

Hunger: Deprivation and manipulation of food as a torture method. State of the art in research and ways forward

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Deprivation of food is one of, if not the oldest method of punishment. Hunger and famine are described in the Bible as a way of retribution when God was offended. There are accounts of the use of forced imposition of hunger or starvation in places of detention and concentration camps worldwide. Surprisingly, however, the quantity and quality of academic research on the subject is unusually low. (Rubin, 2019). It is neither mentioned as a torture method in source handbooks (i.e. Rejali, 2009) nor in the Istanbul Protocol, which mentions it marginally concerning conditions of detention without any other mention or guidance within its pages (UNHCR, 1999). In this Editorial, we would like to update the medical and psychological research on the impacts of starvation as a torture method and suggest some tentative conclusions and avenues for further research.

1. Definitions and conceptual map

1. **Hunger.** Refers to the *subjective sensation of wanting or needing food*. Hunger is an evolutionary adaptive signal essential for survival that directs attention towards food acquisition in a similar way that pain is a signal of bodily harm and a signal of threat (Al-Shawaf, 2016).
2. **Food Deprivation.** Provided that *hunger* is a subjective sensation, in human rights research sometimes is better to work with

objective measures. *Food deprivation* is defined as a food intake below the dietary required minimum energy level. There are different ways to measure it, reviewed below. Food deprivation is often combined with *Food manipulation*, a term referred to the quality, aspect, taste or contamination of the food provided to an individual (DIGNITY, 2016).

3. **Starvation.** Refers to a deficiency in caloric intake severe enough to be below the level needed to maintain an organism's life. While the purpose of a reduction in food supply can be to temporarily debilitate the individual physically and psychologically, in starvation, the purpose is to produce unbearable pain and eventually, as a consequence, slow death.
4. **Malnutrition** is the specific effect of having a deficiency of one or more essential nutritional components (ie. thiamine deficit, iron deficiency producing anemia) without necessarily receiving an insufficient daily energy intake.

Objective measures of food deprivation.

Defining and measuring an individual's food needs is a challenge given variations in relation to gender, age, health status and level of physical activity. Based on reports by the World Health Organization (WHO) and the Food and Agriculture Organization of the

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United Nations¹, for a moderately active 70 kg individual ($1.75 \times \text{BMR}$) between the ages of 30 and 60, the daily energy requirement (or approximate Total Energy Expenditure (TEE)) is 3000 kcal/day (44 kcal/kg/day) for men and 2500 kcal/day (36 kcal/kg/day) for women. The recommended WHO baseline protein delivery to avoid starvation in humans is ~ 0.75 g/kg/day. (FAO & WHO, 2005).

Based on the Minnesota study (see below), Wischmeyer, (2017) has suggested that food-deprivation produces starvation when intake is below 30 kcal/kg/day and 0.9 g protein/kg/day. For an average 70 Kg person this is 2100 calories² and 36 gr. of proteins.

In monitoring visits to detention centers or in the context of analyzing the use of mass starvation as a war weapon, an alternative measure is to estimate the percentage of individuals with protein-energy malnutrition and, ideally, to perform a follow up after some months. For instance, a study of nutritional status in a women's prison in Anatinomora (Madagascar) found that the proportion of undernourished female prisoners was 38.4%, including those who were pregnant and lactating. Undernutrition was related to the intake of two meals a day instead of three ($p = 0.003$), insufficient energy intake ($p < 0.001$), incarceration duration of more than 10 months ($p < 0.001$), absence of family visits ($p = 0.013$) and lack of financial assistance from family ($p = 0.013$) (Ravaoarisoa et al., 2019).

An alternative and useful measure when the nutritional status cannot be assessed is **Food Insecurity**, usually defined as those households where living conditions cannot

ensure daily food provision for all family members. The idea of food insecurity has also been applied to monitoring detention centers. For instance, in a country-wide study in Malawian prisons, 95% of inmates considered themselves food insecure (i.e. uncertain that they could get enough food the following day). 61% of the prisoners reported feelings of anxiety over availability of food. Approximately 22% of the prisoners stated they slept hungry at night, 12% reported staying a whole day and night without eating and 62% of the prisoners used, they themselves believed, shameful means of obtaining food, such as begging or stealing from other inmates (Moloko et al., 2017). There are excellent reviews and proposals of food insecurity measurements, from short scales to complex multidimensional measures (Coates et al., 2003; A. D. Jones et al., 2013; Leroy et al., 2015; Pérez-Escamilla & Segall-Corrêa, 2008).

Legal definition and jurisprudence

At an individual level, Rule 22 of The *Nelson Mandela Rules* establishes the duty to provide 'food of nutritional value adequate for health and strength, of wholesome quality'. The Principles and Best Practices on the Protection of Persons Deprived of Liberty in the Americas of the Inter-American Commission on Human Rights states (Principle XI) that: "Persons deprived of liberty shall have the right to food in such a quantity, quality, and hygienic condition so as to ensure adequate and sufficient nutrition, with due consideration to their cultural and religious concerns, as well as to any special needs or diet determined by medical criteria. Such food shall be provided at regular intervals, and its suspension or restriction as a disciplinary measure shall be prohibited by law" (ICHR, 2008). Neither definition contains clarity on what would be considered "adequate and sufficient nutrition".

1 <http://www.fao.org/docrep/007/y5686e/y5686e00.htm#Contents>

2 The Minnesota study only included men, but lacking specific data, the value can be assumed for men and women.

It is beyond the scope of this medical review to analyze the legal precedents of food-deprivation as amounting to torture. Taking as a reference a recent comprehensive preparatory document for the Special Rapporteur Against Torture (IHRLC, 2018) it can be suggested that there is some, although limited legal precedence, notably in the jurisprudence of the Inter-American Court of Human Rights, for considering deprivation³, and manipulation

of food⁴ as ill-treatment or torture, especially when combined with other methods (see footnote for details).

3 The review considers the following cases: *Sendic v. Uruguay*, ¶¶ 2.3, 2.4, 20, U.N. Doc. CCPR/C/14/D/63/1979 (Oct. 20, 1981) (holding that subjecting the victim to a “lack of food” while in detention was, in addition to other factors, a form of torture and ill-treatment); *Polay Campos v. Peru*, ¶¶ 2.1, 8.7, U.N. Doc. CCPR/C/61/D/577/1994 (Nov. 6, 1997) (noting while the victim was detained, “the food [was] deficient” and that this contributed to a finding of torture and ill-treatment); *Danilo Dimitrijevic v. Serbia and Montenegro*, ¶¶ 2.2, 7.1, U.N. Doc. CAT/C/35/D/172/2000 (Nov. 16, 2005) (finding that the victim was “denied food and water” and that this omission was found, along with other factors, to constitute torture); *Miguel Castro Castro Prison*, No. 160, ¶¶ 37, 44, 103 (Nov. 25, 2006) (finding that inmates “did not receive food [or] . . . water” during an attack on the prison where they were detained, and that this contributed to a finding of torture); *Institute for Human Rights and Development in Africa v. Angola*, Communication 292/04, Afr. Comm’n H.P.R., ¶¶ 51, 53 (May 22, 2008) (holding that as “food was not regularly provided” to victims in detention, and was “insufficient,” this contributed to a finding of torture); *Prosecutor v. Popovic*, Case No. IT-05-88-T, Judgment, ¶ 844 (Int’l Crim. Trib. for the Former Yugoslavia June 10, 2010) (finding that victims “were detained in intolerable conditions of overcrowded facilities with no food” and that this contributed to a finding of ill-treatment); *Abdel Hadi, Ali Radi & Others v. Republic of Sudan*, Communication 368/09, Afr. Comm’n H.P.R., ¶ 74 (Nov. 5, 2013) (holding that the general conditions of detention, which included the deprivation of food, constituted ill-treatment); *Franck Kitenge Baruani v. Democratic Republic of Congo*, ¶ 2.4,

U.N. Doc CCPR/C/110/D/1890/2009 (Apr. 23, 2014) (holding that the deprivation of “food and water” contributed to a finding of torture and ill-treatment); *Abdulrahman Kabura v. Burundi*, ¶ 7.8, U.N. Doc. CAT/C/59/D/549/2013 (Nov. 11, 2016) (noting that the victim was denied “water . . . [and] food,” which contributed to a finding of ill-treatment). (IHRLC, 2018)

4 According to the same review, providing food which was in poor condition or contained inedible elements, like faeces, urine or dead animals, as amounting to ill-treatment or torture, in the following cases: *Cariboni v. Uruguay*, ¶ 4, U.N. Doc. CCPR/C/31/D/161/1983 (Oct. 27, 1987), *Juvenile Reeducation Institute v. Paraguay*, Preliminary Objections, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 112, ¶ 16 (Sept. 2, 2004) *Miguel Castro Castro Prison v. Peru*, Merits, Reparations, and Costs, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 160, ¶ 37 (Nov. 25, 2006), *Déogratias Niyonzima v. Burundi*, ¶ 2.7, U.N. Doc. CAT/C/53/D/514/2012 (Nov. 21, 2014), *Muteba v. Zaire*, ¶¶ 2.1, 8.2, 10.2, U.N. Doc. CCPR/C/22/D/124/1982 (July 24, 1984), (noting that outside food also needed to be brought by the victim’s family in response to the provision of “insufficient” food, and the “withholding” of food while in detention, which contributed to a finding of torture and ill-treatment) (IHRLC, 2018). Also in some instances, the treatment amounted to torture by the manner that the food was provided (*Cariboni v. Uruguay*, ¶ 4, U.N. Doc. CCPR/C/31/D/161/1983 (Oct. 27, 1987) (having to eat with the fingers), *Giri v. Nepal*, ¶ 2.4, U.N. Doc. CCPR/C/101/D/1761/2008 (Apr. 27, 2011) (eating blindfolded), *Istratii and Others v. Moldova*, Eur. Ct. H.R., App. No. 8721/05, 8705/05, 8742/05, ¶ 62 (2007) (noting that “all detainees had to eat standing up” because there were no chairs in their cells, although the decisional body did not clarify whether this factored into their finding of torture and ill-treatment), *Prosecutor v. Kvocka*, Case No. IT-98-30/1-T, Judgment, ¶ 64 (Int’l Crim. Trib. for the Former Yugoslavia Nov. 2, 2001). (Only having 3 minutes to eat and being beaten afterwards).

At a collective level, Conley & de Waal (2019) advocate the term **mass starvation** and **starvation crimes** when famine is intentionally produced through actions that impede the capacity of a targeted country or community to access the minimum food requirements to sustain life. They suggest nine purposes: (i) extermination or genocide; (ii) control through weakening a population; (iii) gaining territorial control; (iv) flushing out a population; (v) punishment; (vi) material extraction or theft; (vii) extreme exploitation; (viii) war provisioning; and (ix) comprehensive societal transformation.

For the interested reader, especially thought-provoking are the historical works on the use of starvation in World War -II (Gerhard, 2015) and post-World War II (Autumn, 2009), Kampuchea / Cambodia (DeFalco, 2014; Tyner & Rice, 2015), Ireland (Nally, 2006), Armenia (Peterson, 2004) and Darfur (De Waal, 2005), as well as the ongoing systematic use of hunger and starvation as torture and method of war in Yemen (Graham, 2020), Syria (Amnesty International, 2016; GRCI, 2019), Libya (United Nations High Commissioner, 2018), Turkmenistan and other former Soviet republics (Sharipzhan, 2015) among many other contemporary contexts.

De Waal and Conley have extensively reviewed accountability issues regarding mass starvation in a seminal paper (Global Rights Compliance, 2019) that follows the elements of the definition of torture as applied to a collective situation. They specifically review how to probe intentionality, purpose and lawfulness. Especially useful is the 41-page annex that includes analysis of starvation in commissions, inquiries and fact-finding missions, courts and tribunals around the world. There has been enormous progress in the definition of the crime of starvation especially after its inclusion in the Rome Statute of the Interna-

tional Criminal Court, although accountability and prosecutions of perpetrators remain a complex issue (Akanke & Gillard, 2019; D'Alessandra & Gillett, 2019; Hutter, 2019; Marcus, 2003; Sheldon, 2012; Ventura, 2019; Wayne Jordash et al., 2019).

Two situations that deserve separate analysis.

Taking into account all the above, this medical and psychiatric review will be divided according to two different phenomena: Food Deprivation and Manipulation and Starvation and Famine (see table 1). Although both situations can ultimately represent a danger to life, the medical and psychological processes and consequences are entirely different.

Table 1. Conceptual domains

1. Food deprivation and manipulation.

Short-term or partial restrictions in food quantity, including food insecurity, or food of low quality or which is provided in a denigrating manner.

2. Starvation and famine. Prolonged and sustained restriction in the access to food that causes undernutrition and, ultimately, compromises life.

We aim to answer the following questions: (a) Is it possible to operationally define food deprivation within the study of the methods of ill-treatment or torture? (b) What is the medical and psychological evidence that exists on the severity of the suffering and the sequels of Food deprivation and manipulation and Starvation and famine? (c) Are there medical or psychological criteria that may be relevant to the legal world regarding the consideration of these facts as amounting to torture?

Setting the baseline: psychophysiology of hunger emotions and the feeding circuit

There is a homeostatic circuit that controls feeding through sets of neurons in the hypothalamus that segregate two specific hunger hormones: *ghrelin*, which signals energy scarcity and drives towards food intake and *leptin*, which signals energy availability and inhibits food-seeking behaviour. Both add to the effects of *insulin* in regulating sensations of hunger in humans. The level of these substances depends on internal chemoreceptors (i.e. glucose level) and environmental stimulus. Furthermore, external cues may be more important than internal signals in arousing feelings of hunger (Chen & Knight, 2016).

There is evidence of individual differences in the perception of gastric signals of fullness or emptiness. The reason is unknown, although there seems to be coincidence with human variability in perceiving cardiac signals, pointing to a general element of differences in the individual perception of vagal signals (Chen & Knight, 2016).

How we become aware of and feel hunger is still largely unknown. Complex sensory information from the bodily organs (e.g., bowel, bladder, stomach, heart), the skin senses (e.g., cool, warm, touch, itch), internal chemoreceptors (e.g. oxygen concentration, hunger hormones), and muscles and tendons (e.g., proprioceptive feedback, fatigue) is transmitted via spinothalamic and vagal afferents to the anterior insular, somatosensory and orbitofrontal cortices of the brain where it is integrated (Stevenson et al., 2015). This process is mediated by awareness and consciousness that attach meaning to the afferent sensations, including emotions and feelings linked to that meaning (Quadt et al., 2018). These same cortical centres support the integration of all these inputs into drive states (e.g., pain, sex, hunger, thirst) and to associated behaviours (Harshaw,

2014). So, there are strong neural interconnections between physical needs, meanings, emotions and drives. In this sense, the idea of “gut decisions” or “gut feelings” might have more meaning than it may seem.

2. Short-term deprivation of food: physical and psychological effects

Almost all existing academic research is based on experimental studies with students, completed in reward for academic credit or small financial incentives where the motivational and attitudinal elements are far from what is to be found in natural settings where torture occurs. The results must, therefore, be analysed with caution. Here, we will specifically review the impact of food deprivation on emotions, cognitive functions, moral judgment and altruistic and prosocial behavior.

Hunger and emotions. There is an assumption that hunger evokes negative emotions (rage, anger, irritability, sadness). Nevertheless, short-term laboratory studies do not seem to confirm this idea. There is only indirect and inconsistent experimental evidence suggesting that low glucose levels increase impulsivity, aggression and leads to unstable mood (Anderberg et al., 2016; Benton, 2002; Bushman et al., 2014; DeWall et al., 2011; Gailliot, 2013; Hermanns et al., 2007).

The idea behind this assumption is the well-known - even in folk culture - *ego-depletion* theory (Baumeister & Vohs, 2007) that accepts that a human being has a limited amount of physical and mental energy. Self-regulation and self-control, therefore, depend on having sufficient “ego energy”. Glucose deficit due to food-deprivation would provoke *ego depletion* and allow negative emotions to appear and render the person more vulnerable to emotional cues. This has been linked to false confessions in the interrogation of suspects (Davis

& Leo, 2012). Recent research suggests that the theory may be too “mechanical” and not give sufficient consideration to other factors, and specially that high motivation can overcome the effect of glucose depletion (Baumeister & Vohs, 2007) suggesting that short-term hunger should be better studied as a context-dependent emotion.

In a similar vein, in a series of experiments with volunteers, MacCormack & Lindquist (2019) showed that subjects who felt hunger reacted with negative emotions to a neutral stimulus only when they were put in a context that they interpreted as unfavorable. Only then, the person reacted with irritability or anger. Furthermore, this effect disappeared when the volunteers were asked to express the emotions they were feeling, including hunger. In most subjects, this led to self-control. This is what probably reflects the popularly-coined expression “hangry”, indicating feelings of bad temper or irritability as a result of hunger. When the person is made aware, he can easily regain control and manage the emotion.

A particularly relevant negative emotion is disgust towards inedible or unpalatable food. Laboratory research with volunteers has shown that disgust was significantly reduced in subjects who had been food-deprived for 15 hours and that this attenuation occurred automatically. In other words, subjects found food palatable that they previously saw as disgusting even if they were unaware of their previous reaction (Hoefling et al., 2009).

Cognitive functions. Laboratory studies show that five hours of fasting significantly increases distraction (mind-wandering behaviour) and thinking in actions in the immediate future related to food-relevant stimuli, interfering with normal cognitive function (Gidlöf et al., 2020; Rummel & Nied, 2017). This effect seems to increase in obese subjects

(Vicario et al., 2019). In a similar vein, nine hours of food restriction enhances memory for food items but not for non-food items (Montagrin et al., 2019).

When turning to non-food-related cognitive functions, the experimental evidence is inconclusive. In a review of ten studies, Benau et al., (2014) found that in seven of these, short-term fasting did not affect performance in any cognitive task, while in the remaining three, there was a low to moderate impairment in psychomotor speed and reaction times in executive functions including problem-solving and decision-making. Short- and long-term memory seemed unaffected in all experiments (Benau et al., 2014). In summary, research *with volunteers in lab conditions* shows that food deprivation increases attention and memory related to food cues, but not to other elements and it does not support the idea that short-term food-deprivation produces a decline in cognitive functions per se.

Taking decisions. Initial experimental data suggests that during short-term food-deprivation people tend to be less rational and are guided by intuitive decisions, perhaps due to the overall feeling of tiredness or to the need to save cognitive resources (Brown et al., 2020). Also, some very preliminary evidence suggests that hungry individuals tend to take greater risk and do not assess dangers properly (Vicario et al., 2019). No data on naturalistic settings is available.

Moral judgment and punishment. In two laboratory studies with students deprived of a mealtime, subjective hunger was associated with a more lenient view of moral violations in different ethical dilemmas (Vicario et al., 2018) and with more lenient punishments for transgressors (Kerry et al., 2019). Hungry individuals seem to be less strict in judging moral contexts, which might be linked to an overall element of fatigue. This can poten-

tially have implications for explaining wrong decisions in interrogations in the context of hunger.

Social attitudes and short-term food deprivation. From the point of view of evolutionary psychology, in early infancy human beings seem prone to share food. 19-month old infants repeatedly and spontaneously transferred high-value, nutritious natural food to a stranger as a way of exchange and interaction, even after a feeding delay (Barragan et al., 2020). But this changes with age. Hungry 4-9-year-old children were less likely to share overall, but particularly when sharing food-relevant resources. Despite that, children still expected that others behaved to the contrary and shared their food (Huppert et al., 2020).

Anthropological data suggests that in cultures where families place value on being harmonious and empathic toward others, pay attention to reciprocity rules, and childrearing practices support the expression of altruistic behaviour, then food-sharing is the norm. In individualistic societies, food-sharing and cooperative skills become less relevant in family education patterns and must be reinforced at school (Barragan et al., 2020). The results strongly suggest that hunger per se cannot explain altruistic food-sharing behaviour in human adults and children and cultural and educational elements are essential.

In adults, there is a robust popular conception, supported by various surveys, that hunger undermines prosocial attitudes and human beings become selfish and survival-oriented. But the data shows conflicting results. Short-term food-deprivation seems to increase prosocial behaviour (for instance, hungry people are more supportive of welfare programs), but only if it does not mean parting with their resources (i.e. giving money to a charity). Hungry individuals support more egalitarian positions when these are theoretical ques-

tions but, in fact, they are less prone to share what they have (Aarøe & Petersen, 2013). In the most comprehensive set of laboratory game studies with volunteers, in overall, acute hunger did not affect pro-sociality, neither in cooperative nor competitive games (Häusser et al., 2019). Again, these are lab studies: the games did not have any emotional nor practical implications for the participant, much less that there was competition for survival or any risk to life.

Psychosocial background and early experiences. Data provide strong support to the idea that experiences of poverty and lack of resources frame the emotions and behaviours associated with food-deprivation. In a series of experiments, Allen & Nettle (2019) showed that adults with a personal history of childhood socioeconomic deprivation reacted with more impulsivity and emotionality in a situation of hunger probably as it evoked past experiences and attached negative explanations and meanings to it.

The symbolic value of food. All the above suggest that beyond caloric intake, in any given context, food has a symbolic value that is also extremely relevant to assess. By way of example, in in-depth qualitative interviews with 30 female inmates at a correctional facility in the US, food was found to be a significant determinant of the subjective impression of punishment carried out by the institution (Smoyer & Lopes, 2017). Although sufficient in quantity, the variety and presentation, the way the food was cooked and served, and being rushed and watched while eating were seen as dehumanising experiences of symbolic punishment that were deeply humiliating. Food was far more than a means for survival and instead was seen as a mechanism of degradation, surreptitiously showing control on all aspects of their life.

In overall, short-term deprivation of food goes beyond simply cutting the supplies of energy to the body; it is an attack on the self and as such, must be studied when documenting ill-treatment and torture.

Combining short-term food deprivation with other torture methods. Finally, the effects of starvation must be studied as interrelated to other concurrent elements in the creation of torturing environments. There is not much research on how these different mechanisms can interact. However, data shows, for instance, that (a) in animal studies, hunger has complex interactions with *fear* and *pain* (Misanin & Campbell, 1969; Ponomarenk & Korotkova, 2018; Verma et al., 2016). Both Fear and Pain increase when the person is hungry and food is not available. However, both Fear and Pain are inhibited and superseded by Hunger when food is available. (b) In humans, *hypoxia* (linked to forced exercising or dry and wet asphyxia) reduces hunger and energy intake, potentiating a short-term debilitating effect of both methods (Matu et al., 2018). The effect seems to be mediated by decreased circulating concentrations of acylated ghrelin. (c) Total food restriction increases *sleepiness* in night shift-workers, while partial food restriction decreases it (Gupta et al., 2019). This seems to be linked to cortisol and glucose levels. (d) There is a mutually exponentially potentiating effect of 10-hours of fasting in combination with total *social isolation* (Tomova et al., 2020). The explanation is unclear, but the authors found fMRI images suggesting common neural pathways that reinforce craving for social connectedness and food.

All these elements are only preliminary data suggesting the complex interactions and consequences of short-term food deprivation and hunger in the creation of torturing environments.

3. Prolonged deprivation: starvation and famine.

Testimonials of survivors. It would be impossible to review the many testimonials available in the literature where prolonged food deprivation and experiences of starvation are described in detail. Prolonged starvation can be excruciating until the point of becoming an unbearable source of pain (Nath, 1998), the obsession with food dominates all thoughts (Levi, 1989; Nath, 1998), and people talk, imagine and dream of food (Frankl, 1964; Semprun, 1972) with a drive even to the point of risking one's life for a small piece of bread (Antelme, 1971; Wiesel, 1983). As Jean Amery (1966) summarises: "*I was my body in hunger and nothing else*".

In a mostly speculative paper, Young (2014) considers that starvation was the cornerstone of the Holocaust system and the main reason to explain the allegedly defeating behaviours of survivors. He links physical and cognitive deterioration to psychological breakdown including apathy and loss of hope.

Anthropological studies. In her analysis, *The Madness of Hunger* ("Delirio de fome" in Portuguese), the anthropologist Nancy Schepher-Hughes (1988) studies *Nervos* ("Nervousness"). She considers *Nervos* an example of the many folk diagnoses, studied as psychiatric syndromes, that can be found among poor, marginalised, ethnic minorities in North and South America, Europe (primarily the Mediterranean) and the Middle East. In her study among Brazilian sugar cane cutters and their families, she describes extensive communities chronically malnourished, in a generally weakened and debilitated state, that become "mad" when, due to agricultural cycles, they have even fewer food supplies. She describes a victim shaky, dizzy and disoriented, emotionally labile, sad and depressed, without an ap-

petite, and often alternating between periods of passive withdrawal and unpredictable outbursts of rage in what she considers that represents a psychiatrization of chronic cycles of starvation. Similar reasoning can likely be applied to such diverse “cultural-bound” syndromes as *Susto* (Mexico), *Mancharisqa* (Peru), *Wendigo* (Inuit) or *Nubila* (Central Africa).

Ghetto studies and The Minnesota Experiment. During the Holocaust, Jewish doctors monitored and recorded the starvation process in the Ghetto of Warsaw and the process of starving to death in Dachau in adult and children. None of the authors survived. Their compelling observations were published after the war (Magowska, 2020).

In the *Minnesota Starvation Experiment*, conducted during World War II (Keys et al., 1950), thirty-six volunteers were subjected to a regime of semi-starvation in which most participants lost in as much as a 30% of body mass, with severe medical and psychological consequences including anaemia, chronic fatigue and apathy, extreme weakness, irritability, neurological deficits, and lower extremity oedema (Guetzkow & Bowman, 2012; Kalm & Semba, 2005). The participants experienced dizziness, extreme tiredness, muscle soreness, hair loss, reduced coordination, and ringing in their ears (Keys et al., 1950). As one of the participants explained, years later: “*Food became the one central and only thing really in one’s life*”. Pre- and post-starvation personality tests showed a temporary and reversible increase in the Minnesota Multiphasic Personality Inventory (MMPI) scales of Depression, Hypochondriasis and Hysteria. The recovery period took between 8 months and two years with no long-term consequences in follow-up studies (Eckert et al., 2018).

Important as it is, the study is, however, not representative of what would happen in a torturing environment. The volunteers were

highly motivated conscientious objectors. All of them had academic degrees and an average IQ of 130. Furthermore, as one of the participants said: “*The difference between us and the people we were trying to serve: they probably had less food than we did. We were starving under the best possible medical conditions and we knew the exact day on which our torture was going to end. None of that was true of people in Belgium, the Netherlands, or whatever.*” (Keys et al., 1950).

Animal studies replicating Holocaust conditions. There was a plethora of animal studies in the following decades (table 2). Most of them would be ethically unacceptable nowadays. Table 2 also shows a summary of contemporary studies with animals.

Body adaptation and medical and psychological consequences of chronic food-deprivation. During the initial hours of acute starvation, there is a carbohydrate depletion that affects muscle and brain function in particular, both highly dependent on glucose, producing fatigue and mild cognitive effects. After 24 hours the body begins to resort to body proteins and fat to produce glucose through glycogenesis procedures and the use of fat acids (ketosis metabolism). There is a down regulation to save resources and after two weeks brain glucose consumptions falls to 50%. Although there is significant variability among individuals and contexts (high versus low levels of stress associated to hunger), this compensatory mechanism allows for somewhat decreased but normal functioning during this initial period of 10 to 15 days.

After that period, fat reserves are not enough to keep normal functioning and the body resorts to further visceral and endocrine adaptations to diminish calorie needs (i.e. decrease in thermal regulation, lower blood pressure, lower cardiac frequency, slower kidney functioning) and there is a progressive increase in the consumption of proteins. This

Table 2. Selection of animal studies on starvation

- When albino rats were starved, the drive for food increased steadily from the first day until a point when their search activity decreased abruptly. This *breaking point* was extremely variable, in a range from the 4th to the 15th day with no indication of which variables could predict it (Heron & Skinner, 1937).
- Once the *breaking point* was reached, it was almost impossible to recover the animal. It would always die whatever actions were taken to heal it (Heron & Skinner, 1937).
- When albino rats were starved collectively, hunger did not increase hostile or aggressive attitudes among them. There was one lead rat –not necessarily always the same one– that guided the others towards food. At the end of the experiment, all rats had had a similar amount of food (Weiss et al., 2017).
- Feelings of hunger or drive for food was difficult to condition (for instance, to a light or a sound), contrary to what was expected (Cravens & Renner, 1969).
- Hunger was determined by both bodily weight loss and feeding schedule, with more hunger elicited by irregular feeding schemas (Ezinga & Becker, 1970).
- Hunger elicited an initial phase of *anxiety symptoms* in albino rats, that latterly evolved to depressive symptoms, eventually leading to apathy and lethargy.
- When subjected to electric shocks, hunger did not change the capability to detect and respond to the shocks and develop avoidance behaviours. Starvation did not diminish neither reactivity to pain nor intents to scape it (Misanin & Campbell, 1969).
- Selection of relevant contemporary studies
- In albino rats, hunger and fear interact. When exposed to a threatening situation, hunger diminishes the acquisition of fear. Once acquired, hunger increases the rate at which that fear is extinguished. In other words, hunger seems to decrease feelings of fear (Verma et al., 2016)
- There is an interaction between hunger and pain. When either is sufficiently severe, pain inhibits hunger and vice versa (Ponomarenk & Korotkova, 2018).
- Following the ethological principle that animals should always have one single central motivational drive at each time that over supersedes all others, when food is available, Hunger is the first drive in a hierarchical position. It is able to suppress competing motivational systems, such as thirst, anxiety-related behaviour, innate fear, and social interaction (Burnett et al. 2016)

implies a deterioration in muscle mass and in the production of new cells, including blood cells, leading to anaemia and lymphocyte depletion (see table 3). There is also an overall decrease in endocrine functioning, including hypothyroidism symptoms and amenorrhea. Vitamins decrease sequentially. Thiamine (Vitamin B1) after two weeks, Vitamins C and D after 4-5 months and Vitamins A and B12 after 12 months. The deficit of thiamine, the most dangerous consequence of chronic food deprivation, produces potentially irreversible damage in the cardiovascular and neurological systems, with ataxia and permanent impairment of memory (Wernicke's encephalopathy).

If still prolonged in time, extreme starvation will then lead to lethargy, neurological

irritability, fatal oedema and death in an estimated three to four months. This terminal stage corresponds to what survivors of the Holocaust labelled as the “Muselmann”: human beings that, through a combination of starvation and the oppressive conditions of captivity had lost all identity and consciousness, who were apathetic and acting without consideration for their actions – virtually waiting for death:

“Their life is short, but their number is endless: they, the Muselmann, the drowned form the backbone of the camp, an anonymous mass, continually renewed and always identical, of non-men who march and labour in silence, the divine spark dead within them, already too empty to really suffer. One hesitates to call them living: one hesi-

Table 3. Physical consequences of chronic deprivation of food - starvation

	Impacts	In practice
Cardiovascular	Short-term - Bradycardia, Hypo-tension Long -term - Arrhythmias	Fatigue, palpitations, dizziness, sudden death ¹
Renal	Mild pitting oedema Electrolyte abnormalities (Hypo-phosphataemia, hypo-magnesaemia, hypo-calcaemia) Renal calculi Renal failure	Fatigue and weakness Progressive oedema Memory and concentration
Skeletal	Osteoporosis Myopathies	Pathological fractures Weakness
Endocrine	Hypothyroidism Low gonadal hormones High cortisol Hypercholesterolemia Thiamine deficit – Wernicke-Korsakoff syndrome	Cold intolerance Weakness Amenorrhea Loss of libido Irreversible memory and motor damage
Haematological	Pancytopenia: Anemia / Leukopenia /Thrombocytopenia	Weakness Susceptibility to infections Abnormal fever response Difficulties in healing wounds Bleeding
Gastrointestinal	Dysphagia Aspiration pneumonia Slow movements Liver dysfunction - Elevation in transaminases	Difficulties in swallowing Constipation Nausea after ingestion Death due to aspiration of food
Neurological	Brain atrophy Peripheral neuropathies Seizures due to glucose deficit	State of confusion Memory, Attention, Concentration Emotional instability
Dermatological	Lanugo Alopecia	Fragile hair and nails / Losing hair Dry skin that can fissure and bleed Pruritus.
Eyes	Lagophthalmos	Chronic irritation of the cornea

¹ Sudden cardiac death is the main cause of death after suicide in chronic starvation
Sources: Personal elaboration from Jones et al., (2012); Mehler & Brown, (2015); Phillips, (1994); Westmoreland et al., (2016)

tates to call their death death, in the face of which they have no fear, as they are too tired to understand..." (Primo Levi, *If This Is a Man*)

4. Summary, conclusions and proposals.

1. Measuring hunger and food deprivation.

None of the different international standards for the treatment of prisoners establishes criteria for deciding when a population is being starved. They adhere to the criteria of the person receiving *food in such a quantity, quality, and hygienic condition so as to ensure adequate and sufficient nutrition*. This criteria can be problematic, as lack of enough food will only be detected when there is already severe and detectable malnutrition. Based on UN bodies recommendations, the minimum nutritional requirements for a healthy adult with low activity level can be estimated around 3000 kcal/day (44 kcal/kg/day) for men and 2500 kcal/day (36 kcal/kg/day) for women. Any food supply under 2000 Kcal/day (30 Kcal/Kg/day) should be considered as starvation (Wischmeyer, 2017). An alternative for monitoring visits is analyzing Food security, for which there are different measures available in the literature.

2. Short-term food-deprivation and manipulation as a torture method.

a. Hunger is a subjective sensation of wanting and needing food. Context, purpose, motivation and meaning are essential for understanding the impact of short-term food-deprivation. Food manipulation and even mild food deprivation in caloric terms, when used as a form of dehumanisation, humiliation and denigration of the

detainee may be a powerful method to produce severe suffering and break identity.

- b. It is especially relevant to assess the combination of short-term deprivation and manipulation of food with other methods as part of a torturing environment, with preliminary evidences showing an interaction with fear, sleep deprivation, hypoxia and pain producing methods including exhaustion exercises. It is also relevant to explore actions that foster forced absorption in hunger feelings⁵.
- c. A change in an interoceptive state—such as hunger—has implications, through neural connections, with affective and cognitive functions. This has potential implications in the susceptibility to cognitive and emotional manipulation techniques.
- d. Specific physical and psychological impacts must be assessed on a case by case basis taking into account specific vulnerability criteria of each victim including age, gender, past experiences of deprivation or trauma, physical state and psychological status.

3. Prolonged starvation and famine as a torture method.

- a. In chronic food-deprivation, the human body may adapt and resorts to systems of downward regulation during the first two weeks. After that

⁵ The Kubark Manual (CIA, 1963) defined *forced absorption* as the practice of preventing distraction from the pain of hunger; from escaping into mental disconnect, thus making hunger one of the central elements of the experience of the detainee to create cognitive and emotional tension and break the self.

period, severe consequences affecting all organs occur, with thiamine deficit as the earliest and most dangerous condition. This is associated with cognitive, emotional and personality changes leading to a break *in almost all human beings*. The medical and psychological effects of chronic starvation are critical and produce *severe suffering*.

- b. The research reviewed suggests, so far, that the limit between short-term and prolonged food deprivation is two weeks. In other words, while short-term food deprivation (less than two weeks) might amount to torture, especially when combined with other methods and conditions, *prolonged food deprivation (established as less than 2000 calories/day for more than two weeks) is a life threatening condition that produces severe suffering in almost all human beings and that should, in most if not all cases, at least from a medical point of view, amount to torture*. There is a need for more interdisciplinary research between medical and psychological experts and legal professionals. The seven proposals aim to help in this direction.

In this issue

We include the second part of the Special Section on *Physiotherapy for Torture Survivors*. Laura Pizer Gueron and MaryAnn de Ruiter present the results of a survey conducted among professionals worldwide regarding the availability and use of physiotherapy services with torture survivors. The same team presents the development and gives initial assessment data of the Group physiotherapy model with torture survivors that has been developed by the Center for Victims of Torture

in recent years. Anne-Mette Karrer et al present an evaluation of the cultural acceptability and feasibility of a School Pain Treatment programme for populations affected by trauma in Arab countries, showing its usefulness in changing traditional practices towards new contemporary models with an integrative perspective. Finally Marie Nordheim Alme et al describe the PREP programme, an international experience of consensus and collaboration in training processes for physiotherapists working with torture victims. Overall, the two volumes of the Special Section (issues 2020-2 and 2020-3) show how physiotherapy is evolving and the challenges ahead. However, they also confirm the lack of enough evidence-based support for Physiotherapy interventions and especially the lack of proper research related to better profiling target populations and integration with other disciplines.

Within the regular articles, Marta Guarch presents worrying data on the prevalence of situations of ill-treatment or torture of asylum seekers arriving to Serbia. Their findings indicate that most refugees have suffered from situations of ill-treatment on European soil. Moa Nyamwathi Lonning et al present a nation-wide study on public rehabilitation systems for torture victims in Norway. The results suggest the absence of a common global policy and shortcomings in the planning of services that would require urgent action. Finally, Maria-Angeliki Psyrraki et al present a study on the narratives of rehabilitation and the importance of mutual support in the Congolese refugee population in Athens. This work is co-authored by Gianfranco di Maio, who unfortunately passed away recently. A person who has been linked for more than 15 years to the work with torture survivors and who left a deep impression for his commitment and humanity.

All in all, an important group of studies to close a year marked by the COVID pandemic as an element of distortion. We are confident that in 2021 there will be new challenges and we will strive to keep on being the Journal of reference in the field of prevention and rehabilitation of torture victims if you, our authors and readers, decide so.

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