protocol described in the United Nation's "Istanbul Protocol".<sup>9</sup>

The medical interview conducted by the doctors within Amnesty International Danish Medical Group had no curative purpose, however, if during an examination the doctor found that an asylum seeker needed medical treatment, the doctor contacted the health personnel at the Red Cross after having received verbal consent from the asylum seeker in order to let the Red Cross initiate the appropriate diagnostic and treatment.

All asylum seekers exposed to torture can free of charge have a more detailed medical examination done by the Amnesty International Danish Medical Group. The medical report can be used as documentation in their asylum case.

The Amnesty International Danish Medical Group is financially independent and all asylum seekers and doctors have participated voluntarily in this study.

The asylum seekers were informed that Amnesty International and Danish Red Cross are politically independent organizations and that participation in the project would have no consequences for the asylum seekers' asylum case in Denmark.

#### **Results**

According to The Ministry of Refugee, Immigration and Integration Affairs in Denmark, 720 asylum seekers arrived in Denmark during the project period.<sup>1</sup> Amnesty International's project coordinators were in contact with 164 asylum seekers at Center Sandholm during the project period. Four