On stimulus persistence and human behavior: the stimulus persistence unification theory

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ABSTRACT
A person trapped in a building engulfed in a raging fire, a person dealing with severe chronic disease, people dealing with a virus pandemic, and people fighting in a protracted war may appear dissimilar but are fundamentally in a similar situation and their behaviors follow a predictable and similar pattern. In this paper, the behaviors of rational people dealing with a significant persistent unpleasant, or dangerous stimulus that is inescapable are elucidated. The unique modulatory effects of stimulus persistence on human behavior as well as the role of means and interest are discussed.

Introduction

The ability to respond to a stimulus, defined as any internal or external agent, event, or situation that provokes a response from an organism, is a distinguishing characteristic of living things [1]. Response to stimulus is crucial to an organism’s survival and reproduction [1] and in response to stimuli, organisms adapt their physiology and behavior [2]. Indeed, stimuli play an important role in animal behavior including habits [3] learning, and decision-making [2].

Different types of environmental stimuli modulate animal behavior including pressure, temperature, salinity, light/darkness, displays, calls, movements, pheromones, colors, etc. [2]. Response to stimuli that are unpleasant or threatening usually evokes a psychophysiological reaction promoting the organism’s readiness for active defense and enhanced conflict monitoring [4,5]. Response to an unpleasant or threatening stimulus is typically to ignore it when it is insignificant and familiar and to escape or withdraw when it is significant and/or novel. However, when an unpleasant or threatening stimulus is significant and/or novel and inescapable, the response is to try to survive or ensure well-being by taking steps to neutralize or render it impotent. When efforts to counteract this stimulus are unsuccessful, it is considered persistent and its continuing presence has a significant effect on human behavior.

The objective of this paper is to discuss the effects of the persistence of a significant and/or novel inescapable unpleasant or dangerous stimulus on human behavior.

Relationship between stimulus persistence and interests and means

Two important factors play a crucial role in the relationship between a threatening or unpleasant persistent stimulus and human behavior: interest and means. Interest entails a person’s desire or proclivity to counteract a stimulus. Typically, interest to counteract a novel and/or significant unpleasant or threatening stimulus is high. However, if the stimulus becomes persistent because efforts to neutralize it are unsuccessful, this modulates interest and behavior. Interest to counteract an inescapable persistent dangerous or unpleasant stimulus is influenced by the perceived severity and strength of the stimulus before, during, and after the employment of the neutralizing intervention. Interest is also modulated
by different factors including, negative consequences, knowledge and education, trust, group cohesion or one
ness of purpose, beliefs [6,7], benefit/harm relative to energy expended toward counteracting the persistent sti
mus, etc. Interest to counteract a significant and/or novel threatening or unpleasant inescapable stimulus
may be low but it is never zero.

As Table 1 shows, interest can be categorized into four classes. Class 4 is interest at its highest. At this
point, interest to counteract the stimulus is existential and very resistant to modulation.

Means, on the other hand, entails the resources available including social support, finances, access,
manpower, capability, and ability to help counteract or neutralize the stimulus. Means impact interest and
the interplay between them triggers different behavioral responses to a persistent stimulus.

As Figure 1 shows, initial interest to counteract a significant and/or novel inescapable stimulus is typically
Class 3 or 4 regardless of means. If the stimulus becomes persistent, interest is modulated by many fac-
tors including means, individual perception of the threat or unpleasantness of the stimulus, burden
imposed by the stimulus, the effectiveness of the neutralizing intervention and the benefit/harm of main-
taining the neutralizing intervention. There are several potential outcomes of the persistence of an unpleasant
or dangerous stimulus; high interest and high means,
high interest and low means, low interest and low means, and low interest and high means.

*Figure 2* provides insight into how stimulus persistence modulates behavior and how interest is modulated by different factors.

**Escalation phase (high interest, Class 4 or 3)**

Escalation can be defined as a significant and rapid increase in efforts and measures to counteract or neutralize a threatening or unpleasant stimulus or a significant change in the potency or severity of the stimulus. If faced with a novel and/or significant dangerous or unpleasant stimulus that is inescapable, the objective of the stimulus receiver (the person dealing with the stimulus) would likely be to escalate to neutralize the stimulus. As an example, at the beginning (March 2020) of the COVID-19 pandemic [8], there was a general effort to counteract the virus by taking preventive measures and evidence suggests that all people were alike in their likelihood of taking part in preventive personal behaviors [9]. Similarly, uncontrolled
chronic disease symptoms result in treatment escalation in efforts to control it, and this is associated with increased health-care costs [10–12]. Also, significant worsening in chronic patient disease severity typically leads to treatment escalation to counteract the worsening [13,14]. Correspondingly, in a conflict, many civilians counteract the dangers of bombs and missiles by hiding in the subway or their basements [15,16].

**Stalemate phase (high interest, Class 2)**

Over time, if a persistent unpleasant or threatening stimulus is perceived to be less potent, brought under control, or stabilized, it enters a stalemate phase. If the stimulus is stabilized or perceived to be reduced from its initial potency, this may indicate that current efforts to counteract it are helpful. In this situation, interest to continue to counteract the stimulus is likely to wane from its previous high (3 or 4) before the attenuating intervention. Indeed, during the COVID-19 pandemic, after the introduction of preventive measures, evidence suggests that over time there was an increased likelihood of risky behavior across groups [9,17]. Multiple lines of evidence support the notion of fatigue or decreased motivation to follow pandemic-instituted social distancing measures and health-protective behaviors over time [18–20]. Similarly, patient treatment adherence and persistence in many chronic diseases tend to decrease significantly over time if their symptoms are brought under control. Indeed, forgetfulness and patient good self-perceived health which are typical when disease symptoms are under control are known to play in role in reducing medication adherence and persistence [21].

If a persistent stimulus is perceived to be less potent, under control or manageable, resilience, habituation and adaptation are likely to follow. Indeed, after several years of people dealing with COVID-19, the availability of vaccines and preventive measures to counteract it has increased the need to live with it as part of daily life [22], indicating that people have come inured or resilient to its presence. Similarly, evidence suggests that over time many patients suffering from chronic disease/condition develop coping/adaptive mechanisms and resilience, and those who develop these mechanisms display quicker recovery from the negative effects of their condition [23–27]. These adaptive mechanisms developed to counteract the persistent unpleasant symptoms of the disease include prayer/meditation, optimistic outlook, social support, consistent exercise, being engaged in the community, expressing a greater belief that their lives have meaning, and accepting their condition and its consequences [23,24,28–31]. In contrast, lower acceptance of illness is associated with poorer health conditions [32].

In the stalemate phase, interest to maintain efforts to counteract the persistent stimulus is modulated by multiple factors including the individual perception of the potency of the persistent stimulus, socioeconomic status (SES), cost or stringency of the intervention, education/literacy, perceived benefit/harm of the attenuating intervention, etc. Research indicates that patient treatment adherence and persistence in many chronic diseases tend to decrease significantly over time for multiple reasons including forgetfulness, age, side effects, comorbidities, good self-perceived health, mood, and patient knowledge about medication regimen [21,33–36]. Similarly, people who saw the threat from COVID-19 as significant were more likely to maintain compliance with preventive measures [37,38]. Indeed, being female [37], having higher SES, having a higher perceived risk for infection and dying, having a more left-leaning political orientation, and having more COVID-19 cases in one’s state of residence positively influenced the likelihood of following or adopting pandemic mitigating behaviors [9].

**Persistent stimulus increasing in potency (high interest, Class 3 or 4)**

If a persistent stimulus is perceived to be increasing in potency, there is a tendency for interest to counteract it to remain very high (3 or 4) and this increases the likelihood of continued escalation of efforts to counteract or neutralize the stimulus regardless of whether means is low or high. Indeed, escalation of efforts to contain or suppress a rapidly spreading wildfire in the city area will continue as long as necessary to save lives and properties. The 2017 wildfires in California saw one of the worse destruction of properties and lives and the state mobilized a large number of firefighters and enormous resources to suppress the fire [39,40]. Until the fire was suppressed or brought under control, there was continued escalation. Similarly, uncontrolled chronic disease symptoms result in continuous treatment escalation in efforts to control it, and this is associated with increased health-care costs [10–12]. Research indicates that high levels of persistent pain despite the use of analgesics translate into a lower adaptation to illness leading to a decrease in the acceptance of illness [32]. This indicates that resilience and adaptation are less likely for patients with uncontrolled
pain or those suffering from pain that is worsening in potency despite all efforts to attenuate it and their lower adaptation, reduced acceptance of illness, and lower life satisfaction makes them more likely to continue to escalate efforts to reduce or counteract their pain.

De-escalation or discontinuation (low interest, Class 1)

When a persistent stimulus is perceived to have reduced in potency, been stabilized, or brought under control, interest to continue the stimulus neutralizing intervention could become low [1] regardless of whether means is high or low and this could result in discontinuation or de-escalation of the stimulus neutralizing intervention. Indeed, long-term treatment may be perceived by chronic patients as a loss and burden and this can negatively impact treatment adherence [41] regardless of SES. Evidence suggests that many chronic disease patients develop depression which could hamper their adherence to treatment [42–44]. Forgetfulness and patient good self-perceived health which are typical when disease symptoms are under control are known to play in role in reducing medication adherence and persistence [21]. Correspondingly, the nearly 20-y war of the US in Afghanistan was discontinued in 2021 [45] even though the country had the means to continue the war largely because of internal reevaluation of the country’s interest after significant human and financial resources have been expended and the perception of reduced threat level from Afghanistan.

Also, if a stimulus is worsening in potency and it is impossible to bring under control or neutralize it, this could lead to a reduction in interest to Class 1 and discontinuation or de-escalation of the attenuating intervention. As an example, treatment for terminally ill patients reaches a point where nothing more can be done for the patient but palliative care [46,47]. At this point, treatment is de-escalated as it may contribute to the patient’s suffering, and end-of-life palliative care is recommended. Similarly, physician-assisted suicide or medical assistance in dying is typically requested by patients with irremediable and debilitating medical conditions, who have lost hope and for which further treatment will not be significantly helpful to improve their grievous symptoms or quality of life [48–50]. Correspondingly, the Soviet Union’s invasion of Afghanistan in 1979 was met with stiff prolonged resistance that they were unable to overcome. Change in leadership with the emergence of Mikhail Gorbachev brought about a significant change in the country’s perceived interest and coupled with the unsustainable cost of the war, the significant loss of troops and equipment, prompted the Soviet Afghanistan withdrawal [51,52]. The same situation applies to the US–Vietnam war where the US spent over $200 billion and lost about 58,000 people [53] without neutralizing the communist North Vietnamese army.

Moreover, in the stalemate phase, interest in a stimulus neutralizing intervention could move between Class 2 and Class 1 due to intervention optimization. As an example, costs, side or adverse effects of medication, and any positive change in disease risk assessment could spur treatment discontinuation, dose reduction, or the use of alternative medications without any treatment escalation [54,55].

Re-escalation

In the stalemate phase, a significant change in the potency and/or novelty of the persistent stimulus increases the likelihood of escalation of efforts to counteract it. As an example, although, there have been many variants of COVID-19 [56], only the ones that posed a significant and/or novel threat led to the implementation of escalatory preventive measures which were removed once the threat was considered manageable. Indeed, the emergence of the more potent delta variant of COVID-19 spurred global panic causing many countries to reinstate precautionary measures such as lockdowns, curfews, travel restrictions, and mask mandates that have previously been lifted [57]. Similarly, the emergence of the omicron variant, a novel, and significantly dangerous variation of the virus, spurred global panic and the reinstatement of precautionary measures [58,59].

This tendency to escalate efforts to neutralize a persistent stimulus when it increases its potency is similar to what is observed in the treatment of patients with chronic illnesses. Patients suffering from chronic diseases which typically have no cure have to contend with many grievous symptoms and treatment typically follows an individualized approach which is guided by the patient’s response to treatment, patient’s disease severity, clinical status, and preferences [60,61]. The initial regimen is to stabilize the patient’s condition and maintain it if the patient is doing well. Treatment escalation is typically recommended if there is clinical or disease worsening until the maximum that can be
done for the patient is reached. Patient treatment adherence and medication persistence, treatment response, and clinical status are actively monitored and treatment is altered as necessary to achieve the best possible outcome for the patient [60]. Correspondingly, escalation in a conflict or war typically follows the same pattern. Indeed, the US military escalatory approach (increasing troop levels which was popularly known as the surge) was employed to arrest a worsening situation in both Iraq in 2007 and Afghanistan in 2009 [62–64].

**Stimulus persistence: risky and non-optimal behavior (high interest (Class 4, 3, and 2) and low means)**

If interest is very high (4, 3, or 2) but means is low, this increases the tendency for risky or reckless behavior and non-optimal approach. When interest is extremely high (Class 4) and means are low is called “grave” point defined as the most dangerous point for risky or non-optimal behavior. A good example of a grave point situation is that of people caught in the raging fire at the world trade center towers. They had a Class 4 (existential) interest to counteract the fire but low means and many chose to jump from the World Trade Center towers rather than face death by asphyxiation or fire [65], a non-optimal choice. Correspondingly, a nation-state like North Korea that perceives existential threats to its existence has developed a nuclear program in response to these perceived threats. The international community and the United Nations have imposed heavy economic sanctions which have significantly reduced the means (access, finances, and resources) of the country. These sanctions have not changed the behavior of North Korea because interest remains extremely high (Class 4). The reduction in means has made the North Koreans develop methods to evade the sanctions and counteract the perceived existential threats by engaging in non-optimal or non-conventional behavior expected from a nation-state [66] including cyberattacks, brinkmanship, nuclear and missile tests [67,68], and crypto theft [69].

Another example of a grave point situation is that of patients addicted to opioids. The symptoms of opioid withdrawal following addiction are intolerable for many patients. Indeed, the desire to avoid withdrawal symptoms and feel normal are the most important factors that drive drug-seeking behavior [70]. The approach for some physicians who suspect a patient of opioid misuse or abuse is to discontinue opioid therapy and even terminate the relationship [71]. The problem is that the withdrawal symptoms and cravings which have been described as life-threatening [72], are overwhelmingly strong that the interest to feel normal and counteract the symptoms is extremely high (Class 4). Cut off from prescription opioids, many patients switch to heroin and illicitly produced fentanyl [73] to counteract these withdrawal symptoms and feel normal. Some opioid addicts take to theft [74,75] and some women turn to prostitution [76] to satisfy this powerful interest. Also, opioid addicts incarcerated face imposed withdrawal, and to alleviate their withdrawal symptoms some took medications prescribed for other patients or bought “spit-back” medications [77].

If a persistent stimulus is perceived to be less potent or stabilized and interest is high (Class 2) but means is low, this increases the tendency of risky behavior and non-adherence or compliance. Indeed, if means is low because the proposed intervention is too tasking or expensive, adherence is likely to be reduced. Research indicates that low SES was found to be associated with more risky behaviors and difficulty practicing recommended COVID-19 pandemic mitigating behaviors [9] and high-cost COVID preventive measures (physical distancing) saw a decline in adherence [17]. Similarly, evidence suggests a strong relationship between treatment discontinuation over time and SES [78–81].

**Discussion**

Interests and means are the cornerstones for understanding the influence of the persistence of a significantly threatening or unpleasant inescapable stimulus and their variations in efforts of counteracting the stimulus provide an insight into the dynamism of human behavior.

If an unpleasant or threatening stimulus is worsening in potency, there is an increased likelihood of poor adaptation and high interest to continue the escalation of efforts to neutralize it to ensure well-being. However, if a persistent unpleasant, or threatening stimulus is perceived to be less potent, or brought under control (stabilized), interest to counteract the stimulus is likely to reduce from its previous high before the attenuating intervention. Interest to maintain the attenuating intervention is modulated by different factors and may reduce over time. Interest follows this pattern in all persistent inescapable unpleasant or threatening stimuli (Figure 2). Indeed, the introduction of COVID-19 preventive measures caused an increase in risky behavior across all groups, and adherence to COVID preventive measures reduced over time because of reduced perceived
risk, the cost/stringency of preventive measures, knowledge/literacy, and SES. Correspondingly, medication adherence reduces over time in chronic diseases due to the perceived benefit/harm of the medication, good self-perceived health, knowledge/literacy, SES, and side effects. Similarly, interest to maintain support for Ukraine by western allies in the Russian-Ukrainian conflict [82] may reduce over time due to western allies’ economic damage, inflation, high cost of living, and Ukrainian success or failure on the battlefield. When a persistent inescapable stimulus is perceived to be less potent or stabilized, escalation of efforts to neutralize the stimulus is usually when the threat or burden from the stimulus becomes significant and/or novel in its potency and form. If the stimulus change in potency is not perceived as significant, there is a low likelihood of escalation.

Also, interest to counteract any persistent inescapable unpleasant, or threatening stimulus follows the same pattern of escalation and de-escalation/discontinuation. Indeed, just as mutations of COVID-19 into more significantly dangerous strains led to an escalation of preventive measures to counteract it so is the treatment of chronic disease escalated when there are signs of significant clinical worsening and de-escalated/discontinued in disease remission or when symptoms severity is reduced/stabilized. Similarly, a protracted war between two evenly matched opposing forces will result in a stalemate and a significant escalation from one of the parties will elicit a similar response from the other. Furthermore, just as interest reduces for further treatment if a chronic disease reaches a point where nothing can be done for a patient so does interest to continue fighting reduce resulting in discontinuation if one of the warring parties in a conflict is overwhelmed by the stronger force. Just as side effects or perceived lack of benefit of medication in the treatment of a chronic disease results in low interest and discontinuation so is poor food or supplies and inferior weapons to face a superior enemy in a war can lead to personnel low interest to fight and desertion.

Risky and non-optimal behaviors are common when interest is high and means are low and the same pattern is observable in all situations involving a persistent inescapable unpleasant or dangerous stimulus. Of note is Class 4 interest which is extremely difficult to modulate. Risky behavior is highest at grave point; the point where a stimulus receiver has a Class 4 interest but low means. The unfortunate case of a patient in persistent pain with no relief from treatment who took the extraordinary step of murdering his physician [83] is a case in point of how extremely high interest to counteract a significant and inescapable persistent stimulus coupled with low means can push people to act in non-optimal ways. However, although extremely difficult to modulate, if means are significantly reduced, a Class 4 interest can be modulated in some cases. As an example, the North Korean regime which perceives an existential threat from the US, conducted a nuclear test in 2006 which was followed by economic sanctions from the UN security council. During this time, evidence suggests that trade between North Korea and its main economic partner remained largely unaffected [84]. Unsurprisingly, they conducted further tests in 2009, 2013, twice in 2016, and 2017. Importantly, in 2018, North Korea stopped its missile programs (long-range nuclear and ballistic) and indicated that it was willing to denuclearize. Research indicates that a decline in trade between North Korea and her economic benefactor, China, and improvements in the China-US relationship modulated North Korea’s behavior [85] during this time. Another example is the Portuguese colonial war (1961 and 1974) stopped because of the significant depletion of means (the war was consuming significant state resources) which spurred a change in internal leadership and revision of the country’s strategic interest [86]. Similarly, some opioid addicts incarcerated with no access to heroin were forced to detox from heroin [77].

The stimulus persistence theory can serve as a framework to predict behavior and could be used as an interventional framework. The ongoing war in Ukraine [87] is a case in point. The Russian plan to neutralize the Ukrainian army was met with significant resistance and this has prolonged the conflict [82]. Significant economic sanctions have been imposed on Russia [88] aimed at depleting her means (finances and resources) to finance and prosecute the war but this has not been successful in modulating her interest; a Class 4 interest that is very resistant to modulation. Russia’s means have not been depleted as the high energy prices have cushioned the effects of the economic sanctions and not all countries have supported the sanctions [88]. Ukraine is being supported with resources to continue fighting. Using the stimulus persistence theory, below are some possible outcomes of the conflict:

(1) The sanctions will ultimately take effect significantly reducing Russian financial means. This may result in the use of non-optimal methods
and weapons to achieve their objectives if interest remains extremely high.
(2) Casualties in the war on one or both sides eventually impact means (manpower) and modulate interest increasing the likelihood of negotiation and de-escalation.
(3) Change in leadership by either warring party could reduce interest from Class 4
(4) The war falls into a stalemate and Ukrainian allies become inured to the fighting and this may reduce their interest from its height at the time of the invasion.
(5) Interest of Ukrainian allies is reduced because of the economic damage/pain caused by the sanctions/war and a lack of Ukrainian success with the significant resources and energy expended.
(6) Russia makes significant advances with the potential for total defeat and Ukrainian allies escalate because interest remains very high.
(7) Ukraine makes significant advances with the potential for total defeat and Russia escalates because interest remains very high.
(8) Russia makes significant and steady advances overwhelming the Ukrainians leading to negotiations and de-escalation.
(9) Facing significant losses and potential defeat, Russia employs nuclear weapons or a new tactic that causes unprecedented, outrageous, and significant damage to Ukraine resulting in escalation from Ukraine and her partners.

The economic sanctions will not stop the war as far as Russia continues to perceive Ukraine and its pro-western tilt as an existential threat. Indeed, reducing the means could potentially make things worse if Russia’s interest remains very high. Alternative weapons, tactics, and brutality may increase as a consequence of low means and extremely high interest. As far as Russian means are not significantly reduced, it will be difficult to change her interest level. The possibility of change in leadership on both sides is impossible to predict but this could potentially impact interests and objectives.

Also, chronic diseases are on the rise and are expected to rise further in the future. Many of these diseases have no outright cure and the treatment goal is often to improve patient quality of life and relief symptoms. Patients with chronic conditions whose interest to attenuate their symptoms remains high or extremely high (Class 4 or 3) are more likely to be those who are not getting effective relief for their most burdensome symptoms, are unable to develop adaptive mechanisms, and accept their illness. Such patients are likely to suffer from low quality of life and low life satisfaction. The goal of treatment of patients with chronic disease or conditions must be to reduce interest to Class 2 by effectively relieving patients of their most severe symptoms, helping them adapt and accept their illness/condition, and employing resources including patient education, psychosocial support, psychological treatment, peer support, etc. Ways to help patients find meaning in life should also be explored because evidence suggests that the presence of meaning is negatively associated with negative affect and positively associated with life satisfaction, and happiness. Patients whose interest remains in Class 3 or 4 (those with greater disease burden or unattenuated symptoms) with low means may engage in risky non-recommended or non-optimal behaviors to relieve their condition including non-evidence-based approaches (such as traditional and herbal medicine), suicide, and even violence. The government must do more to help patients with severe chronic conditions particularly those of low SES to have optimal access to healthcare and relevant health services as well as provide financial support. Clinicians must do all they can to attenuate patients suffering and reduce their interest to counteract the unpleasant persistent stimulus of their chronic condition from being too high (Class 4 or 3) or too low (Class 1).

Finally, it is important to note that the stimulus persistence theory works on the assumption that people (the stimulus instigator if it is a person and the stimulus receiver) are rational actors because the actions of irrational actors are unpredictable. Also, its scope is limited to when a person is dealing with a significant unpleasant or dangerous persistent stimulus that is inescapable. There are variations in the definition of stimulus persistence from a few seconds/minutes in a case of a person trapped in a building by a raging fire to years in the case of a protracted war. Furthermore, individual perception of the significance of a threat or unpleasantness of a stimulus varies and this may affect individual response. Learned helplessness which tends to develop with prolonged exposure to uncontrollable and persistent stressors could play a role in individual interest to counteract a persistent significant unpleasant or dangerous stimulus. Human decision-making is complex and interest is modulated by different types of biases and fallacies that may not have been comprehensively discussed in this paper. Also, the theory applies to humans and may not be applicable in understanding behavior at the cellular or micro levels. Although the theory may be used to understand and predict the behavior of rational people dealing with a significant persistent aversive stimulus that is
inescapable, the evidence presented in this paper includes the behaviors of countries in international relations, behaviors of people dealing with addiction, severe chronic diseases/conditions, wildfire, a virus pandemic, and a protracted conflict. There may be situations of rational people dealing with an inescapable significant persistent aversive stimulus that the theory has not taken into account and in which it may not be applicable. The most important implication of this theory is that it unifies dissimilar situations involving a persistent and inescapable stimulus improving understanding of behavior in these different situations. Another implication of the persistence theory is that interest can be created or elevated. However, over time, interest to continue to counteract or maintain the attenuating intervention is likely to wane due to various factors including reduced perception of the stimulus threat potency, lack of perceived benefit with efforts expended or required to be expended, literacy/education, cost or stringency of neutralizing intervention, etc. The most effective way to counteract this tendency and increase interest again will be to make the stimulus appear significantly more threatening or unpleasant especially in a novel way, or stimulate interest using different approaches including increased education, and trust-building measures such as engagement, improved messaging on the benefits of counteracting the stimulus and maintaining the attenuating intervention measures, reducing the cost/stringency of the attenuating intervention, especially for people of low SES, etc.

Conclusions

The behaviors of rational people dealing with a significant persistent aversive stimulus that is inescapable are similar and predictable. A person managing a severe chronic disease is fundamentally in a protracted war with the disease and their behavioral patterns are similar to people in a state of war or in an area where there is a significant and dangerous wildfire or disease outbreak. Interest to counteract a significant persistent threatening or unpleasant stimulus is influenced by many factors including the individual perception of the threat or unpleasantness of the aversive stimulus, means to counteract it, the effectiveness of the neutralizing intervention well as the cost/benefit of maintaining the neutralizing intervention.

The shock of the new member

A person who joins a group that has become inured or resilient to an unpleasant inescapable persistent stimulus is likely to be shocked at the indifference displayed by the group members toward the stimulus. However, over time being in the group, as far as means are low and the new member cannot galvanize the interest of the group to counteract the stimulus, they may gradually become inured to the stimulus. As an example, India is a country with a persistent problem of urban waste management driven by low interest and means. Indeed, this problem is believed to be due to inadequate policy and legislative tools as well as low financial resources, and capacities of local bodies [93]. Both the local government and the populace have become indifferent to the problem. A foreigner visiting this area of India will be shocked at the way people ignore the waste problem and go about their lives. If the foreigner has no choice but to live in this area for a long time, they may initially escalate efforts to counteract the unpleasant stimulus emanating from the waste by using a mask and other methods. But over time, if the stimulus is unvarying or not perceived to be worsening, and if the attenuating measures are burdensome, they may not maintain the attenuating measures. They are likely to adapt and become inured or indifferent to the conditions.

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[35] glader et al. aarp public policy institute policy reports 2016 feb 1;1(2):1-9. available from: https://www.aarp.org/content/dam/aarp/ppi/health/policy_reports/2016021 Papua New Guinea, where the prevalence of palliative care services is very low. This is evident from the limited availability of specialized palliative care services in the country. The lack of trained professionals and resources for palliative care delivery is a significant barrier to the provision of adequate care for patients in need.

[36] According to a study by the World Health Organization (WHO) in 2018, the proportion of countries with palliative care services is only 30%, with most of them located in high-income countries. In low-income countries, the situation is even worse with only 2% of countries having such services.

[37] The lack of palliative care services in low-income countries is particularly concerning given the high prevalence of chronic illnesses and terminal illnesses in these regions. For example, in sub-Saharan Africa, the prevalence of cancer is projected to increase from 6.2% in 2020 to 8.8% in 2040, making palliative care an essential component of cancer care.

[38] In conclusion, while palliative care services have made significant strides in high-income countries, there is still a long way to go in low-income countries. A more comprehensive approach to palliative care delivery, including the training of more palliative care professionals, is urgently needed to ensure that patients in need receive the care they deserve.
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