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"Symptoms associated with environmental factors" (SAEF) – Towards a paradigm shift regarding "idiopathic environmental intolerance" and related phenomena

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ABSTRACT

Health conditions characterized by symptoms associated with chemical, physical and biological environmental factors unrelated to objectifiable pathophysiological mechanisms are often labelled by the general term "idiopathic environmental intolerances". More specific, exposure-related terms are also used, e.g. "multiple chemical sensitivities", "electromagnetic hypersensitivity" and "candidiasis hypersensitivity". The prevalence of the conditions varies from a few up to more than 50%, depending on definitions and populations. Based on evolving knowledge within this field, we provide arguments for a paradigm shift from terms focusing on exposure and intolerance/(hyper-)sensitivity towards a term more in line with the perceptual elements that seem to underlie these phenomena. Symptoms caused by established pathophysiologic mechanisms should not be included, e.g. allergic or toxicological conditions, lactose intolerance or infections. We discuss different alternatives for a new term/concept and end up proposing an open and descriptive term, "symptoms associated with environmental factors" (SAEF), including a definition. "Symptoms associated with environmental factors" both is in line with the current knowledge and acknowledge the experiences of the afflicted persons. Thus, the proposed concept is likely to facilitate therapy and communication between health professionals and afflicted persons, and to provide a base for better understanding of such phenomena in healthcare, society and science.

1. Introduction

A substantial part of the general population associate symptoms with environmental factors at levels that are tolerated by the majority of people. The symptoms are not caused by any known physiological dysfunction of organs or systems that are relevant for the symptoms. Examples of factors associated with such symptoms are odorous chemicals [15], (parts of) buildings [37], electromagnetic fields (EMF) [8], dental amalgam fillings [5,31], wind turbines [42] and sounds [4,9] at work, home or in public environments. The reactions range from mildly to severely distressing symptoms. In some cases, the symptoms may lead to severe disability and major restrictions in daily life [10,45]. The afflicted persons report airway, mucosal, skin, emotional, cognitive, gastrointestinal and more general (e.g. headache and fatigue) symptoms. Whereas the symptom picture may vary considerably among individuals who associate their symptoms with similar factors, at group level there is considerable overlap in symptomatology between factors [50]. No specific symptom profiles have been identified. The symptoms also overlap with those of other chronic health conditions [6,36]. The estimated prevalence rates in the general population for reactions to

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environmental factors vary considerably depending on definition (e.g. physician-based "diagnosis" vs. self-reported) and country. For chemicals, the prevalence of reactions ranges from 0.5 to 52%, for buildings from 1.3 to 7%, for electrical devices from 0.1 to 21%, and for sounds from 8 to 39% [8–10,15,29,50].

"Multiple chemical sensitivity(-ies)" (MCS) is frequently used to indicate symptoms associated with chemicals [30]. In 1996 a workshop organized by the WHO classified "unexplained environmental intolerances" associated with different environmental exposures under the term "idiopathic environmental intolerance" (IEI; [26]). This aggregation of environmental factors under an overarching label is supported by large overlap in prevalence (10–70% overlap with at least one other factor; [9,38,50]). A working definition of this condition, proposed by the workshop included: (i) an acquired disorder with multiple recurrent symptoms, (ii) associated with diverse environmental factors tolerated by the majority of people, and (iii) not explained by any known medical or psychiatric/psychologic disorder.

In addition to phenomena usually included in IEI, symptoms may be associated with other kinds of environmental factors without support for any underlying pathophysiological mechanisms. Examples are food and food ingredients (with no allergy or reproducible intolerances; [18,23,32]) or microbes (without infections, such as "candidiasis hypersensitivity"; [3]).

1.1. Possible explanatory mechanisms

Three sources of evidence indicate where to look for an explanation of the experienced symptoms (for reviews of this evidence: [47] and more explicitly on IEI: [46]). Firstly, there is a lack of convincing evidence for the role of any physiological dysfunction caused by exposures to the environmental factors that could explain the symptoms. Secondly, carefully blinded exposure studies have shown that afflicted persons cannot reliably distinguish real from sham exposures and that symptom reporting in these studies is critically depending on (veridical or illusionary) knowledge that exposure took place [19]. Thirdly, a large array of well controlled experimental studies has demonstrated that expectation induction, either by associative learning (i.e. Pavlovian conditioning) and/or informational manipulations can cause the symptoms, both in healthy subjects and in afflicted persons [49,53]. However, the effects are typically larger in persons with symptoms and the effects in healthy persons are modulated by individual difference and context-related variables that are characterizing afflicted persons. These arguments strongly suggest that the symptoms result from nocebo mechanisms [46]. Nocebo mechanisms have been shown to recruit interoceptive brain areas that are also activated when peripheral physiological dysfunction is causing symptoms. Nocebo mechanisms can be understood within recent models of brain functioning that emphasize the active and constructive nature of the brain in creating adaptive models of the (internal and external) world. In these models, conscious experience is thought to emerge from the joint input of two counterflowing streams of information across several hierarchical levels of the brain. One downward stream reflects prior beliefs (implicit predictions of the brain), while an upward stream represents somatic input, creating prediction errors (that is, non-predicted somatic input) at multiple levels. Prediction errors are feedback to modify the models in the brain that generate new predictions. Both predictions and prediction errors are qualified by a reliability parameter (precision). In conditions with strong (highly precise) prior beliefs and imprecise prediction errors, symptoms may emerge that predominantly reflect the prior beliefs with relatively little to no impact from somatic input [24,46,47]. In addition, the notion of central sensitization has been advanced to explain more intense responses to exposures in afflicted persons compared to healthy persons [15]. However, besides conceptual and empirical problems with this explanatory concept [48], the more intense responses of afflicted persons may simply reflect that environmental factors have become learned sources of concerns and stress causing stronger affective responses upon exposure to them. In fact, the stronger affective responses may contribute to the imprecise interoceptive prediction errors that allow prior beliefs to dominate the conscious experience of symptoms [46,47].

2. Disadvantages of using IEI and related terms

It may be argued that the choice of terms for medical conditions are of limited importance. However, studies on the "being a patient effect" and effects of labelling "the mentally ill" vs. "people with mental illnesses" as well as medical conditions like gout, schizophrenia, epilepsy and bipolar disorder indicate that choices of terminology may have effects on causal beliefs, illness perceptions, management strategies, communication and stigma [21,28,40,43,44,57]. As we will outline, the issue of labelling may have implications also in the case of IEI and related phenomena.

Among the commonly used terms, a distinction can be made between the general descriptive term IEI, that remains relatively neutral as to the implication of potential causes, and those that imply that the symptoms are caused by a specific type of exposure, such as "multiple chemical sensitivity(ies)" (MCS), "chemical intolerance" (CI) and "electromagnetic hypersensitivity" (EHS). Due to this neutrality, IEI is currently the preferred term. In addition, it allows sub-specifying attributions to different factors, e.g. IEI-Chemicals (idiopathic environmental intolerance associated with chemicals; [26]).

However, the term IEI reflects the state of the knowledge in 1996, whereas in the last 20 years considerable progress has been made in our understanding of the underlying mechanisms. This implies that "idiopathic" may no longer be an adequate description, while having some disadvantages. For example, "idiopathic" may suggest that the afflicted persons suffer from a condition we know "nothing about", or even worse, that "may not really exist". These messages are not correct nor helpful and may reduce the possibilities for health professionals to give, and for afflicted persons to receive, proper treatment or other kinds of support. In addition, such messages may unnecessarily elevate the afflicted persons' level of anxiety, worries and despair, while it may raise "modern health worries" in the general population [7,39].

The "intolerance" part of IEI may be appropriate if it is used in a broad meaning. However, most health professionals, afflicted persons and the public interpret "intolerance" according to a traditional biomedical model [34,51], suggesting that the connection between the exposure and the symptoms associated with it, follows a pathophysiological mechanism similar to an allergic or a toxic exposure, e.g. as in allergic asthma, lactose intolerance or acute intoxications. Such interpretations of "intolerance" are not consistent with current scientific evidence. Furthermore, despite the absence of a pathophysiological mechanism, these interpretations of "intolerance" suggest reduced exposure as the main cure to ease the symptoms. For health professionals and afflicted persons, such a view may create unnecessary problems and, in fact, may have an anti-therapeutic and even iatrogenic effect. Extensive avoidance behavior is often one of the main reasons for reduced quality of life in these conditions [13,16,22]. Avoidance behavior often contributes to perpetuate and even strengthen the symptoms by negative reinforcement learning (supra). At the societal level, the "intolerance" part of IEI may lead to demands for the reduction of the associated exposures, even if a scientific rationale is missing. Examples may be actions to reduce EMF by avoiding the use of cell phones, opposing to base stations, power lines, Wi-Fi etc. or demands for odor or chemical free environments. If the society takes such actions, it may put unnecessary restrictions on society and individuals, and it may contribute to "modern health worries" and more persons attributing symptoms to such environmental factors [11,41,52,54]. If symptoms are not reduced after actions mitigating exposure, afflicted individuals may well interpret this as an increased sensitivity and need for even more strict avoidance of perceived triggering factors [16,53].

Other terms such as MCS, CI and EHS are even less appropriate than

IEI. They indicate that the symptoms are caused by pathophysiological mechanisms due to the specific chemical or physical exposure itself. The consequences of these misleading messages are similar to those discussed for IEI, but are more severe, including polarized public discussions [25]. The criticism on the use of "intolerance" in IEI (supra) also applies to the term as used in CI, while the meaning of terms such as "sensitivity(-ies)" and "hypersensitivity(-ies)" as in MCS and EHS, is de facto close to the biomedical interpretation of "intolerance". While MCS and EHS, etc. seem to be accepted to a moderate or high degree among afflicted persons, health professionals may be more reluctant to use these terms. On the other hand, IEI may be more accepted among health professionals than among afflicted persons.

In conclusion, both IEI and the more specific exposure-related terms are not reflecting the current state of knowledge, may be misleading, hamper therapy and are not well accepted among all parties concerned. There is a need for a new label for symptoms associated with a variety of environmental factors.

3. Criteria for a new term

As discussed later in this article, we do not find it appropriate to suggest a new diagnosis for inclusion in e.g. ICD or DSM. Instead, we propose a new term and definition compatible with the current knowledge and minimizing the earlier discussed problems. We have developed the following criteria to guide us to select a new term (for an example with other criteria developed in another case, see [14]):

1. Being in line with current knowledge:

a) Not implying causal relationships that are not demonstrated.
b) Appropriately neutral with regard to pathology and etiology.
c) Avoiding the dualism psyche-soma.
d) Potentially valid for a long period.

2. Supporting guidance on how to handle and treat afflicted persons:

a) Facilitating multidisciplinary approaches.
b) Not directly or indirectly leading to unhelpful reactions and interventions or unnecessary chronic course.

3. Being informative and acceptable for health professionals, afflicted persons and the public.
4. Being short and:

a) Embracing core aspects of the conditions to be included.
b) Being in line with medical nosology.
c) Having an acceptable acronym.
d) Having cross-cultural relevance.

5. If possible, serving to improve surveillance and statistics on this kind of health condition.

3.1. Not implying a causal relationship in accordance with a biomedical model (criteria 1a-b and 2a-b)

We argue that integrative models rather than the traditional biomedical model [51] are more appropriate for the understanding of conditions like IEI, e.g. attempts such as biopsychosocial [1] and psychoneuroendocrinoimmunological [20] models and, probably even better, recently proposed predictive processing models [24,46,47]. However, as mentioned, most health professionals, afflicted persons and the public de facto interpret according to a biomedical model [51]. Based on this and the discussion on possible explanatory mechanisms on how symptoms emerge and evolve in conditions such as IEI, a new term should not imply a "biomedical mechanistic" link between exposure and symptoms. This will give the appropriate messages as to "causes" and treatment, and may reduce recruitment of new persons associating symptoms with environmental factors.

3.2. Not based on psyche-soma dualism (criteria 1a-d, 2a-b and 3)

There is limited scientific evidence for categorizing health problems as either somatic or psychological [34,35,47]. The problems this categorization creates is excellently illustrated by "persistent symptoms", including IEI [24,46,47]. This urges us to find a new term that does not imply such a dualism, but, on the other hand, may still be understood within a culture in which the psyche-soma dualism will be prevailing for many years to come. This combination is probably best achieved by a descriptive term that is as neutral as possible. In addition, a term that avoids any reference to such dualism may survive as new knowledge emerges.

3.3. Not related to terms such as MUS, BDD and SSD (criteria 1a-d, 2a-b and 3)

IEI may be seen as a subgroup of the contested concept "medically unexplained symptoms" (MUS; [6,36]). The concept of "medically unexplained" is de facto based on a biomedical model [12], which is to be avoided (supra). In addition, the term is in itself of limited informative value [14]. For these reasons, we do not propose a term based on this concept.

Other options for a new term may be to subsume IEI under "bodily distress disorder" (BDD; CD-11; [56]) or "somatic symptom disorder" (SSD; DSM-5; [2]). An argument for doing so would be that it would be in line with the current diagnostics/nosology used for describing conditions that IEI may be seen as part of. However, BDD and SSD are intended to include a wide spectrum of conditions making the terms too unspecific for labelling conditions of which the characteristic feature is that the symptoms are associated with specific environmental factors. In addition, as regular revisions of diagnostic classification systems tend to suggest new terms, particularly in the area of chronic symptoms without underlying well-characterized pathophysiologic mechanisms (e.g. BDD and SSD), we aim to suggest a term that is more likely to survive such revisions. Further, while BDD and SSD may be intended to avoid a psyche-soma dualism, the diagnoses are a part of the "psychological"/"mental" sections of the diagnostic systems (SSD is included in DSM, which is a psychiatric classification system, while BDD is included in the "mental" chapter of ICD-11). Problems may add up when considering that afflicted persons, health professionals and the public may interpret the words "somatic" and "bodily" as part of the psyche-soma dualism, and may associate SSD and BDD with their predecessors, e.g. "somatization" or "somatoform disorder". In addition, the meanings of both SSD and BDD may be difficult to interpret for afflicted persons and the public. "Disorder" and "distress" may not be optimal to describe the core of conditions like IEI and only a fraction (depending on the definition used) of persons afflicted by IEI fulfill the criteria for BDD and SSD. Further, SSD and BDD are difficult to translate into other languages in a systematic way, both linguistically and culturally. This would also apply for a new term for IEI if based on either of these.

In sum, the psyche-soma dualism, as implied in SSD and BDD, is a source of substantial, yet avoidable, problems in communication with afflicted persons, health professionals and parts of the public on conditions such as IEI. By refraining from linking up with what many will interpret as "psychological" diagnoses, we hope to reduce the risk of substantial resistance in groups of afflicted persons, their organizations, media etc. It may also counteract "not my table" thinking in somatic medicine, which is the part of healthcare that see most of these patients and where most of them will receive treatment, or worse, not receive it. Given the pros and cons, we find that a new term should be both more neutral and easily accessible than that offered by SSD and BDD, especially for afflicted persons and the public.

3.4. Being in line with current knowledge (criteria 1a and d)

As presented earlier, recent predictive processing models [24,46,47] or similar perspectives, including nocebo, open for a paradigm shift from a focus on exposure and intolerance/(hyper-)sensitivity towards the perceptual elements underlying IEI and related phenomena. However, we acknowledge that our current knowledge is not yet at the stage where we may include such elements explicitly in a new term. In addition, to use such constructs as the basis for e.g. a diagnosis or a term would need a paradigm shift of the nosology and diagnostic systems used for diseases and other medical conditions. We argue that such a shift is strongly needed, but how to get there cannot be dealt with within the scope of this paper. Meanwhile, we should have a term that fits in if such a change would become reality.

4. Alternatives for a new term

A new descriptive and, as far as possible, neutral term describing the essence of conditions such as IEI, should refer to (a) the health problems that the person experiences, (b) the person's perceived cause of the problem, and (c) the connection between symptoms and environmental factors (criteria 1b and 4a). Among the many possible terms, we find it relevant to discuss the appropriateness of (a) "symptoms", "ill health", "distress" and "disorder", (b) environmental "factors" and "exposures", or just "environment", and (c) "perceived", "attributed" and "associated" to denote the relationship between (a) and (b). The interpretation of words and phrases is highly dependent on culture, education, languages and other factors. This makes it impossible to find a term that suites all. We have tried to find a term primarily based on our knowledge in English and the different European languages and cultures represented by the authors.

4.1. The health problems that the person experiences (criteria 2b, 3 and 4b,d)

"Ill health", "distress" and "disorder" are little specific on what bothers the individual, and only express the self-perception of feeling ill, feeling bad or "not in shape". In addition, the terms imply a categorical boundary between a normal and a pathological state that rather is gradual. Those who are much bothered by their symptoms may agree with the labels illness, distress or disorder, whereas those with milder symptoms may oppose such classifications. Therefore, we suggest using "symptoms" which simply, and specifically, describes the problem, e.g. headache, stuffy nose or feeling fatigued. It is consistent with the tendency in afflicted persons to consider their symptoms as rather specific, and it includes the milder cases. However, some may find that it undercommunicates the distress the symptoms evoke (infra). "Symptoms" may be less culturally dependent than the alternatives, while translation into other languages may be more complicated and potentially less uniform for "ill health", "distress" and "disorder" than "symptoms". In addition, "ill health" is not in line with traditional medical nosology.

4.2. The person's perceived cause of the problem (criteria 1a-b, 2a, 3 and 4c)

As afflicted persons by definition associate their symptoms with rather distinct factors in the environment, simply "environment" is too unspecific and over-inclusive, e.g. embracing primarily psychosocial environment. Environmental "exposure" may be interpreted as rather specific and probably more in line with traditional medical nosology than "factors". "Factors" clearly includes "exposures", but it may also include factors that may not be understood by all as "exposures", e.g. unclear pictures of symptoms associated with indoor air/buildings, and symptoms associated with food and microbes. Some afflicted persons and others may prefer "exposure" as it fits with the biomedical model, while "factors" may communicate that the connection is a bit "blurry". Overall, we find "environmental factors" being the most appropriate alternative as it may be perceived as more neutral than "exposure", given that the scientific evidence does not support a traditional mechanistic link between the factors and the symptoms.

4.3. Connection between symptoms and environmental factors (criteria 1a-b, 3 and 4a-b,d)

In accordance with the definition of these conditions, we may not use "caused by" or similar phrases. The afflicted persons most often link their symptoms to specific environmental factors, e.g. certain sources of EMF or specific chemicals. Thus, we need to find a phrase that embraces this perception, acknowledges the lack of support for a traditional mechanistic link and opens for a paradigm shift (supra). The best candidates for this seem to be "perceived", "attributed" and "associated" [33]. Whereas "perceived" relates to the perception of the afflicted persons, "attributed" points more directly to the mechanism of directly linking the symptoms to one or more specific environmental factors, e.g. via nocebo, conditioning or similar mechanisms. In science, and probably in general as well, "associated" is used when factors seem to be connected, without necessarily implying a causal relationship. "Attributed" probably is the alternative among these three that is most in line with nosology used in psychology, current knowledge and is in some use (e.g. [17]). "Perceived" and "associated" also fit acceptably with current knowledge; the latter possibly being "blurrier", i.e. in accordance with our current knowledge.

For all three alternatives, it may be uncertain whether it is the afflicted person or the health professional, etc. who has "attributed", "perceived" or "associated" the symptoms with environmental factors. To clarify this, one might add e.g. "self-reported", but that may not be necessary and will make the term longer. Afflicted persons, the public and health professionals may interpret "attributed" or "perceived" as implying that the symptoms are "not real", or rely on "imagination", "manipulation" etc. The two words themselves may culturally also be experienced as negative. "Associated" is more neutral and therefore may be more acceptable for afflicted persons, the public and probably most health professionals. Another argument is that "attributed" may be interpreted in different ways. Afflicted persons, the public and many health professionals probably are not familiar with the psychological mechanism of "attribution", and may instead find "attributed" unknown, unclear or even indicating "caused by". "Attributed" and "perceived" may not have an identical meaning when translated from English to other languages. Overall, the alternative among the three that seems most suitable is "associated" since it probably is most familiar and acceptable. In addition, it probably has rather identical meaning in several languages.

5. Symptoms associated with environmental factors

We suggest that health conditions up to now labelled as IEI and the other more specific associations (e.g. MCS and EHS) may be replaced by the term "symptoms associated with environmental factors", with the acronym "SAEF". In addition, we suggest subsuming a wider range of phenomena under SAEF than IEI, that is, to denote *every phenomenon* that is characterized by symptoms associated with biological, physical and chemical environmental factors that cannot be explained in terms of, for example, allergy or toxicology.

5.1. Definition of "symptoms associated with environmental factors" (SAEF)

1. A phenomenon characterized by recurrent symptom(s) that the afflicted person evaluates to have a negative impact on health.
2. The afflicted person associates symptom(s) with chemical, physical or biological environmental factors that, by their nature and exposure levels, do(es) not cause similar symptom(s) in the majority of

people.

3. Symptoms recur and abate according to perceived exposure to one or several specific environmental factors. The perception of exposure may be by means of any or unspecified sensory modality and the environmental factor may or may not be objectively present.
4. The health impact may vary from mild to severe.
5. Symptoms caused by well-characterized pathophysiologic mechanisms, e.g. allergic or toxicological conditions, lactose intolerance or infections, are excluded from the phenomenon.
6. The phenomenon may be the person's only health problem or may coexist with, in principle, any disease or other health condition.

The definition of SAEF is wide. It imposes no limitations regarding symptomatology, sensory modality and objectivity of the exposure. It has few limitations as to duration ("recurrent" only), number and intensity of the symptoms ("the afflicted person evaluates… negative impact on health" only) or environmental factors ("chemical, physical or biological" only). As such, the phenomenon is acknowledged as dimensional, that is: from mild for which no healthcare is sought, to intense and potentially disabling. We consider such a wide definition as being appropriate and useful because it is consistent with current knowledge and because it avoids the disadvantages of both IEI and the rather precise, but not scientifically based, definitions of MCS (supra). The wide variety of conditions denoted by SAEF probably has a common ground in terms of symptomatology, underlying mechanisms, and for more severe cases, also in associated comorbidity. However, as more knowledge emerges, conditions may be removed from, and potentially also included into, the phenomenon SAEF. By this operationalization, SAEF will be a dynamic and probably long-lasting term.

In SAEF, symptoms may be associated with any kind of chemical, physical or biological environmental factor, e.g. chemical substances, EMF, sound, vibration, light, food and microbes. The environmental factors in focus may change over time and in different cultures. The term does not include association with environmental factors such as primarily psychosocial factors. In SAEF, symptom episodes may last for minutes (e.g. SAEF-EMF cases) up to years (e.g. SAEF-dental amalgam fillings). SAEF is not to be used when symptoms ensue from allergies, infections, lactose intolerance and other pathophysiologically well-characterized and established medical conditions. However, it should be noted that SAEF not only applies when more well-characterized, medical conditions have been excluded. When SAEF co-exists with established pathophysiological mechanisms, differential diagnosis involving the separation of the part of the symptom profile that can be subsumed under SAEF and the part that is associated with physiological dysfunction of organ systems that are relevant for the symptoms can be difficult [27]. This view is not reintroducing a dualistic perspective in which symptoms are either biomedically or psychologically based. It only acknowledges the role of symptom perception mechanisms that modulate the relationship between pathophysiology in the body and the expression of a symptom, and that may play substantial role in determining the eventual symptoms [27,46].

Diagnoses are important tools in healthcare for treatment, communication and surveillance (criteria 5). In addition, patients often regard a diagnosis as recognition of an existing disease or condition. However, a diagnosis should be based on well-established knowledge of the mechanisms underlying the condition. As elaborated in the section "Possible explanatory mechanisms", one might argue that we are on our way to establish sufficient knowledge on mechanisms. However, as discussed earlier, a major obstacle is that the available diagnostic systems have substantial limitations regarding classifying phenomena such as SAEF. If SAEF would be used as a diagnosis, in practice, it would rely on self-report only and thus not be in line with normal procedures in medical diagnostic systems. In conclusion, we do not find it justified or suitable to propose a diagnosis for SAEF at this stage. However, for e.g. administrative reasons, one option may be to use one or more symptom codes, or a code such as MG9Y, "Other specified general symptoms, signs or clinical findings" (ICD-11). In general, for medical conditions not pathophysiologically well-characterized and established (including SAEF), a multiaxial classification approach would be more suitable to describe the impact on health and serve as a tool for individualizing treatment. Such a classification may include symptoms, severity, time (acute/chronic and duration), behavior (e.g. avoidance and sick leave), level of function and quality of life, potential factors of association etc. The International Classification of Functioning, Disability and Health [55] includes some of these aspects.

In analogy with the IEI nosology, we propose the opportunity to distinguish subclasses within SAEF that refer to the specific environmental factor with which the symptoms are associated. In addition to being informative, sub-classification will probably also improve the acceptance among afflicted persons. Because the environmental factors with which the symptoms are associated may change over time, setting and culture, we do not present an exhaustive list of subclasses, but rather indicate a system to label subclasses. For example, "symptoms associated with environmental factors" experienced as being due to electromagnetic fields (EMF), may be indicated as "SAEF-EMF"; "symptoms associated with EMF". Another example is "SAEF-food"; "symptoms associated with food".

Describing SAEF as a *phenomenon* rather than a disorder or disease, with a corresponding diagnosis, eliminates the need to determine artificial and potentially counterproductive categorical borders between those included and not included. The afflicted person defines the condition, that is; the occurrence and meaning of the symptom(s), the perception of the causal or contributing environmental factors, and the experienced health impact that are taken as a valid indication for the condition. SAEF may be seen as a tool to encourage empowerment of the afflicted persons in a collaborative relation with health professionals. Hopefully, this will reduce unnecessary conflicts and discussions on what is "real" or not in the health situation of the afflicted persons. As a relatively neutral descriptive term, not implying causal relationships that most likely do not exist, SAEF does not give support to unhelpful reactions and interventions, e.g. avoidance strategies. In addition, defining SAEF as a phenomenal description, not a diagnosis/disease, may also reduce over-diagnosis and unnecessary pathologization and chronification. Other advantages are that health professionals and afflicted persons may consider a broad variety of treatment and intervention options, and that it probably provides fewer "suggestive cues" to experience symptoms compared to terms such as IEI, MCS and EHS [11]. In addition, because SAEF is neutral regarding the psychesoma split, it facilitates multidisciplinary approaches (criteria 1a-d and 2a-b). Since SAEF is more compatible with current knowledge than terms such as IEI and MCS, it may make the condition more acceptable for health professionals. This may result in better healthcare for the afflicted persons, which is needed [17]. However, SAEF may disappoint some afflicted persons because a causal link through biomedical pathways is not explicitly stated. In addition, some may experience the "symptoms" part of SAEF indicating "just having symptoms", i.e. "something not to be taken seriously". It can be explained that, just like in any other medical condition, symptoms may vary from minor to very distressing.

6. Conclusion

The concept of SAEF opens for a paradigm shift from a focus on exposure and intolerance/(hyper-)sensitivity towards the perceptual elements underlying IEI, MCS and related phenomena. The concept and term are likely to be informative and acceptable to health professionals, the afflicted persons and the public. The choice of SAEF is based on considerations of priority. The prime priority is that the proposed concept will facilitate treatment and communication between health professionals and afflicted persons. In addition, it provides a base for better understanding of such phenomena in healthcare, society and science. As discussed, we do not propose SAEF as a diagnosis. However,

as a phenomenal descriptive term, it may very well be used in clinical settings. SAEF may also be used for definitions in research. The acronym SAEF is unused and easy to pronounce in most languages. SAEF may be translated and understood in a largely identical way in different countries and describes the condition reasonably well by embracing the core aspects of the condition.

Declaration of Competing Interest

The authors have no competing interests to report.

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