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Review

"GOD SPOKE TO ME":

SUBJECTIVE PARANORMAL EXPERIENCE AND THE BRAIN'S HOMEOSTATIC RESPONSE TO EARLY TRAUMA

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ABSTRACT

Subjective paranormal experience (SPE) has been a notable part of the human historical narrative. Alleged miracles, telepathy, clairvoyance, precognition, witchcraft, spiritualism, monsters and ghosts have received a supernatural interpretation. The incidence and prevalence of reported SPE remains at high levels in all populations investigated to date. Previous research on SPE has focused on the cognitive and social factors that facilitate paranormal beliefs and experiences. I consider here developmental factors in the brain's responses to trauma that appear to predispose certain individuals towards SPE. The theory draws upon the established mechanisms of dissociation and fantasy generation to describe and explain the origins of paranormal experience. The theory hypothesizes that childhood abuse and victimization trigger autonomic responses of dissociation, depersonalization and compartmentalization. Freezing and associated releases of fantasy serve as a survival strategy in the homeostatic regaining of safety and control. The predictions from the homeostasis theory are consistent with the findings of multiple studies and falsifying evidence has yet to be identified.

Keywords: subjective paranormal experience, homeostasis, trauma, dissociation, depersonalisation, compartmentalisation, fantasy proneness, safety, control, survival

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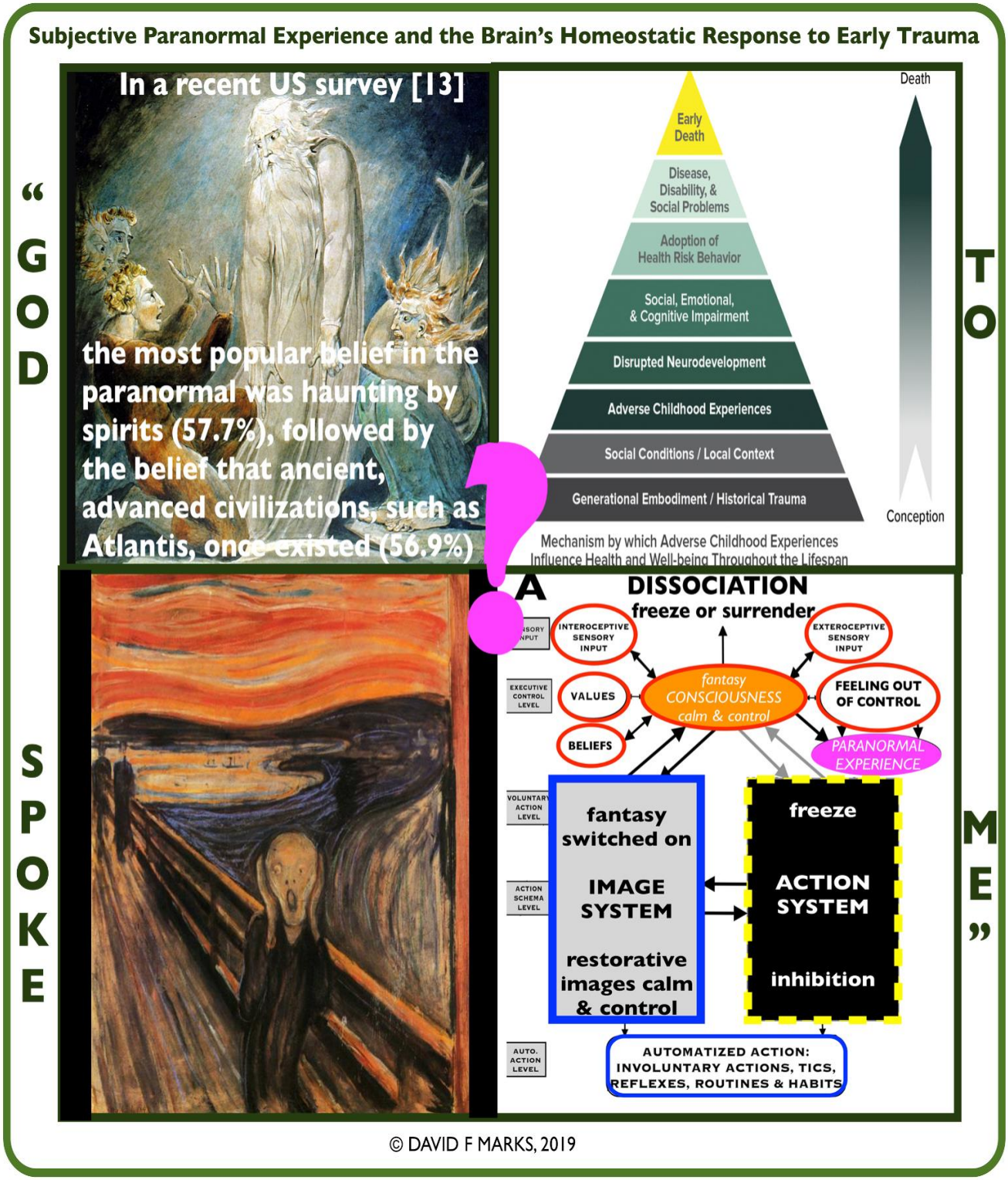
GRAPHICAL ABSTRACT



1. INTRODUCTION

One ingredient of an interesting life is anomaly, especially anomaly that defies explanation. I do not just mean oddness or peculiarity in human behaviour, for these are

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everywhere to be seen. I refer to things that should just not be so, the weird, the wonderful, the sheer spooky, the face in the mirror that isn't you. Anomalistic experiences feel weird and strange. If we engage with the experience, we wish to understand it, to dig beneath the surface, to perhaps discover something new, an insight, a new perspective on our fragile view of 'Reality'. In their editorial in *Cortex*, Peter Brugger and Christine Mohr (2008) wrote:"*Paranormal ways of experiencing and reasoning seem predestined to link abnormal to normal ways, and their study may thus be ideally suited to bridge major gaps between (neuro)psychology and cognitive neuropsychiatry. The other, related reason is the Janusian face of at least some paranormal beliefs, i.e., their double relevance for (a) understanding pathologies of belief, and (b) elucidating at the same time the cognitive bases of some of the most adaptive forms of human reasoning, i.e., creativity. Investigating the paranormal mind may serve to substantiate the perennial idea about commonalities between genius and madness"* [1](p. 1291). Mystical, paranormal and anomalous experiences of multiple different kinds permeate all cultures and religions. The Torah is claimed to have been given by God to Moses, who wrote it down verbatim. The Quran was revealed to Mohammed directly by God, and the gospels of Christianity came as the word of God directly to Jesus. These accounts are replicated by a participant in a recent scientific study who stated: "**God spoke to me and His voice was as real as the person next to me**"[2]. There appears to be no limit to what is believed and acted upon in contemporary society. To give one example, Nostradamus, born in 1503 in Saint-Rémy-de-Provence, France, is believed by some to have predicted the moon landings of 1969 and the Notre Dame fire of 2019.

The purpose of this article is to provide a scientific explanation for paranormal and mystical experience by offering an integrative review and theory. The concepts are defined, the research literature reviewed, the assumptions declared, and the theory composed. The motivation comes principally from three facts: 1) the incidence and prevalence of reported

subjective paranormal experiences (SPE) are high and, in some areas, increasing; 2) the incidence and prevalence of reported child abuse are high and, in some areas, increasing; 3) because they are reported by a majority of the population, SPEs are 'normal' aspects of conscious experience that lack any accepted scientific explanation.

It is helpful to contextualize this paper with a few remarks about the relationship between the discipline of Psychology and its distant cousin, Parapsychology. In theorizing about anomalous experience, it is intuitively appealing -to this author at least- to treat the field of Parapsychology as a part of the Psychology discipline. Subjective anomalous experiences such as synesthesia, lucid dreaming, hallucinations, psi-related experiences, and near-death experiences can be viewed as an essential topic in psychology . Bringing the 'Para' part back into mainstream Psychology helps to make the discipline more integrated and complete. I believe that integration can best be achieved within shared theory.

Psychology contains myriads of variables, A,B,C…N…X,Y,Z. One strategy for producing new studies is to identity gaps in the literature and to set about filling the gaps with correlational studies using almost every available permutation and combination of variables. This is what I call 'Polyfilla Science'[1], an essentially tick-box exercise with minimal scientific meaning. 'Polyfilla Science' exists on an industrial scale, keeping thousands of researchers busily in competition. Research funds, promotions and prizes are given to those workers who fill the most holes and produce the most papers in high impact journals. 'Polyfilla Science' can be represented by a multidimensional matrix of cells. The scientist sees his/her task as filling every last cell in the space. Many researchers find it necessary to use the Polyfilla approach by testing a dozen or more "hypotheses" in one go using inconclusive cross-sectional,

[1] In the UK, Ireland, South Africa, Australia, and Canada, the brand "Polyfilla", is a trademarked name for a multi-purpose filler, used as a generic term for what in the US is called 'spackling paste'.

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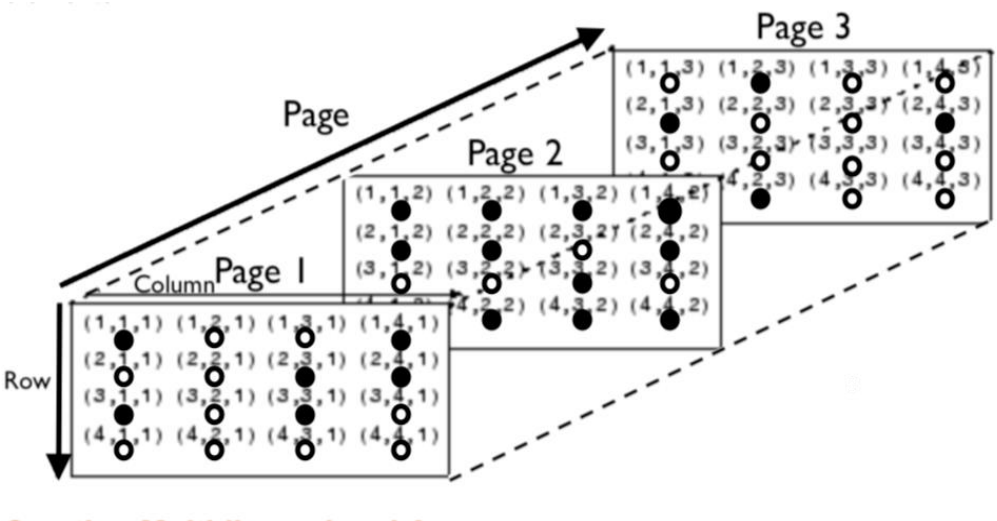
correlational research designs. Fortunately,'Polyfilla Science' is not the only game in town. A theory-driven approach (i) identifies questions that need answering by developing concrete hypotheses and predictions; (ii) designs tests of theories by making predictions.

FIGURE 1: A 'Polyfilla Model' of Science as a 3-dimensional space of rows, columns and pages. The space can be extended indefinitely in all directions. In this example, page 1 has 6 filled and 4 unfilled cells, page 2 has 10 filled and 6 unfilled cells, and page 3 has 4 filled and 6 unfilled cells. The process of filling continues indefinitely as more pages, rows and columns are added by splitting and redefining hypotheses into ever finer categories. With every filled hole the investigator can generates ever finer categories and so the research continues indefinitely and independently of its theoretical importance.



In the first 20 years of the 21st century, there have been some astonishing scientific discoveries: the first draft of the Human Genome, graphene, grid cells in the brain, the first Self-Replicating, Synthetic Bacterial Cells, the Higgs boson, liquid water on Mars and Gravitational waves. Sadly, neither Psychology nor Parapsychology has made discoveries during this period which would be worth telling one's grandchildren. One part of the problem is the lack of integrative theories. Over more than a century, fragmentation in Psychology has

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been called a 'crisis'. One of the fragments, Parapsychology, has been ungraciously pushed aside as the most peripheral member of the Psychology family. The term 'Parapsychology' itself appears unhelpful and could be dispensed with. The term "Anomalistic Psychology" covers the same territory, involves no loss of meaning while removing the unwanted baggage. This same point of view has been expressed by Irwin (2009)[3].

I propose here a unifying theory of homeostasis for paranormal ideation and SPE which connects the topic with a general theory of behaviour. Unusual experiences are encounters that deviate from accepted explanations of reality [4]. It is proposed that SPE provides one clue to the occurrence of trauma-related dissociation in childhood, not an infallible one, to be sure, but a clue worth taking seriously. Individuals damaged by childhood trauma seek higher levels of safety, stability and equilibrium in fantasies, beliefs and experiences of the paranormal. These individuals may also tread beyond what authorities in the mental health world see as the boundaries of 'normality', and present hallucinations and delusions that are assumed by clinicians to be episodes of psychosis, assumptions that, today, are questioned, e.g.[5]. The first step in this review is to examine the evidence on the prevalence of beliefs and experiences of the paranormal.

2. PREVALENCE OF PARANORMAL BELIEFS AND EXPERIENCES

When we talk about beliefs, we refer to a conviction that an idea is true, that an object or ability exists. Beliefs are more than simply cognitive processes however. They are cognitive, emotional and behavioral in nature. One feels one's beliefs as much as one thinks them. Beliefs are projections of ourselves. When a person's beliefs are challenged, a person may feel as it they are being attacked personally. Beliefs are acquired from a variety of sources including family, friends, associates, media and education [6]. Being ready to defend one's beliefs using rational argument is one of the values of education. With widening access to scientific education one might have expected to see reduced levels of superstition and beliefs

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in the paranormal. However, the reality is far from this. Intense interest in the paranormal in books, movies, TV dramas, and video games has significant and sustained impact [7].

Traditionally, research on superstition and magical thinking has focused on people's cognitive shortcomings, but, as Risen (2016)[8] has pointed out, many smart, educated, emotionally stable adults hold superstitious beliefs that are not rational. Dual process models such as those of Kahneman and Frederick (2002)[9] help to show why superstitious thinking is so widespread and maintained, but there is also acquiescence/conformity when people detect an error, but choose not to correct it.

Beliefs in paranormal powers have been a cultural feature since time immemorial and remain popular everywhere today. Queens, Kings, Emperors, Presidents, sages, scientists – including several Nobel laureates – philosophers, prophets and poets are all represented in the huge following of the paranormal. If you yourself are a believer, feel no shame, you are in the most distinguished company. In contemporary Western societies, the typical incidence of paranormal belief is around 50% of the population. Ross and Joshi (1992)[10] in Canada found more than half of their participants reported at least one ESP experience. Haraldsson and Houtkooper (1991)[11] surveyed 18,607 participants from Europe and the US to find a high percentage of respondents reported at least one paranormal experience, 46% in Europe and 60% in the US. More women than men reported telepathy and contact with the dead. There is evidence that, in some regions, the incidence of paranormal beliefs is increasing. Lindeman and Aarnio (2006)[12] found that more than one-third of US adults believed in psychic powers and ESP. The Chapman University Survey of American Fears Wave 5 (October 16, 2018)[13] found that paranormal beliefs are the norm in the US. Only one-quarter of US adults (24.1%) did not hold any of seven beliefs. Slightly more than 75% of US adults believed in at least one paranormal phenomenon and 4.8% believed in all 7 paranormal beliefs. The sample showed high and, increasing rates of paranormal beliefs compared to previous years

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ranging from belief in aliens and psychic powers to Bigfoot and haunted houses. In 2018 the most popular belief in the paranormal among US adults was haunting by spirits (57.7%), followed by the belief that ancient, advanced civilizations, such as Atlantis, once existed (56.9%). More than two-out-of-five Americans (41.4%) believe that that aliens visited Earth in our ancient past and more than a third believe aliens are visiting now (35.1%). US Americans are the most skeptical about fortune tellers, with only approximately 17.2% believing that others can see the future. It is striking how rapidly such beliefs were rising between 2017 and 2018, when prevalence of six of the seven beliefs increased, the only exception being the belief that fortune tellers and psychics can foresee the future.

FIGURE 2: Notable people who have declared superstitious behaviours and beliefs in the paranormal. A: Nostradamus, French astrologer; B: Empress Joséphine; C: Emperor Napoleon Bonaparte; D: Alfred Russel Wallace, co-developer of the Theory of Natural Selection; E: Queen Victoria, Queen of the United Kingdom of Great Britain and Ireland; F: President Barack Obama.

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In the UK, beliefs in the paranormal are also popular. In a nationally representative sample of 4,096 adults aged 16 years and over across Great Britain in 2009, 37 per cent reported at least one SPE and women, the middle-aged and individuals resident in the South West are more likely to report such experiences (Castro, Burrows and Wooffitt, 2014)[14]. In a northern English metropolitan university, a sample of 1215 adults, 75.7% (920) of whom were female and 24.3% (295) were male, the most frequently reported SPEs were ESP (23%), astrology (15%), haunting (14%), and contact with the dead (13%)(Dagnall et al. 2016)[15]. The majority who reported ESP (73%), Haunting (69%) and Witchcraft (67%) related experiences, recalled more than one experience. Incidence of PK (46% vs. 54%), Contact with the Dead (46% vs. 54%), and Astrology (44% vs. 56%) contained roughly equal proportions reporting single vs. multiple experiences. Of the respondents claiming an SPE, 43% reported one experience type, while 57% reported different types of SPEs. Within multiple experiencers, 94% identified between 2-5 experience types and 6% more than 5 experience types.

The high prevalence of SPEs in the US and UK of 50-70 percent is similarly reported in Germany (Schmied-Knittel and Schetsche, 2005)[16]. Many studies have found similar results and evidence of increases in prevalence of SPEs [17-21]. Qualitative research on the meaning of SPEs is at an early stage, but there are a few, early findings. Drinkwater, Dagnall, Grogan and Riley (2017)[22] investigated personal accounts of SPEs with 10 UK using semi-structured interviews and thematic analysis, a method that identifies patterns within data. They discussed how alleged paranormal experiences made them feel, whether the narrated event was unusual/strange, and what they believed caused the occurrence. Five central themes emerged: sensory experiences, you are not alone, distortion of reality, personal growth, and socio-cultural factors. The analysis revealed an “intricate, inextricable link between

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perception, interpretation and belief. Generally, SPEs were associated with the desire to comprehend the unknown and a reluctance to accept the uncertain"[22](p. 23). In the next section, the relationships between paranormal belief and experiences are examined.

3.BELIEFS AND EXPERIENCES: A CHICKEN-EGG PROBLEM

When talking about having a belief in something, we are referring to a conviction that the thing (or idea or ability) actually exists. Plainly, belief and experience are not one and the same. However, there is a reciprocity between the two. Actually having a SPE is strongly supportive or even causally connected to the corresponding paranormal belief. However, a reverse causal association is not necessarily the case. A person can believe something to be true, for example, that there are Yetis in the Himalayas, but not ever directly experience Yetis for themselves. However, if a person visits the Himalayas and observes a Yeti, then their belief in Yetis is entitled to become very strong. Personal experience of paranormal phenomena is cited as the most common reason for paranormal belief [23-25]. While knowledge is always fallible, new experiences and observations strengthen beliefs, regardless of whether or not one is a Bayesian. The situation can be described by two statements:

A) Paranormal Experience produces Stronger Paranormal Belief.

However, the connection between belief and experience also can run in the opposite direction. If a person believes strongly that something is the case, for example, that Yetis exist in the Himalayas, and goes looking for the thing that they believe in, the person may well find it, or find something that appears quite similar. If a person looks for a Yeti in the snow, but sees a footprint left by a large bear, they might well think that they have found evidence of a Yeti. In this case, the relationship runs counter to that shown above, namely:

B) Paranormal Belief produces Paranormal Experience.

Statements A and B indicate a circularity between belief and experience that is difficult

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to unravel. It is a 'chicken/egg problem' especially if the only measure one has of the association between experience and belief is a correlation. In the majority of studies following the correlational route, there is no way of making any conclusions about the causal direction of the association or, even, if there is a causal relationship. One way of breaking the circularity is to take a lifespan perspective and consider the issue developmentally. Using a lifespan approach one can ask, which comes first in a person's lifetime, belief or experience? When we know the answer to this question, we can proceed to determine what triggered the SPE. Using longitudinal research designs, one can explore factors in early life experience that predispose individuals to have SPEs.

How do we explain the existence of SPEs? To date, three main theories have been suggested:

1)Socialization to a Cultural Source, absorbing paranormal beliefs and experiences through exposure to family members and close friends with a shared culture of paranormal belief, e.g. joining religious, cultist groups, reading astrology columns or New Age literature, watching paranormal-themed entertainment on television [26], YouTube, games and social media that promote paranormal content. The Cultural Source theory points to a significant cultural context for paranormal experience, but it cannot explain the huge variations that exist between people in the number and intensity of their paranormal beliefs and experiences.

2)The *Social Marginality Theory* suggests that paranormal experiences are more likely in socially marginal people with limited education, low income, low social status, ethnic minorities, unstable sexual relationships and few friendships [27]. The paranormal provides compensation for the pressures arising from these types of 'structured social marginality'. However, the evidence in support of this hypothesis is inconsistent and the theory appears untenable due to the diverse cross-section of the population who report paranormal

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experiences [14,28].

3)The *Experiential Source Theory* of McClenon (1994)[19] suggests that anomalous experiences have a universal physiological basis, which acts as a source of recurring beliefs in spirits, souls, life after death, and magical abilities. McClenon's (2000)[29] content analysis of a collection of 1215 accounts of anomalous experiences indicated to him that experiences of apparitions, paranormal dreams, and waking extrasensory perceptions have uniform structures and that these experiences coincide with recurring ideas within folk traditions. McClenon's hypothesis is speculative and, to date, has not received the attention it deserves; the theoretical predictions require testing by independent researchers.

I review next the literature on the incidence and prevalence of childhood trauma and its connections with the processes of dissociation and SPE.

4.CHILD ABUSE, DISSOCIATION AND SPE

Over the last decade,'celebrity' cases of childhood victimization have been publicized in the media. In 2012, the UK had its 'Jimmy Savile moment'; in 2019, the US had its 'Michael Jackson moment'. In 2019, one of the Pope's closest advisors, Cardinal George Pell, was convicted of sexual abuse and Pope Benedict XVI issued an apology for child abuse by priests. Studies in the US by Finkelhor (1994, 2008)[30,31] and Finkelhor et al.(2014)[32] suggest that 1 in 5 girls and 1 in 20 boys is a victim of child sexual abuse. Finkelhor's reviews indicate that 20% of adult females and 5-10% of adult males recall a childhood sexual assault or sexual abuse incident; during a one-year period, 16% of youth ages 14 to 17 had been sexually victimized, and, over the course of their lifetime, 28% of youth aged 14 to 17 had been sexually victimized. The late 1980s and early 1990s saw an increase in the reporting of childhood sexual abuse in the US. The US Department of Health and Human Services' Children's Bureau (2016)[33] reported that the vast majority of 78.3% suffer neglect, 17.6% suffer physical abuse and 9.2% of victimized children are sexually assaulted yet the

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impact can be equally profound across all categories. The National Institute of Justice (2003)[34] suggested that 3 out of 4 sexually assaulted adolescents were victimized by someone they knew well. More than 25% of children and adolescents in the US are exposed to a traumatic event by the age of 16, and many are exposed to repeated events [35]. Since the late 1980s, the detrimental effects of child sexual abuse (CSA) on the well-being of victims has been systematically researched. A child who is the victim of prolonged sexual abuse usually develops low self-esteem, a feeling of worthlessness, an abnormal or distorted view of sex, become withdrawn and mistrustful of adults, or even suicidal [36-43].

A substantive contribution to the understanding of childhood trauma has been drawn from the clinical theorizing of the 19th century French psychologist, Pierre Janet (1889/1973) in *L'automatisme psychologique* [44]. Janet was interested in the integration of experience associated with trauma which were accompanied by "vehement emotion and a destruction of the psychological system", a process Janet called "dissociation"[45](p. 1532). Dissociation occurs when mental functions split into a compartmentalized or automatic way of operation outside of conscious awareness or memory recall [46-48]. Janet's dissociation theory focused on the role of dissociation, and especially compartmentalization, in conditions induced by trauma and is relevant for research into traumatic stress and posttraumatic 'hysteria'[49].

Dissociation has been defined as "an experienced loss of information or control over mental processes that, under normal circumstances, are available to conscious awareness, self-attribution, or control, in relation to the individual's age and cognitive development"[50](p.246). In discussing the dissociation construct, theorists have proposed a dichotomy between two qualitatively different phenomena:'detachment' and 'compartmentalization'[51]. Detachment incorporates depersonalization, derealization and similar phenomena such as out-of-body experiences, all of which can occur in combination

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[52]. Detachment involves feelings of being ‘spaced out’,‘unreal’ or ‘in a dream’. Patients may have SPEs in which events seem as though they are not really happening, with the external world appearing pallid and two-dimensional.‘Peri-traumatic dissociation’ involves a sense of detachment at the moment a traumatic event occurs and can be evaluated with ‘The Peritraumatic Dissociative Experiences Questionnaire’[53]. It is thought that in peri-traumatic detachment, the encoding of information is disrupted so that memories of the traumatic event may be incomplete. Such fragmented memories can trigger intrusive images and flashbacks [54]. It may be that peri-traumatically encoded feelings of detachment are part of the intrusive memory that is re-experienced, or perhaps the process of re-experiencing itself generates feelings of detachment. Becoming totally immersed in a traumatic memory to the point of believing that the event is actually happening again (‘flashbacks’) appear relatively rarely.

Compartmentalization involves a deficit in the ability to deliberately control processes or actions that would normally be amenable to such control [51,55,56]. It incorporates an inability to bring normally accessible information into conscious awareness (e.g. dissociative amnesia). The functions that are no longer amenable to deliberate control, and the information associated with them, are said to be ‘compartmentalized’. One of the defining features of this phenomenon is that the compartmentalized processes continue to operate normally [57-59]. Dissociation is viewed as an adaptive strategy to intense stress or trauma that leads to conditioned dissociative reactions, which can prevent adequate processing and integration of information [60-63]. Repeated trauma can sensitize a child to consequent hyper-arousal, leading to dissociative responding under stress [64](Perry, Pollard, Blakley, Baker,& Vigilante, 1995). In their landmark paper, Bruce Perry et al. describe trauma processes in the following terms:

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"When threatened, a human will engage specific adaptive mental and physical responses Increasing threat alters mental state, style of thinking (cognition), and physiology (e.g., increase heart rate, muscle tone, rate of respiration). As the individual moves along the threat continuum from calm to arousal to alarm, fear, and terror—different areas of the brain control and orchestrate mental and physical functioning. The more threatened the individual, the more "primitive"(or regressed) becomes the style of thinking and behaving. When a traumatized child is in a state of alarm (because they are thinking about the trauma, for example) they will be less capable of concentrating, they will he more anxious and they will pay more attention to "nonverbal" cues such as tone of voice, body posture, and facial expressions. This has important implications for understanding the way the child is processing, learning, and reacting in a given situation. A traumatized child is often, at baseline, in a state of low-level fear—responding by using either a hyperarousal or a dissociative adaptation the child's emotional, behavioral, and cognitive functioning will reflect this (often regressed) state"[64](p.274).

Although, it must be acknowledged that many abused women do not show evidence of having dissociative experiences [65], the theory presented here can be applied to the sizable proportion of cases where trauma triggers dissociation, especially in child abuse. The evidence suggests that SPEs are one of the more frequent sequalae of childhood trauma. Ellason and Ross (1997)[66] found ESP experiences correlated .45 and .44 respectively with the level of childhood physical and sexual abuse. Similar findings were reported by [10] from a random sample of 502 adults in Canada. Reports of paranormal or extrasensory experiences were common and linked to a history of childhood trauma and also to dissociation. Ross and Joshi [10] conceptualized SPE as one aspect of the dissociation triggered by child abuse. SPEs discriminated between individuals with childhood trauma histories from those without trauma histories. Perkins and Allen (2006)[67] compared

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paranormal belief systems in individuals with and without childhood physical abuse histories using the Tobacyk Revised Paranormal Belief Scale and a SPE questionnaire with 107 students. They found that psi and spiritualism were among the most strongly held beliefs in abused students, and significantly higher in abused versus non-abused participants. Perkins and Allen (2006)[67] concluded:"by providing a sense of control, certain paranormal beliefs may offer a powerful emotional refuge to individuals who endured the stress of physical abuse in childhood"(p. 349).

In the context of both detachment and compartmentalization, paranormal ideation can serve a restorative function. This idea has been expressed by a number of researchers. Earlier, we expressed the idea that humans "seem to have a profound yearning for a magic formula that will free us from our ponderous and fragile human bodies, from realities that will not obey our wishes, from loneliness or unhappiness, and from death itself"[68](Marks and Kammann, 1980, p. 156). Psychologists have suggested that individuals use paranormal ideation as a coping strategy for past traumas in a search for stability, restorative justice, compensation or even revenge, e.g.[69]. If emotional security and psychological adjustment depend on the conviction that the physical and social worlds are orderly and meaningful, then a paranormal worldview can provide a framework for structuring otherwise chaotic, unpredictable or unfair experiences so that they appear more comprehensible and can be mastered [70].

5. RATIONALE FOR AN INTEGRATIVE THEORY

Trauma in childhood evokes an instinctive need to regain a sense of control, which, in turn, increases the appeal of paranormal abilities to providing a sense of mastery over threat and incomprehensible events. When children experience persistent terror without escape, as in neglect, attachment disruptions, or trauma, dissociation is protective against emotional

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distress [71]. Repetitive childhood physical and sexual abuse, or other forms of trauma such as neglect, are associated with the development of dissociative states and disorders [72]. Dissociation, detachment and compartmentalization can be considered adaptive to childhood trauma because they can reduce the degree to which the distress is overwhelming However, if detachment and compartmentalization continue in adulthood, they can be maladaptive. The dissociative adult may automatically disconnect from situations perceived as unsafe or threatening, without taking time to determine whether there is any real danger. This tends to leave the person “spaced out” or “dreamy” and unable to protect themselves in conditions of real danger making them vulnerable. In the following sections, different strands of theory about childhood trauma, dissociation, fantasy and paranormal ideation are integrated within a single coherent theory.

This theory hypothesizes a need for power and control in the face of adversity [73-75]. To elucidate one origin of paranormal ideation, the theory incorporates neurobiological evidence from the Polyvagal Theory of Porges (2017)[76] and the principles of psychological homeostasis from the General Theory of Behaviour (Marks, 2018)[77]. The theory draws upon neurobiological evidence concerning the changes that accompany repeated childhood neglect and abuse [64], which are thought to permanently alter developmental processes of adaptation in producing a "use-dependent" brain:

> “*Childhood trauma has profound impact on the emotional, behavioral, cognitive, social, and physical functioning of children. Developmental experiences determine the organizational and functional status of the mature brain…There are various adaptive mental and physical responses to trauma, including physiological hyperarousal and dissociation. Because the developing brain organizes and internalizes new information in a use-dependent fashion, the more a child is in a state of hyperarousal or dissociation,*

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the more likely they are to have neuropsychiatric symptoms following trauma. The acute adaptive states, when they persist, can become maladaptive traits."(Perry et al., 1990, p. 271)[64].

In addition to neurobiological changes, child abuse and neglect produce increased risk for major psychiatric disorders including major depression, bipolar disorder, post-traumatic stress disorder (PTSD), substance and alcohol abuse, and others) and also medical disorders such as cardiovascular disease, diabetes, irritable bowel syndrome, asthma, and others [78]. Persistent biological alterations associated with childhood maltreatment include changes in neuroendocrine and neurotransmitter systems and pro-inflammatory cytokines in addition to alterations in brain areas associated with mood regulation. A systematic review found that individuals with at least four abusive childhood experiences (ACEs) are at increased risk of multiple health outcomes compared with individuals with no ACEs [79]. Associations were found to be weak or modest for physical inactivity, overweight or obesity, and diabetes (ORs of less than two); moderate for smoking, heavy alcohol use, poor self-rated health, cancer, heart disease, and respiratory disease (ORs of two to three), strong for sexual risk taking, mental ill health, and problematic alcohol use (ORs of more than three to six), and strongest for problematic drug use and interpersonal and self-directed violence (ORs of more than seven).

Exposure to violence is thought to activate a set of threat-responses in the child's developing brain. Excess activation and arousal of the neural systems involved in threat responses alter the developing brain which, in turn, produces functional changes in emotional, behavioural and cognitive functioning. The existence of a graded relationship of the ACE scores to outcomes in multiple domains parallels the cumulative exposure of the developing brain to the stress response with resulting impairment in multiple brain structures and functions [80].

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One implication of the trauma-dependent neurobiological changes is that paranormal ideation becomes a positive coping strategy for victims of child abuse. I discuss a series of linkages, beginning with fantasy proneness, mental imagery and dissociation.

6. FANTASY-PRONENESS, MENTAL IMAGERY AND DISSOCIATION

Everybody daydreams, but some people daydream much more than others. Fantasy, daydreams, and imagination are integral processes within healthy functioning, playing an adaptational role in daily life [81-83]. Fantasy and daydreams reflect our current concerns, regulate mood, organize experience, provide self-relevant information, facilitate learning, and stimulate decision making [84]. But, like everything else, there are widespread variations in fantasy proneness across the population. Fantasy proneness (FP) refers to an enduring personality trait of individuals who are thought to spend a large part of their life daydreaming in fantasy. Daydreaming is ubiquitous [85], taking up 30–50% of daily thinking time [86]. I am reminded of an incident at school when I was 13. I had missed the first year of the course, having been promoted from class 'B' to class 'A', and, because I wasn't taking Latin, I had been required to sit through Latin classes reading a book. One day, as I was dreamily staring out of the classroom window, the Latin master clipped me over the ear with his ruler, telling me to concentrate."But, sir", I said,"I am not taking Latin."[Why do I still find this incident so deeply satisfying, I wonder?]

From the very beginning of research on FP, Wilson and Barber (1983, pp. 359-364)[87] had suggested that people with FP have psychic experiences, realistic out-of-the-body experiences and experiences of apparitional entities. Wilson and Barber proposed that extreme fantasy is a coping strategy for dealing with loneliness and isolation by providing a means to escape from aversive environments. FP requires the generation of mental imagery, those quasi-perceptual experiences that occur in the absence of an objective stimulus. It is established that there are wide individual differences in the continuum of reported vividness and controllability of images [77]. Individuals at

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the fantasy prone end of the normal distribution (1-5%) experience vivid, uncontrollable images of almost hallucinatory quality [88] which seem *as real as actual events* [87]. Another small percentage (2-3%) of people at the opposite end of the distribution are unaware of any mental imagery at all [89].

The brain has a 'default network' that participates in internal modes of cognition such as autobiographical memory retrieval, envisioning the future, conceiving the perspectives of others and daydreaming. The default network is a specific, anatomically defined brain system [90] that is activated on a frequent basis among people with FP. From the 1980s and 90s, it had been hypothesised that FP is a process that is exacerbated by child abuse and that it may be a trait, like absorption, a variable that is related to FP [91], which is genetically mediated [92]. Lynn and Rhue (1988)[93] elaborated the FP construct to include "a unique constellation of personality traits and experiences coalesced around a deep, profound and long-standing involvement in fantasy and imagination"(p.35). Fantasy prone individuals are believed to share a unique set of characteristics, including the experience of vivid memories, the ability to voluntarily hallucinate and superior hypnotic abilities [87]. Researchers have explored many phenomena which appear to be associated with FP, including: absorption [93-96], aversive childhood experiences [97 -101], hypnotic abilities [102,103), hallucinatory abilities [104], mental imagery [105] and paranormal beliefs and experiences [106-115].

There are two connections with FP that are particularly salient: *among individuals reporting a history of childhood abuse, the incidence of FP is especially high [116,* 93] and also *dissociation has been linked to both child abuse and FP* [98, 117]. These findings led to a renaissance of the trauma theory (TT), as originally proposed by Pierre Janet in the 19th century [44]. Dissociation is considered a psychological defence mechanism for victims of traumatizing events such as sexual molestation, natural disaster, or combat [118]. The TT holds that victims are able to

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compartmentalize their perceptions and memories and detach themselves from the full impact of the trauma and that these dissociative processes possibly continue throughout their entire lives. Vonderlin et al.(2018)[119] investigated the relationship between childhood interpersonal maltreatment and dissociation in 65 studies with 7352 abused or neglected individuals using the Dissociative Experience Scale (DES). The results revealed higher dissociation in victims of childhood abuse and neglect compared with non-abused or neglected subsamples sharing relevant population features with highest scores for sexual and physical abuse. Earlier age of onset, longer duration of abuse, and parental abuse significantly predicted higher dissociation scores.

Skeptics express doubts about the trauma theory (TT) of dissociation proposing a fantasy theory (FT), also known as a 'socio-cognitive' or 'iatrogenic'[3] model. This viewpoint is associated with the "False Memory Syndrome" movement, an organization of people accused of childhood sexual abuse. Dissociation is alleged to produce fantasies of trauma in fantasy prone and suggestible patients who are vulnerable to the planting of false memories by psychotherapists. The proposal led to a huge controversy with cases coming before the courts brought by alleged perpetrators of abuse, usually the parents believing themselves to be totally innocent of any abuse [120-124]. The possibility that a variety of therapeutic techniques could create illusory memories of abuse became a major debating point that divides psychotherapists and researchers into opposing camps.

In a systematic review of memory implantation studies, Brewin and Andrews (2017)[125] found that some recollective experience for the suggested events can be induced on average in 47% of participants, but only in 15% are these experiences likely to be rated as full memories. They concluded that susceptibility to false memories of childhood events seems to be more limited than previously suggested. As must so often be the case with judgements about the veracity of anomalous experience, the jury is still out, but there can be little doubt that a significant

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proportion of recovered memories of child abuse are veridical, i.e. they are based on actual events.

Dalenberg et al.[126,127] also reviewed numerous studies in a meta-analysis to determine whether the TT or FT received the most empirical support and concluded that the TT was most consistent with the evidence which included several supportive longitudinal studies. Dalenberg and colleagues found the trauma–dissociation relationship was modest for CSA (r = 0.31) and physical abuse (r = 0.27) but stronger among individuals with dissociation disorder (DD)(0.54 for CSA and 0.52 for physical abuse). However, dissociation scores predicted only 1–3% of the variance in suggestibility. Other studies have found that individuals with dissociative identity disorder (DID) are no more suggestible or prone to creating false memories than individuals with PTSD, actors simulating DID, or healthy controls [128]. A continuum of trauma-related symptom severity was found across the groups which supports the hypothesis of association between the severity, intensity and age at onset of traumatization, and the severity of trauma-related psychopathology. The evidence from [128] supported the TT of DID and challenged the core hypothesis of the FT. However, the issue is not yet fully resolved and discussion continues [129,130]. A further issue to complicate an already complex picture is that unusual sleep experiences may serve as antecedents of trait dissociation [131].

The closeness of victims to perpetrators has also been the focus of studies which suggest that the impact of abuse is more intense and longer lasting when linked to a sense of betrayal. The betrayal version of the TT proposes that one response to betrayal may be to keep knowledge of the trauma out of conscious awareness [132,133]. Although this 'betrayal blindness' may benefit survival for ongoing abuse by helping to maintain significant relationships, this compartmentalization of reality can lead later to psychological and behavioral problems. Gómez, Kaehler and Freyd (2014)[134] ran three exploratory studies to examine the associations between exposure to betrayal trauma, dissociation and hallucinations which found that betrayal trauma

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increases the likelihood of dissociation and hallucinations.

How might high proneness to fantasy lead to SPEs? One hypothesis is that fantasy-prone people are more likely to experience visions, voices and apparitions of extreme vividness leading them to conclude that such events have a psychic origin [23, 135]. Hallucinogens and psychedelic substances tend to increase FP in people who might otherwise be less fantasy prone. The discoverer of LSD, Albert Hofmann [136] wrote that "in the LSD state the boundaries between the experiencing self and the outer world more or less disappear....Feedback between receiver and sender takes place. A portion of the self overflows into the outer world, into objects, which begin to live, to have another, a deeper meaning. In an auspicious case, the new extended ego feels blissfully united with the objects of the outer world and consequently also with its fellow beings. This experience of deep oneness with the exterior world can even intensify to a feeling of the self being one with the universe." A sense of awe and oneness with nature does not require LSD but is likely to be magnified by LSD and may trigger ‘paranormal’ experience [137].

As noted, multiple studies have examined the relationship between FP and SPE. Merckelbach, Horselenberg and Muris [96] found that the Creative Experiences Questionnaire (CEQ), a brief self-report measure of FP, correlated with dissociativity in the range of .47 -.63 and also with paranormal experiences. Richard Wiseman and Caroline Watt (2006)[138] felt that the evidence should be treated with caution given that the measures employed are intercorrelated and may reflect the operation of a single underlying concept. They refer to Kirsch and Council (1992)[139] and cite Thalbourne’s (2000)[140] concept of ‘transliminality’, which is claimed to underpin a range of imagery factors including frequency of dream interpretation, FP, absorption, magical ideation and mystical experiences. Other studies, however, suggest that the Vividness Hypothesis may indeed be correct, especially

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when combined with high absorption [141](Glicksohn and Barrett, 2003). In Brazil,[142] Alejandro Parra and Juan Carlos Argibay (2012) compared people who claimed psychic abilities with a non-psychic control group to find that the 'psychic' group (N = 40) had significantly higher scores on dissociation, absorption and FP than did the 'non-psychic' group (N = 40). In Australia, Gow et al.[143] tested 114 females and 59 males who were classified as 'anomalous experiencers'(n = 125),'anomalous believers'(n = 39) and 'non-believers'(n = 9), according to their responses on a 'Measure of Anomalous Experiences and Beliefs'. In the experiencer group, significant correlations occurred between FP and five subscales of paranormal belief and significant moderate to low correlations with both the "intuition" and "feeling" dimensions of the Myers–Briggs Type Indicator. Dissociation was also found to be related to global paranormal belief and to the subscales of psi, superstition, and extraordinary life forms.

Parra (2015)[144] assessed 348 educated believers for their paranormal or anomalous experiences, and capacity for visual imagery under eyes-open- and eyes-closed conditions using the Vividness of Visual Imagery Questionnaire Revised (VVIQ-R; Marks, 1995)[144] and a 10-item self-report inventory designed to collect information on spontaneous paranormal/anomalous experiences. The results showed that VVIQ scores and paranormal/anomalous experiences correlated significantly, especially for Aura, Remote Healing, and Apparitions, but only in the Open-Eyes condition. Parra [145] noted:"*These results also highlight the fact that mental imagery ability may be psi-conducive, and it is interesting to note that the VVIQ may be helpful in identifying and selecting better psi-scorers in psi experiments, and may even be of use in psychomanteum (sic) and aura-seeing research. The other advantage of the VVIQ is its ease of administration and speed of data analysis."*

Lawrence and colleagues (1995)[112] proposed a model of paranormal experience

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(SPE) and belief (PB) which included fantasy but not dissociation as a predictor. In Lawrence's model, trauma was found to have two causal routes in influencing SPE, one direct, the other indirect (Figure 3). However, in this author's opinion, the omission of dissociation is a significant limitation of the Lawrence et al. model [112]. My current proposal assumes that it is dissociation that is the most significant sequela of extreme forms of ACE and that fantasy, paranormal experience and paranormal belief are consequences of the process of dissociation. Figure 3 show the supervenient role of dissociation in the fantasy that is generated following childhood trauma.

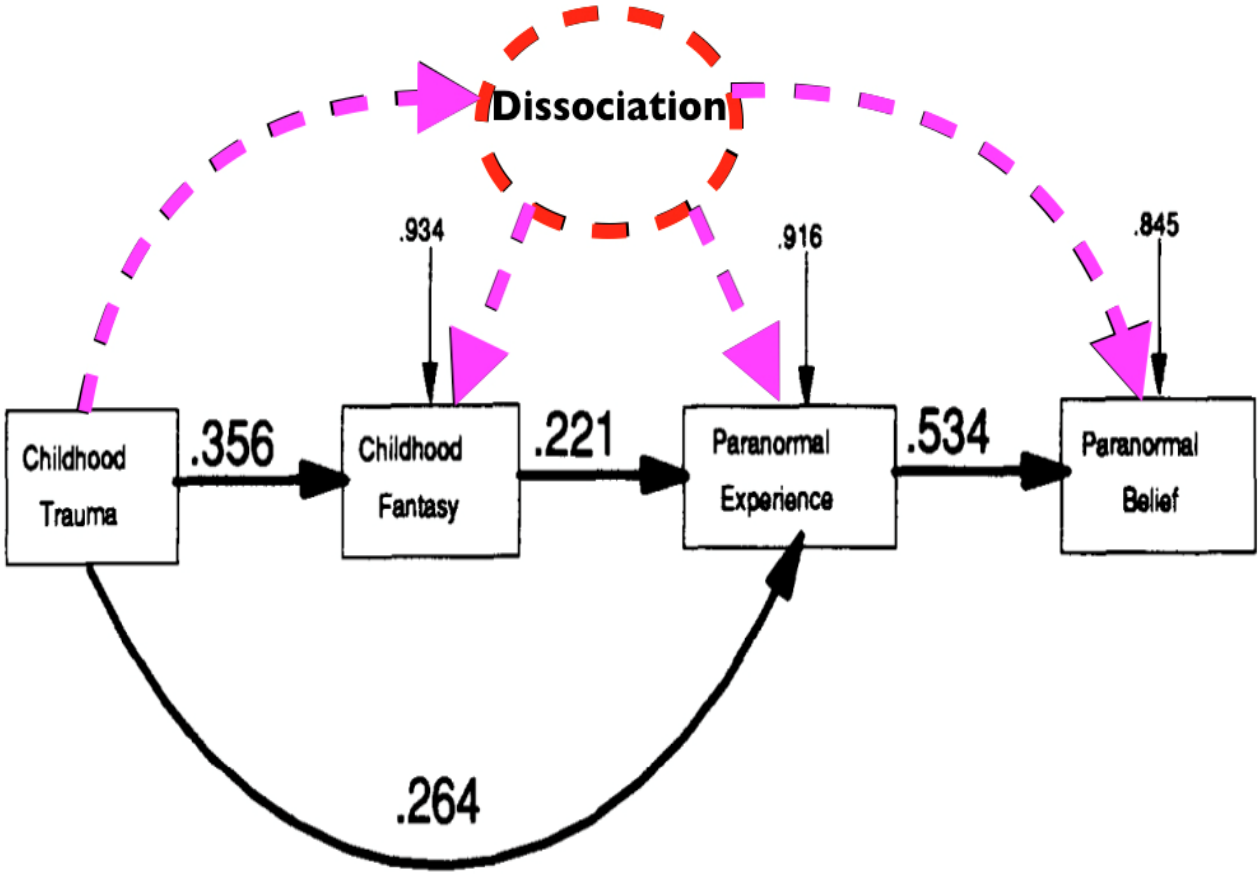

FIGURE 3: A model of childhood trauma, dissociation, paranormal experience and belief as an extension of the model suggested by Lawrence et al. (1995)[112] (continuous black lines). The model is extended to include dissociation as the main sequela of childhood trauma causing childhood fantasy, paranormal experience and paranormal belief (broken coloured lines).

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The extended model suggests that the psychological system strives to restore safety, security and equilibrium by dissociating into compartments to inhibit action and generate compensatory fantasy. Homeostasis performs a restorative function with its ability to deploy the entire resources of the psychological system, including affect, fantasy, and the approach-avoidance-inhibition system to reset the imbalances created by dissociation. The reset restores feelings of safety and of being in control [77,83]. The hypothesised stabilising role of homeostasis is consistent with the theory of Silvan Tomkins [146] who proposed that the *primary motivational system is the affective system and biological drives have impact only when amplified by the affective system*. Clinical studies have established that involuntary images and difficult-to-control memories are associated with dissociation, trauma, stress, anxiety and depression. Sufferers often report repeated visual intrusions concerning real or imaginary events that are 'usually extremely vivid, detailed, and with highly distressing content'[147]. These elements are precisely the sequelae of a dissociative response to ACE.

7. PSYCHOSIS, HALLUCINATIONS, CHILDHOOD ADVERSITIES AND DISSOCIATION

Psychotic experience (PE) is receiving the attention of clinical researchers who widely agree that childhood trauma is a risk factor for the development of psychosis. Since Janet [44], the relationship between childhood trauma and symptoms of psychosis has been explained as one consequence of dissociation. For example, Varese, Barkus and Bentall (2012)[148] explored the hypothesis that the effect of childhood trauma on hallucination-proneness is mediated by dissociative tendencies. Patients with schizophrenia spectrum disorders (n=45) and healthy controls (with no history of hallucinations; n=20) completed measures of hallucination-proneness, dissociative tendencies and childhood trauma. Compared to healthy and non-hallucinating clinical control participants, hallucinating patients reported both significantly higher dissociative tendencies and childhood sexual abuse. Dissociation was found to positively mediated the effect of

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childhood trauma on hallucination-proneness, a mediational role that was “particularly robust for sexual abuse over other types of trauma”[148](p. 1025). They concluded that the results are consistent with dissociative accounts of the trauma-hallucinations link.

Meta-analyses of the association between childhood trauma and severity of hallucinations, delusions, and negative psychotic symptoms in clinical populations have confirmed the association. In a meta-analysis of 29 studies (4680 participants) Bailey et al.(2018)[149] found that, in individuals with psychosis, childhood trauma was significantly correlated with severity of hallucinations (r =.199, P <.001) and delusions (r =.172, P <.001) but not with severity of negative symptoms. These results lend support to theories that childhood traumas may lead to hallucinations and delusions. McGrath et al.[150] assessed CAs, PE and DSM-IV mental disorders in 23,998 adults in the WHO World Mental Health Surveys. People who had experienced any CAs were found to have an increased odds of later PE [odds ratio (OR) 2.3, 95% confidence interval (CI) 1.9–2.6]. CAs reflecting maladaptive family functioning, including abuse, neglect, and parent maladjustment, were found to exhibit the strongest associations with PE onset at all life-course stages. Sexual abuse was observed to produce a strong association with PE onset during childhood (OR 8.5, 95% CI 3.6–20.2), while other CA types were associated with PE onset in adolescence.[150] concluded that exposure to CAs is associated with PE onset throughout the life-course, with sexual abuse being most strongly associated with childhood-onset PEs.

Muenzenmaier et al.(2015)[151] tested the dose–response relationship between CA and delusions and hallucinations including the effects of dissociation on the relationship. The prevalence of CA in individuals with psychotic disorders was high, with each additional CA being associated with a 1.20 increase in the incidence rate ratio (95% confidence interval [CI; 1.09, 1.32]) for hallucinations and a 1.19 increase (CI [1.09, 1.29]) for delusions, supporting a dose–response association. After controlling for the mediating effects of dissociative symptoms at follow-up, CA

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remained independently associated with delusions.[151] proposed that cumulative CA can result in complex reactions including dissociative, posttraumatic stress disorder, and psychotic symptoms.

A review of 19 quantitative studies investigated the relationship between voice-hearing and dissociation between 1986 and 2014 [152]. The authors concluded that dissociation may be implicated in voice-hearing as a mediating factor. In a clinical study with 71 patients diagnosed with psychosis,[153] found that childhood trauma was positively associated with the dissociation scale scores (r =.40) and the hallucination (r =.36) and delusions scale scores (r =.32). Depersonalization was found to be a potential mediator between childhood trauma and hallucinations, but not between childhood trauma and delusions. In another study of depersonalisation mediation in the relationship between childhood maltreatment and both hallucination-proneness and delusional ideation, Cole, Newman-Taylor and Kennedy (2016)[154] used a cross-sectional design in a non-clinical group. They found that dissociation mediated the relationship between early maltreatment and hallucination-proneness and delusional ideation.

It has been suggested that the content of hallucinations may be formed out of dissociative memories of traumatic events [155] and that it could reflect the experiencer's perceived lower social self-appraisal as a consequence of childhood abuse [156].

In the next section, I examine yet another piece in the jigsaw, the Polyvagal Theory, which concerns the organism's defences when safety is challenged by imminent threat.

8. THE POLYVAGAL THEORY OF SAFETY

The Polyvagal Theory is a neurobiological theory of safety [157]. The Polyvagal Theory describes an inbuilt system within the nervous system for evaluating risk and threat, which enables a shift of the body's physiological state to support defence. The goal of the psychological system is to continuously monitor the environment for threats by searching for unique cues. When a threat to safety is perceived, the system actively inhibits outward

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responses with the goal of promoting safety and well-being with feelings of love, security and trust. Safety is associated with specific environmental features and unconscious bodily responses as well as conscious cognitive evaluations. Adaptive survival resides in the evolutionary wisdom of the body and nervous system that partly function outside the realm of awareness. These unconscious neural processes for the evaluation of risk without awareness are called *neuroception* [157](p. 43). One example is the sense of danger we may experience immediately prior to a mugging. If somebody suddenly runs up from behind and rips one's bag off one's shoulder, it is a perfectly natural reaction to freeze. Other victims may switch into 'fight' mode, others into 'flight'. These response occur without any conscious decision. Neuroception shifts the ANS response to cues of safety, danger or threat by activating the social engagement system and shutting down the fight/flight and the body's defence systems. This includes the face, heart, and myelinated vagus [76,157]. The Polyvagal Theory is concerned with the vagus, the tenth cranial nerve and the primary nerve in the parasympathetic nervous system (PNS). The vagus connects brainstem areas with structures around the body including the neck, thorax, and abdomen. Polyvagal Theory involves the changes in the autonomic nervous system (ANS) and the unique change in the vagal motor pathways that occurred with the emergence of mammals. When the ventral vagus and the associated social engagement system are optimally functioning, the ANS supports health, growth, and restoration. According to the Polyvagal Theory, defence reactions are manifested as either an increase in SNS activity that inhibits the function of the dorsal vagus to promote fight and flight behaviors or as a shutdown manifested as depressed SNS activity and a surge of dorsal vagal influences that results in fainting, defecation, and an inhibition of motor behavior, as seen in mammals feigning death [76,157].

I turn to consider how the different pieces of the neuropsychological jigsaw may fit together with a single central network responsible for controlling homoeostasis.

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9. THE CENTRAL HOMEOSTATIC NETWORK

Recent analyses of the CNS have explored new methods for discovering cortical and subcortical networks in the brain's anatomical connectivity termed the 'connectome'. These studies of the connectome are revolutionary in showing that the CNS is at once both more complex and more simple that previously assumed. Let me explain why. Regions of interest (ROI) are observed as coherent fluctuations in neural activity at rest as well as distributed patterns of activation or 'networks'. A network is any set of pairwise relationships between the elements of a system—formally represented in graph theory as 'edges' linking 'nodes'. Neurobiological networks occur at different organizational levels from cell-specific regulatory pathways inside neurones to interactions between systems of cortical areas and subcortical nuclei. Architectures which support cognition, affect and action are normally found at the highest level of analysis [158, 159]. Brian Edlow and his colleagues investigated the limbic and forebrain structures that form the 'Central Homeostatic Network'(Edlow et al., 2016)[160]. The Central Homeostatic Network (CHN) plays a major role in autonomic, respiratory, neuroendocrine, emotional, immune, and cognitive adaptations to stress. Collectively, these forebrain structures include the limbic system close to the hypothalamus with strong mono- and/or oligo-synaptic connectivity to one another, and shared participation in homeostasis. Recent research has focused on homeostatic forebrain nodes which receive sensory information concerning extrinsic threats and intrinsic metabolic derangements from the brainstem, resulting in arousal from sleep, heightened attention, vigilance during waking, and visceral and somatic motor defences [160].

There is complexity here but a well-organized complexity. CHN connectogram shows all six brainstem seed nuclei are interconnected with all seven limbic forebrain target sites, but with markedly different streamline probabilities (SPs). The SP measures the probability of a streamline connecting a seed ROI and target ROI, but does not reflect the strength of the neuroanatomic

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connection. To ensure that the target ROI size was not the only factor contributing to the SP, Edlow and colleagues verified that the SP measurements were derived from anatomically plausible pathways from animal or other studies of subcortical pathways in the human brain.

The Edlow group study findings suggest that physiological homeostasis H[Φ] is mediated by ascending and descending interconnections between brainstem nuclei and forebrain regions, which together regulate autonomic, respiratory, and arousal responses to stress. The limbic system has been regarded as the neuroanatomic substrate of 'emotion', but its role in the regulation of homeostasis is also now being recognized, and the limbic system has been added to the central autonomic network of "flight, fight or freeze". Edlow et al. concluded as follows:"*connectivity between forebrain and caudal brainstem regions that participate in the regulation of homeostasis in the human brain*. *These nodes and connections form, we propose, a CHN because its nodes not only regulate autonomic functions such as ''fight or flight'' and arousal (e.g., median and dorsal raphe, and locus coeruleus) but also non-autonomic homeostatic functions such as respiration (i.e., PGCL) and regulation of emotion/affect (e.g. amygdala)"*[160](p. 196). This study supports the idea that interconnected brainstem and forebrain nodes form an integrated Central Homeostatic Network in the human brain. To put this in the simplest terms, the forebrain is involved in homeostatic regulation of both autonomic (Type I) and non-autonomic (Type II) human responses to disturbances of equilibrium. That the forebrain evolved to control both types of homeostasis, inside the body and in outwardly directed behaviour, supports the contention that homeostasis is a unifying concept across Biology and Psychology [77]. Everything we know about the executive role of the forebrain in action planning and decision-making suggests that this must indeed be the case.

A homeostatic role of different components of a frontal and temporal cortex in regulating mystical experience has recently been identified in a study of the neural correlates of mystical experience by Irene Cristofori et al. (2015)[2]. The authors speculate that the executive functions

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of the dorsolateral prefrontal cortex plays a role in the production of mystical experiences by constraining naïve interpretations of the basis and meaning of perceptual experiences. This speculation is exactly in line with our own. The next step is to define the role played by behavioural inhibition.

10. STRIVING, ACTING AND INHIBITING

In 1789 the English philosopher Jeremy Bentham formulated the principle of utility in which any action that promotes the greatest amount of happiness is morally right [161]. Happiness is identified with pleasure and the absence of pain. In 1848 the German physicist Gustav Fechner used the term *Lustprinzip* [162]. Fifty years later Sigmund Freud copied this idea by formulating the 'Pleasure Principle'[163] which has an almost exact equivalent in Cannon's concept of homeostasis which has the goal of tension reduction for the sake of maintaining, or restoring, the inner equilibrium [164]. The idea that organisms strive for pleasure and the avoidance of pain has been accepted for aeons. Emerging evidence indicates similarities in the anatomical substrates of painful and pleasant sensations in the opioid and dopamine systems [165]. The experience of positive and negative affect is based on neural circuits that evolved to ensure survival. These circuits are activated by external stimuli that are appetitive and life sustaining or by stimuli that threaten survival. Activation of the pain and pleasure circuits alert the sensory systems to pay attention and prompt motor action [166]. The approach-avoidance concept has captured the imagination of many theorists and been extraordinarily pivotal. The approach-avoidance system also includes behavioural inhibition which takes over when there is approach-avoidance conflict. We give the Approach-Avoidance-Inhibition System the acronym, "AAIS". Action schemata are also necessary precursors to action [83]. This leads to a four-pronged system including the AAIS, action schemata, the Reset Equilibrium Function (REF), and the CLOCK system, for collectively regulating voluntary

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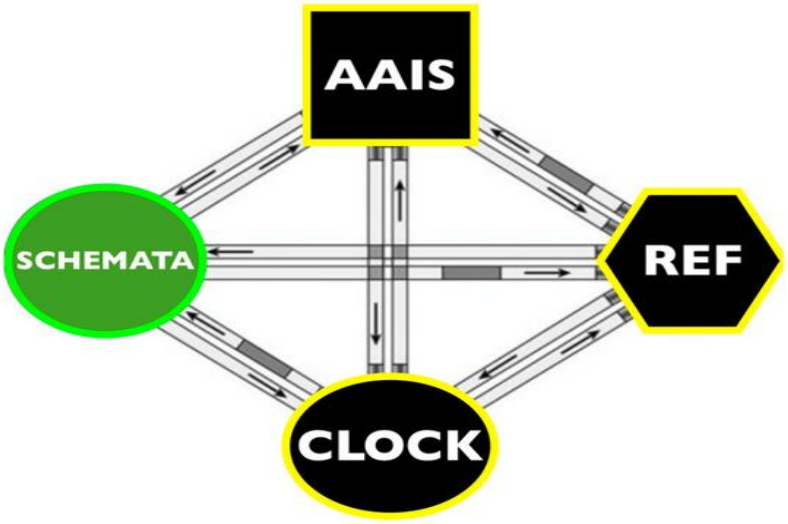
action (Figure 4).

FIGURE 4: The REF, CLOCK and AAIS interconnect with Action Schemata to execute voluntary action and inhibition [83].

As we have seen, major authorities agree that a drive underlies approach and avoidance energised by a striving toward pleasure and away from pain. Every living being strives towards a set point of positive well-being. Organisms approach sources of potential pleasure and satisfaction and studiously avoid potentially aversive stimuli and confrontations with danger. There really isn't much difference between striving for something and having a drive for something. Both concepts involve a felt need to satisfy an unmet need, whether biological or behavioural. When the need has been satisfied, drive is reduced, striving ceases, and the organism resets to equilibrium and can rest.

In encountering a threatening stimulus, the organism fights, takes flight or freezes, in which case inhibition of behaviour minimizes the risks that come with a collision of interests or confrontation. Inhibition of action occurs when approach or avoidance are impossible, when a danger cannot be accurately predicted or when there is no previous response pattern to fall back



on. In these cases, the *système inhibiteur de l'action,* or 'behavioural inhibition system'(BIS), is activated, stimulating the neuroendocrinal responses described by Walter Cannon [164] and Hans

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Selye [167].

Inhibition is a regular, everyday occurrence in the life of free-living animals of all kinds. For example, consider the plains zebra (*Equus quagga*) drinking at a waterhole. With crocodiles always a danger, a cycle of approach, avoidance and inhibition will be repeated several times over before a zebra drinks. In many instances, the drive to drink water exceeds the drive to keep absolutely safe and thirsty zebras are frequently killed by crocodiles. Freezing until danger passes is necessary for the zebra's long-term survival, as long as the suspense of drinking does not continue for too long.'Freezing' is an option in many circumstances for humans also. The BIS was the discovery of Henri Laborit (1914-1995). In regard to inhibition, Laborit stated:"… *this situation in which an individual can find himself, this inhibition of action, if it persists, induces pathological situations. The biological perturbations accompanying it will trigger physical diseases and all the behaviours associated with mental illness"*[168]. Laborit did not discuss dissociation resulting from the extreme freezing response that occurs in abuse-related trauma. The BIS suppresses pre-potent responses and elicits risk assessment, displacement behaviours and, in extreme cases, to freezing. A fear for safety, as anxiety, can lead one to many negative scenarios that the organism may choose to do doing nothing at all, freeze or feign death.

A multitude of situations contain strongly competing goals of approach-approach, approach-avoidance or avoidance-avoidance conflict. To understand how an organism is to deal with such conflicts, we must unpack how the approach-avoidance-inhibition system might actually work in practice. In this regard, the work of Jeffrey A Gray and Neil McNaughton is of particular relevance [169]. Their account of the approach and avoidance systems involves goal representations which have both cognitive (or identifying) and motivational (or consummatory) properties. The properties of a goal distinguish it from other kinds of stimuli and this includes the ability to be attractors (rewards) or repulsors (punishments). In the McNaughton-Gray theory, responding to

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attractors or repulsors brings three output systems into play: the Behavioural Approach System (BAS), the BIS, which we have already encountered, and the Freeze-Fight-Flight System [169]. The BIS has outputs that inhibit the behaviour that would be generated by the positive and negative goals, increases arousal and attention, and increases the strength of avoidance tendencies. Increased avoidance is adaptive since, faced with risk, failing to obtain food or some other positive goal is likely to be easy to make up at another time, but experiencing danger could have severe consequences. A quickly taken avoidance decision may produce a false alarm, but, as the case of zebras at the waterhole illustrates, a slow response to a real threat might provide a crocodile with a fulsome dinner. The BIS is activated when it detects approach-avoidance conflict—suppressing prepotent responses and eliciting risk assessment and displacement behaviours. The systems interact homeostatically to generate behaviour. Based on this theory, it must be concluded that the voluntary behaviour of free-living organisms is coordinated by the REF, CLOCK and AAIS [77, 83]. It is now possible to place the 'jigsaw pieces' together to form a single picture of the genesis of SPE.

11. AN INTEGRATIVE THEORY OF SPE

In order to make sense of the connection between childhood trauma, dissociation, and SPE it is necessary to consider the available options when an infant or young child confronts by a significant and imminent threat from a person who may be either a close family member, another known person or a stranger. Coping with such a threat is of profound evolutionary significance, and how an organism responds can certainly be a matter of life and death. As noted, every living organism has an AAIS to determine the individual's fight, flight or freeze response. It is established that there are basic similarities in the substrates of painful and pleasant sensations in the opioid and dopamine systems respectively [170]. The experience of positive and negative affect is associated with the activation of neural circuits that evolved to ensure survival. These circuits are activated by external stimuli that are appetitive and life sustaining or by stimuli that threaten survival. Activation of the pain and pleasure circuits

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alert the sensory systems to pay attention and prompt motor action [171]. The approach–avoidance concept is pivotal [172] but the AAIS also includes behavioral inhibition, which is activated when there is approach–avoidance conflict. It has been proposed that an Action Schemata (AS) system coordinates and controls action within a four-pronged system for regulating the AAIS [77]. Operating in a coordinated fashion with the AS, the REF, CLOCK and AAIS collectively control the planning and execution of voluntary action.

The innate species-specific defense reactions of the AAIS - fleeing, freezing or fighting - are rapidly acquired by young organisms [161, 162]. As a familiar principle in Psychology, striving towards pleasure and away from pain underlies all approach and avoidance behavior. Organisms approach sources of potential pleasure and satisfaction and studiously avoid potentially aversive stimuli and confrontations with danger. In infants and young children, the first reaction to continuing threat is to cry and then to freeze. The ability to fight or fright will not usually be available. Freezing allows better sound localization and visual observation of the environmental for potential threat. Lack of movement is also a form of camouflage reducing the risk of attracting predators. Traumatised children often develop a "sensitized" hyperarousal or "sensitized" dissociative pattern in association with freezing when they feel anxious. Freezing may escalate to complete dissociation [64].

An adaptive homeostatic mental and physical response to childhood trauma consists of imagery and dissociation. The diagram in Figure 5 shows a representation of a general behavioral control system with two co-active sub-systems for the control and timing of action (the Action System) and for the control and timing of imagery (the Image System)(77).

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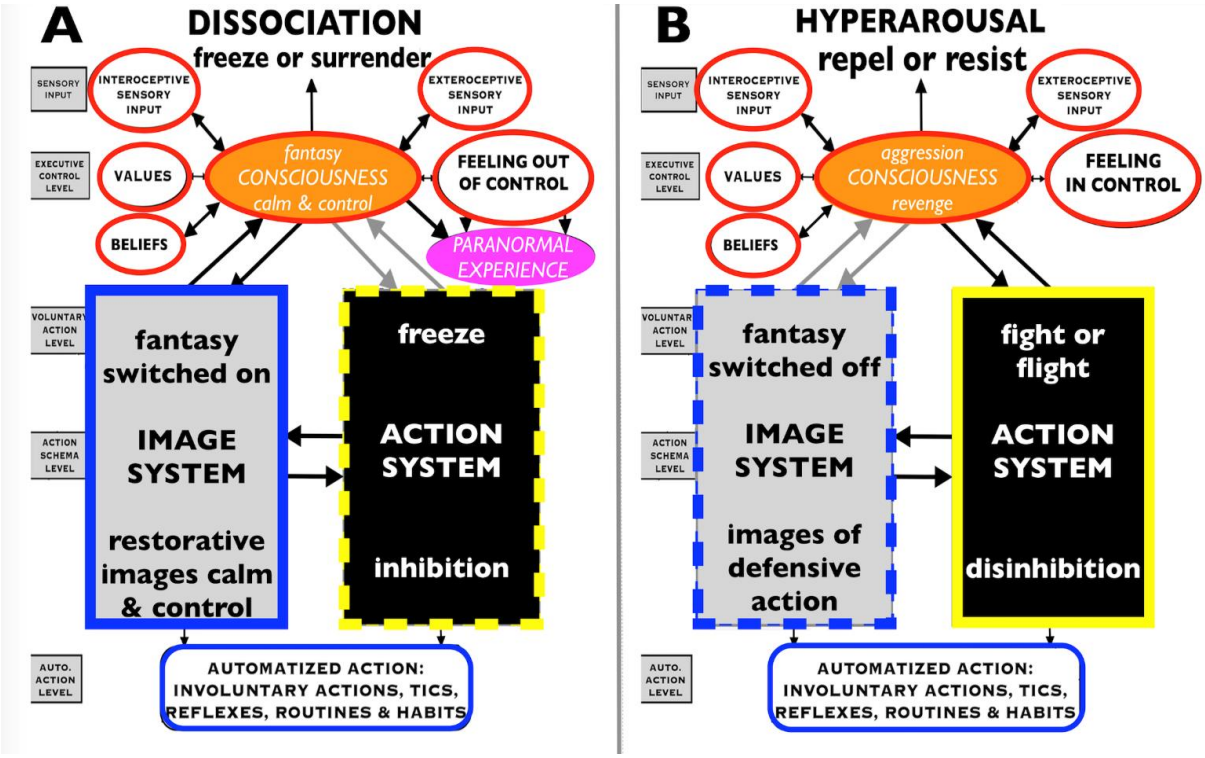

FIGURE 5: A general behavioral control system with two co-active sub-systems for the control and timing of action (Action System) and the control and timing of imagery (Image System) shown in two settings. The system can operate with both sub-systems active, with one sub-system active and one inactive, or with both sub-systems inactive. Left panel A: Triggered by imminent threat to survival, the system is set for dissociation, freeze or surrender. The Action System is 'frozen', but the Imagery System is fully activated to produce fantasized calmness and control. Right panel B: In this case, the Action System is disinhibited for fight or flight with actions of aggression and/or revenge. This option is available to adolescents and adults but infeasible for infants and young children who require the Dissociative freeze setting shown in panel A. Adapted from [83] (Figure 9].

In the Dissociative Setting, which would be activated in a child's response to trauma, the Image System is fully switched and the Action System is switched off with a Freeze or Surrender response. The individual-under-threat withdraws into an inner world of detachment and derealization in which stabilizing fantasy of calm and control are utilized to restore homeostasis. Post-traumatic fantasy is a normal homeostatic balancing process to produce equilibrium in a system experiencing unjustified life threat, loss or harm. There is every reason to expect trauma-based fantasy to be restorative of missing love objects in the form of voices, hallucinatory images or the felt presence of missing persons. The genesis of

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fantasy- and affect-laden paranormal experience is a significant causal factor in paranormal belief. Fantasy and daydreaming increase the likelihood that a person will experience altered states of consciousness, striking coincidences, and beliefs in the paranormal which help to restore a sense of balance and control.

Dissociation is the system's innate response to threat with defensive immobilization, involuntary freezing, or the feigning response of playing dead. As in all behaviours, there are gradations in reactions to life-threat ranging from total shutdown and collapse to immobilization when muscles lose tension and the mind dissociates from the traumatic event similar to the REM state during sleep. Dissociation is an adaptive mechanism aiding survival in the following situations:

1) Direct and close encounter with a dangerous perpetrator using force or having malevolent intent, e.g., when skin contact occurs;

2) In the presence of body fluids with danger of contamination, e.g. blood or sperm;

3) When bodily integrity is already injured, e.g. invasion, penetration, sharp objects (e.g., teeth and knife) at the skin [175].

In the next section, I list 13 hypotheses that follow directly from the theory together with a one- or two-word statement for each hypothesis regarding the degree of support received from the available empirical evidence.

12. HYPOTHESES

H1: SPEs should be more common in people reporting childhood abuse - confirmed:[112, 176-179].

H2: SPEs should be more common among people with dissociative symptoms-

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confirmed:[180].

H3: SPEs should be more common in females than by males - confirmed:[14].

H4: One common response of children to extreme negative affect (trauma, fear and anxiety) is dissociation, detachment, derealisation and restorative fantasies of control and calm - confirmed:[181].

H5: Dissociation in adulthood is more common in people reporting childhood abuse- confirmed:[119, 182].

H6: Dissociative experiences are more common among females than males - inconsistent findings: [183-191].

H7: FP is more common in people reporting childhood abuse -confirmed:[99, 101].

H8: FP is more common in women than in men – confirmed:[192].[2]

H9: Paranormal beliefs are more prevalent in people reporting high levels of FP than in others - confirmed: [66; 111].

H10: Individuals who claim paranormal abilities score higher on dissociation and fantasy than individuals who do not claim paranormal experiences - confirmed: [142].

H11: *FP and coping style fully mediate the relationship between trauma and paranormal beliefs* - confirmed: [107].

H12: Belief in ESP and PK is a vehicle for exercising a need for power and control at a fantasy level - confirmed: [193].

H13: Among victims of childhood abuse, a dissociative response such as PTSD is more

[2] Many publications report correlational studies of FP with other variables but not gender. Wilson and Barber's (1981) original study was with females only.

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likely to be released when trauma occurs in adulthood - confirmed: [194].

In sum, 12 of the 13 hypotheses are confirmed by the empirical literature. One hypothesis (H6) receives inconsistent support, with some supportive evidence and some unsupportive. Subject to further studies, H6 is neither confirmed nor disconfirmed.

13. LIMITATIONS OF THE THEORY

Overall there is an excellent fit between the theory of SPE and the empirical findings. Thus, the theory successfully provides one solution for the ' jigsaw pieces' that were identified by this review. However, of course, there could be missing pieces of the jigsaw that provide a bigger picture that is not yet clearly visible. It seems unlikely that any single theory will be able to explain the genesis of *all* of the huge variety of SPE that exists in the population. It has been well documented that dissociative states are much more common among individuals who have been traumatized in childhood and that the defensive use of fantasy provides a beneficial survival strategy. However, other causal pathways to SPE may yet be revealed, one of which is the possibility that some paranormal experiences are veridical, let us not forget.

The inconsistent findings in relation to *H6: Dissociative experiences are more common among females than males,* does not align with the confirmations obtained with the 12 other hypotheses. Twelve out of 13 confirmations is a strong level of support, however, and the uncertainty about H6 eliminates any validity to the accusation that the theory is too good to be true! It always possible to think of post hoc reasons why H6 might not be correct. Perhaps the greater levels of abuse experienced by girls than boys as younger children are counterbalanced at older ages when boys generally receive greater levels of trauma from physical bullying than girls. For example, in 35 countries surveyed in the WHO *International report from the HBSC*, 11-15 year-old boys report significantly more physical bullying and fighting than same-age girls [195]. In an older sample of 18-24 year-old US college students, however, the prevalence of PTSD and risk for

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trauma were greater for the female gender. The uncertainty about H6 must await further analysis and investigation.

A further limitation is that the majority of studies are cross-sectional by design. Future research efforts need to focus upon longitudinal designs to enable exploration of directional effects and should control for potential confounding factors. Also, it seems unlikely that everybody who experiences SPE has been a victim of abuse as a child. The occurrence of SPEs in people who were never abused as children requires an altogether different kind of theory.

Further research is necessary to develop our understanding of the brain mechanisms required by the system described here. It is hoped that the high level of empirical support that the theory has received will be sufficient encouragement for cognitive neuroscientists to search for the brain mechanisms responsible for the Janetian dissociation that is hypothesized to protect victims of abuse from irreversible consequences including premature death.

14. CONCLUSIONS

One source of SPEs, it is suggested, occurs in individuals who are traumatized in early life for whom dissociation and fantasies of calm and control are a survival strategy. Twelve of thirteen hypotheses are confirmed by empirical evidence and the thirteenth hypothesis requires further study. The theory of SPE is consistent with a General Theory of Behavioural Homeostasis [77,83] which provides a coherent account of the published literature of Psychology. New prospectively controlled research is required with a large sample of children to enable rigorous testing of the theoretical hypotheses together with alternative hypotheses about the origins of SPE.

Nature has given infants and young humans an innate capability to resist that most cruel and harsh of all violence, that perpetrated by adult human predators on their young. *L'automatisme psychologique,* dissociation, described by Pierre Janet in 1889 is not only a defensive manoeuvre of the self, but a powerful mechanism for rebirth and mental growth. Fantasy generation with

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feelings of calm and control are essential building blocks of consciousness enabling a new resilient and robust armour of the self. Subjective paranormal experience is a part of this human adaptive response, part of a universal striving for stability, security and equilibrium. Viewed thus, humans could not survive and grow without it.

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REFERENCES

[1] Brugger, P.,& Mohr, C.(2008). The paranormal mind: How the study of anomalous experiences and beliefs may inform cognitive neuroscience. *Cortex*, *44*(10), 1291.

[2] Cristofori, I., Bulbulia, J., Shaver, J. H., Wilson, M., Krueger, F.,& Grafman, J.(2016). Neural correlates of mystical experience. *Neuropsychologia*, *80*, 212-220.

[3] Irwin, H. J.(2009) *The Psychology of Paranormal Belief: A Researcher's Handbook*. Independent Publishers Group. Kindle Edition.

[4] Cardeña, E., Lynn, S. J.,& Krippner, S.(2000). Introduction: Anomalous experiences in perspective. In *Varieties of Anomalous Experience.Examining the Scientific Evidence*. Washington: American Psychological Association. Pp. 3-20.

[5] Pienkos, E., Giersch, A., Hansen, M., Humpston, C., McCarthy-Jones, S., Mishara, A.,...& Thomas, N.(2019). Hallucinations beyond voices: a conceptual review of the phenomenology of altered perception in psychosis. *Schizophrenia bulletin*, *45*(Supplement_1), S67-S77.

[6] Wiseman, R.,& Watt, C.(2004). Measuring superstitious belief: Why lucky charms matter. *Personality and individual differences*, *37*(8), 1533-1541.

[7] Hill, A.(2010). *Paranormal media: Audiences, spirits and magic in popular culture*. Routledge.

[8] Risen, J. L.(2016).Believing what we do not believe: Acquiescence to superstitious beliefs and other powerful intuitions. *Psychological Review*, 123, 182-207.

[9] Kahneman, D.,& Frederick, S.(2002). Representativeness revisited: Attribute substitution in intuitive judgment. *Heuristics and biases: The psychology of intuitive judgment*, *49*, 81.

[10] Ross, C. A., and Joshi, S.(1992). Paranormal experiences in the general

population. *Journal of Nervous and Mental Disease*, 180(6), 357-361.

[11] Haraldsson, E.,& Houtkooper, J. M.(1991). Psychic experiences in the multinational human values study: Who reports them. *Journal of the American Society for Psychical Research*, *85*(2), 145-165.

[12] Lindeman, M., and Aarnio, K.(2006). Paranormal beliefs: Their dimensionality and correlates. *European Journal of Personality: Published for the European Association of Personality Psychology*, *20*(7), 585-602.

[13] Chapman University (2018). *The Chapman University Survey of American Fears, Wave 5*. Orange, CA: Earl Babbie Research Center [producer]

[14] Castro, M., Burrows, R.,& Wooffitt, R.(2014). The paranormal is (still) normal: The sociological implications of a survey of paranormal experiences in Great Britain. *Sociological research online*, *19*(3), 1-15.

[15] Dagnall, N. A., Drinkwater, K., Parker, A., and Clough, P.(2016). Paranormal experience, belief in the paranormal and anomalous beliefs. *Paranthropology: journal of anthropological approaches to the paranormal*, *7*(1), 4-15.

[16] Schmied-Knittel, I.,& Schetsche, M. T.(2005). Everyday miracles: results of a representative survey in Germany. *European Journal of Parapsychology*, 20(1), 3-21.

[17] Greeley, A. M.(1975). *The sociology of the paranormal: A reconnaissance* (No. 23). Sage Publications.

[18] Yamane, D.& Polzer, M.(1994). Ways of seeing ecstasy in modern society. Experiential-expressive and cultural-linguistic views. *Sociology of Religion*, 55, 1- 25.

[19] McClenon, J.(1994a). *Wondrous events. Foundations of religious belief*. Philadelphia: University of Pennsylvania Press.

[20] McClenon, J.(1994b). Surveys of anomalous experience: a cross-cultural analysis. *Journal of the American Society for Psychical Research, 88*, 117-135.

[21] Newport, F.& Strausberg, M.(2001). *Americans' belief in psychic and paranormal phenomena is up over last decade*. Gallup Poll News Service, June, 8, 2001.

[22] Drinkwater, K., Dagnall, N., Grogan, S.,& Riley, V.(2017). Understanding the unknown: A thematic analysis of subjective paranormal experiences. *Australian Journal of Parapsychology*, *17*, 23-46.

[23] Blackmore, S. J.(1984). A postal survey of OBEs and other experiences. *Journal of the Society for Psychical Research*, 52, 225–244.

[24] Glicksohn, J.(1990). Belief in the paranormal and subjective paranormal experience. *Personality and Individual Differences*, *11*(7), 675-683.

[25] Marks, D.F.(2000). *The Psychology of the Psychic* (2nd ed.) New York: Prometheus Books.

[26] Sparks, G.,& Miller, W.(2001). Investigating the relationship between exposure to television programs that depict paranormal phenomena and beliefs in the paranormal. *Communication Monographs*, *68*(1), 98 -113.

[27] Bainbridge, W. S.(1978). *Satan's power: A deviant psychotherapy cult.* Los Angeles: University of California Press.

[28] Emmons, C. F.,& Sobal, J.(1981). Paranormal beliefs: Testing the marginality hypothesis. *Sociological Focus*, *14*(1), 49-56.

[29] McClenon, J.(2000). Content analysis of an anomalous memorate collection: Testing hypotheses regarding universal features. *Sociology of Religion*, *61*(2), 155-169.

[30] Finkelhor, D.(1994). The international epidemiology of child sexual abuse. *Child abuse &*

neglect, *18*(5), 409-417.

[31] Finkelhor, D.(2008). *Childhood victimization: Violence, crime, and abuse in the lives of young people*. oxford university Press.

[32] Finkelhor, D., Shattuck, A., Turner, H. A.,& Hamby, S. L.(2014). The lifetime prevalence of child sexual abuse and sexual assault assessed in late adolescence. *Journal of Adolescent Health*, *55*(3), 329-333.

[33] U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau.(2016). *Child maltreatment 2014.* Retrieved from http://www.acf.hhs.gov/programs/cb /research-data-technology/statistics-research/child-maltreatment.

[34] National Institute of Justice (2003). *Annual report*. Washington, DC. https://www.ncjrs.gov/pdffiles1/nij/205944.pdf

[35] Costello, E. J., Erkanli, A., Fairbank, J. A.,& Angold, A.(2002). The prevalence of potentially traumatic events in childhood and adolescence. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies*, *15*(2), 99-112.

[36]Cohen, J. A., Deblinger, E., Mannarino, A. P.,& Steer, R. A.(2004). A multisite, randomized controlled trial for children with sexual abuse–related PTSD symptoms. *Journal of the American Academy of Child & Adolescent Psychiatry*, *43*(4), 393-402.

[37] Davis, J. L.,& Petretic-Jackson, P. A.(2000). The impact of child sexual abuse on adult interpersonal functioning: A review and synthesis of the empirical literature. *Aggression and Violent Behavior*, *5*, 291-328.

[38] Finkelhor, D.(1987). The trauma of child sexual abuse: Two models. *Journal of Interpersonal Violence*, *2*(4), 348-366.

[39] Marshall, W. L., Marshall, L. E., Serran, G. A.,& O'Brien, M. D.(2009). Self-esteem, shame, cognitive distortions and empathy in sexual offenders: Their integration and treatment implications. *Psychology, Crime & Law*, *15*, 217-234.

[40] Paolucci, E. O., Genuis, M. L.,& Violato, C.(2001). A meta-analysis of the published research on the effects of child sexual abuse. *The Journal of Psychology*, *135*(1), 17-36.

[41] Münzer, A., Fegert, J. M.,& Goldbeck, L.(2016). Psychological symptoms of sexually victimized children and adolescents compared with other maltreatment subtypes. *Journal of Child Sexual Abuse*, *25(3),* 326-346.

[42] Putnam, F. W.,& Trickett, P. K.(1993). Child sexual abuse: A model of chronic trauma. *Psychiatry*, *56*(1), 82-95.

[43] Romano, E.,& De Luca, R. V.(2001). Male sexual abuse: A review of effects, abuse characteristics, and links with later psychological functioning. *Aggression and Violent Behavior*, 6(1), 55-78.

[44] Janet, P.(1889/1973). *L'automatisme psychologique.* Paris: Felix Alcan.

[45] Van der Kolk, B. A. and van der Hart, O.(1989). Pierre Janet and the Breakdown of Adaptation in Psychological Trauma. *The American Journal of Psychiatry*, 146, 12.

[46] Ludwig, A. M.(1983). The psychobiological functions of dissociation. *American Journal of Clinical Hypnosis*, *26*(2), 93-99.

[47] Ellenberger, H. F.(1970). *The discovery of the unconscious: The history and evolution of dynamic psychiatry* (Vol. 1, pp. 280-281). New York: Basic Books.

[48] Van der Kolk, B. A. and van der Hart, O.(1989). Pierre Janet and the Breakdown of Adaptation in Psychological Trauma. *The American Journal of Psychiatry*, 146, 12.

[49] Van der Hart, O.,& Horst, R.(1989). The dissociation theory of Pierre Janet. *Journal of*

 doi:10.20944/preprints201906.0269.v1

traumatic stress, *2*(4), 397-412.

[50] Cardeña, E.,& Carlson, E.(2011). Acute Stress Disorder Revisited. *Annual Review of Clinical Psychology,* 7, 245-67.

[51] Holmes, E. A., Brown, R. J., Mansell, W., Fearon, R. P., Hunter, E. C., Frasquilho, F.,& Oakley, D. A.(2005). Are there two qualitatively distinct forms of dissociation? A review and some clinical implications. *Clinical Psychology Review*, *25*, 1-23.

[52] Sierra, M.,& Berrios, G. E.(1998). Depersonalization: neurobiological perspectives. *Biological psychiatry*, *44*(9), 898-908.

[53] Marmar, C. R., Weiss, D. S.,& Metzler, T. J.(1997). The peritraumatic dissociative experiences questionnaire. *Assessing psychological trauma and PTSD*, *2*, 144-168.

[54] Brewin, C. R., Dalgleish, T.,& Joseph, S.(1996). A dual representation theory of posttraumatic stress disorder. *Psychological review*, *103*(4), 670.

[55] Brown, R. J.(2006). Different types of “dissociation” have different psychological mechanisms. *Journal of Trauma & Dissociation*, *7*(4), 7-28.

[56] Cardeña, E.(1994). The domain of dissociation. *Dissociation: Clinical and theoretical perspectives*, 15-31.

[57] Hilgard, E. R.(1977). Divided consciousness: Multiple controls in human thought and action.

[58] Kihlstrom, J. F.(1992). Dissociation and dissociations: A comment on consciousness and cognition. *Consciousness and Cognition: An International Journal, 1*(1), 47-53.

[59] Oakley, D. A.(1999). Hypnosis and conversion hysteria: a unifying model. *Cognitive Neuropsychiatry*, *4*(3), 243-265.

[60] Koopman, C., Classen, C.,& Spiegel, D.(1994). Predictors of posttraumatic stress

symptoms among survivors of the Oakland/Berkeley, Calif., firestorm. *The American Journal of Psychiatry*, *151*(6), 888.

[61] Lynn, S. J.,& Rhue, J. W.(Eds.).(1994). *Dissociation: Clinical and theoretical perspectives* (pp. 19-20). New York: Guilford Press.

[62] Putnam, F. W.(1997). *Dissociation in children and adolescents: A developmental perspective*. Guilford Press.

[63] Eisen, M. L., Qin, J., Goodman, G. S.,& Davis, S. L.(2002). Memory and suggestibility in maltreated children: Age, stress arousal, dissociation, and psychopathology. *Journal of Experimental Child Psychology*, *83*(3), 167-212.

[64] Perry, B. D., Pollard, R. A., Blakley, T. L., Baker, W. L., and Vigilante, D.(1995). Childhood trauma, the neurobiology of adaptation, and "use-dependent" development of the brain: How "states" become "traits". *Infant mental health journal*, *16*(4), 271-291.

[65] Hall, J. M.(2003). Dissociative experiences of women child abuse survivors: a selective constructivist review. *Trauma, Violence,& Abuse*, *4*(4), 283-308.

[66] Ellason, J. W., and Ross, C. A.(1997). Childhood trauma and psychiatric symptoms. *Psychological Reports*, *80*(2), 447-450.

[67] Perkins, S. L.,& Allen, R.(2006). Childhood physical abuse and differential development of paranormal belief systems. *The Journal of nervous and mental disease*, *194*(5), 349-355.

[68] Marks, D.F. and Kammann, R.(1980). *The Psychology of the Psychic.* New York: Prometheus Books.

[69] Wuthnow, R.(1976). Astrology and marginality. *Journal for the Scientific Study of Religion*, 157-168.

[70] Irwin, H. J.(1993). Belief in the paranormal: A review of the empirical literature. *Journal*

of the American Society for Psychical Research, *87*(1), 1-39.

[71] Bailey, T. D., & Brand, B. L.(2017). Traumatic dissociation: Theory, research, and treatment. *Clinical Psychology: Science & Practice*, *24*, 170-185.

[72] Putnam, F. W.(1985). Dissociation as a response to extreme trauma. In R. P. Kluft (Ed.), *Childhood antecedents of multiple personality* (pp. 63-97). Washington, DC: American Psychiatric Press.

[73] Bandura, A.(1989). Human agency in social cognitive theory. *American Psychologist*, *44*, 1175-1184.

[74] Taylor, S. E.,& Armor, D. A.(1996). Positive illusions and coping with adversity. *Journal of Personality*, *64*(4), 873-898.

[75] Prilleltensky, I., Nelson, G.,& Peirson, L.(2001). The role of power and control in children's lives: An ecological analysis of pathways toward wellness, resilience and problems. *Journal of Community & Applied Social Psychology*, *11*(2), 143-158.

[76] Porges, S. W.(2007). The polyvagal perspective. *Biological Psychology*, *74*(2), 116-143.

[77] Marks, D. F.(2018). *A General Theory of Behaviour* (SAGE Swifts). SAGE Publications. Kindle Edition.

[78] Nemeroff, C. B.(2016). Paradise lost: the neurobiological and clinical consequences of child abuse and neglect. *Neuron*, 89(5), 892-909.

[79] Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C.,...& Dunne, M. P.(2017). The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *The Lancet Public Health*, 2, e356-e366. doi.org/10.1016/S2468-2667(17)30118-4.

[80] Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C. H., Perry, B. D.,...& Giles, W. H.(2006). The enduring effects of abuse and related adverse experiences in childhood. *European Archives of Psychiatry & Clinical Neuroscience*, *256,* 174-186.

[81] Klinger, E.(1990). *Daydreaming*. Los Angeles: Jeremy Tarcher.

[82] Singer, J. L.(1975). *The inner world of daydreaming*. Harper & Row.

[83] Marks, D. F.(2019). I Am Conscious, Therefore, I Am: Imagery, Affect, Action, and a General Theory of Behavior. *Brain Sciences*, *9*(5), 107.

[84] Rauschenberger, S. L.,& Lynn, S. J.(1995). Fantasy proneness, DSM-III-R Axis I psychopathology and dissociation. *Journal of Abnormal Psychology, 104,* 373–380.

[85] Singer, J. L., and McCraven, V. G.(1961). Some characteristics of adult daydreaming. *J. Psychol.* 51, 151–164.

[86] Kane, M. J., Brown, L. H., Mcvay, J. C., Silvia, P. J., Myin-Germeys, I., and Kwapil, T. R.(2007). For whom the mind wanders, and when: an experience-sampling study of working memory and executive control in daily life. *Psychol. Sci.* 18, 614–621.

[87] Wilson, S. C. and Barber, T. X.(1983) The fantasy-prone personality: implications for understanding imagery, hypnosis, and parapsychological phenomena In Sheikh, A. A.(ed.) Imagery: Current Theory, Research, and Applications, 340–387. New York: Wiley.

[88] Marks. D. and McKellar. P. J.(1982). The nature and function of eidetic imagery. *Journal of Mental* Imagery 6, 1- 124.

[89] Zeman, A. Z., Dewar, M.,& Della Sala, S.(2015). Lives without imagery-Congenital aphantasia. Unpublished manuscript.

[90] Buckner, R. L., Andrews-Hanna, J. R.,& Schacter, D. L.(2008). The brain's default network. *Annals of the New York Academy of Sciences*, *1124*(1), 1-38.

[91] Kunzendorf, R.G., Hulihan, D.M., Simpson, W., Pritykina, N.& Williams, K.(1997/98). Is absorption a diathesis for dissociation in sexually and physically abused patients? *Imagination, Cognition,& Personality, 17,* 277–291.

[92] Tellegen, A., Lykken, D. T., Bouchard, T. J., Wilcox, K. J., Negal, N. L.& Rich, S.(1988). Personality similarity in twins reared apart and together. *Journal of Personality & Social Psychology*, *54,* 1031–1039.

[93] Lynn, S. J.,& Rhue, J. W.(1988). Fantasy proneness: Hypnosis, developmental antecedents, and psychopathology. *American Psychologist*, *43*(1), 35.

[94] Green, J. P.,& Lynn, S. J.(2011). Hypnotic responsiveness: Expectancy attitudes, fantasy proneness, absorption, and gender. *International Journal of Clinical and Experimental Hypnosis*, *59*, 103-121.

[95] Levin, R.,& Young, H.(2001/2002). The relation of waking fantasy to dreaming. *Imagination, Cognition and Personality, 21*, 201-219.

[96] Merckelbach, H., Horselenberg, R.,& Muris, P.(2001). The Creative Experiences Questionnaire (CEQ): A brief self-report measure of fantasy proneness. *Personality and Individual Differences, 31*, 987-995.

[97] Geraerts, E., Merckelbach, H., Jelicic, M., Smeets, E.,& Van Heerden, J.(2006). Dissociative symptoms and how they relate to fantasy proneness in women reporting repressed or recovered memories. *Personality and Individual Differences, 40*, 1143- 1151.

[98] Pekala, R. J., Kumar, V. K., Ainslie, G., Elliott, N. C., Mullen, K. J., Salinger, M. M.,& Masten, E.(1999). Dissociation as a function of child abuse and fantasy proneness in a substance abuse population. *Imagination, Cognition and Personality*, *19*(2), 105-129.

[99] Rhue, J. W.,& Lynn, S. J.(1987). Fantasy proneness: Developmental antecedents.

 doi:10.20944/preprints201906.0269.v1

Journal of Personality, 55, 121-137.

[100] Sànchez-Bernardos, M. L.,& Avia, M.D.(2004). Personality correlates of fantasy proneness among adolescents. *Personality and Individual Differences, 37*, 1069-1079.

[101] Somer, E.,& Herscu, O.(2017). Childhood trauma, social anxiety, absorption and fantasy dependence: Two potential mediated pathways to maladaptive daydreaming. *Journal of Addictive Behavior Therapy & Rehabilitation*, 6: 3 *5*.

[102] Green, J. P.,& Lynn, S. J.(2008). Fantasy proneness and hypnotisability: Another look. *Contemporary Hypnosis, 25*, 156-164.

[103] Terhune, D. B., Cardeña, E.,& Lindgren, M.(2010). Dissociative tendencies and individual differences in high hypnotic suggestibility. *Cognitive Neuropsychiatry*, *16,* 113-135.

[104] Giambra, L. M.(1999/2000). Frequency and intensity of daydreaming: Age changes and age differences from late adolescent to the old-old. *Imagination, Cognition and Personality*, *19*, 229-267.

[105] Laroi, F., DeFruyt, F., Van Os, J., Aleman, A.,& Van der Linden, M.(2005). Associations between hallucinations and personality structure in a non-clinical sample: Comparison between young and elderly samples. *Personality and Individual Differences, 39*, 189-200.

[106] Bartholomew, R., Basterfield, K.,& Howard, G. S.(1991). UFO abductees and contactees: Psychopathology or fantasy proneness. *Professional Psychology: Research and Practice, 22*, 215-222.

[107] Berkowski, M.,& MacDonald, D. A.(2014). Childhood trauma and the development of paranormal beliefs. *The Journal of Nervous and Mental Disease, 202*, 305- 312.

[108] French, C. C., Santomauro, J., Hamilton, V., Fox, R.,& Thalbourne, M. A.(2008). Psychological aspects of the alien contact experience. *Cortex, 44*, 1387-1395.

[109] Gow, K., Lang, T.,& Chant, D.(2004). Fantasy proneness, paranormal beliefs and personality features in out-of-body experiences. *Contemporary Hypnosis*, *21*, 107- 125.

[110] Hough, P.,& Rogers, P.(2007/2008). Individuals who report being abducted by aliens: Investigating the differences in fantasy proneness, emotional intelligence and the big five personality factors. *Imagination, Cognition and Personality*, *27*, 139-161.

[111] Irwin, H. J.(1990). Fantasy proneness and paranormal beliefs. *Psychological Reports*, *66*(2), 655-658.

[112] Lawrence, T., Edwards, C., Barraclough, N., Church, S., and Hetherington, F.(1995). Modelling childhood causes of paranormal belief and experience: Childhood trauma and childhood fantasy. *Personality and Individual Differences*, *19*(2), 209-215.

[113] Parra, A.(2006).“Seeing and feeling ghosts”: Absorption, fantasy proneness, and healthy schizotypy as predictors of crisis apparition experiences. *Journal of Parapsychology, 70,* 357-372.

[114] Rogers, P., Qualter, P.,& Phelps, G.(2007). The mediating & moderating effects of loneliness and attachment style on belief in the paranormal. *European Journal of Parapsychology, 22(2)*, 138-165.

[115] Spanos, N. P., Cross, P. A, Dickson, K.,& DuBreuil, S. C (1993). Close encounters: An examination of UFO experiences. *Journal of Abnormal Psychology, 102*, 624-632.

[116] Rhue, J.W., Lynn, S.J., Henry, S., Buhk, K.,& Boyd, P.(1990). Child abuse, imagination and hypnotizability. *Imagination, Cognition & Personality,10,* 53-63.

[117] Rauschenberger, S. L.,& Lynn, S. J.(1995). Fantasy proneness, DSM-II—R Axis 1 psychopathology, and dissociation. *Journal of Abnormal Psychology*, *104*(2), 373.

[118] Putnam, F. W.(1991). Dissociative disorders in children and adolescents: A developmental perspective. *Psychiatric Clinics*, *14*(3), 519-531.

[119] Vonderlin, R., Kleindienst, N., Alpers, G. W., Bohus, M., Lyssenko, L.,& Schmahl, C.(2018). Dissociation in victims of childhood abuse or neglect: a meta-analytic review. *Psychological Medicine*, 48(15), 2467-2476.

[120] Belli, R. F.,& Loftus, E. F.(1994). Recovered memories of childhood abuse: A source monitoring perspective. In S. J. Lynn & J. W. Rhue (Eds.), *Dissociation: Clinical and theoretical perspectives* (pp. 415-433). New York, NY, US: Guilford Press.

[121] French, C.(2009). Families are still living the nightmare of false memories of sexual abuse. https://www.theguardian.com/science/2009/apr/07/sexual-abuse-false-memory-syndrome

[122] Porter, S., Yuille, J. C.,& Lehman, D. R.(1999). The nature of real, implanted, and fabricated memories for emotional childhood events: Implications for the recovered memory debate. *Law and human behavior*, *23*(5), 517-537.

[123] Giesbrecht, T., Lynn, S. J., Lilienfeld, S. O.,& Merckelbach, H.(2008). Cognitive processes in dissociation: An analysis of core theoretical assumptions. *Psychological Bulletin*, *124,* 617–647.

[124] Lynn, S. J., Lilienfeld, S. O., Merckelbach, H., Giesbrecht, T., McNally, R. J., Loftus, E. F.,...& Malaktaris, A.(2014). The trauma model of dissociation: Inconvenient truths and stubborn fictions. Comment on Dalenberg et al.(2012).

[125] Brewin, C. R.,& Andrews, B.(2017). Creating memories for false autobiographical events in childhood: A systematic review. *Applied Cognitive Psychology*, *31*, 2-23.

[126] Dalenberg, C. J., Brand, B. L., Gleaves, D. H., Dorahy, M. J., Loewenstein, R. J., Cardena, E.,… Spiegel, D.(2012). Evaluation of the evidence for the trauma and fantasy models of dissociation. *Psychological Bulletin*, *138*, 550–588.

[127] Dalenberg, C. J., Brand, B. L., Loewenstein, R. J., Gleaves, D. H., Dorahy, M. J., Cardeña, E.,… Spiegel, D.(2014). Reality versus fantasy: Reply to Lynn

 doi:10.20944/preprints201906.0269.v1

et al.(2014). *Psychological Bulletin, 140*, 911–920.

[128] Vissia, E. M., Giesen, M. E., Chalavi, S., Nijenhuis, E. R. S., Draijer, N., Brand, B. L.,& Reinders, A. A.(2016). Is it trauma- or fantasy-based? Comparing dissociative identity disorder, post-traumatic stress disorder, simulators, and controls. *Acta Psychiatrica Scandinavica*, 134, 111–128.

[129] Merckelbach, H.,& Patihis, L.(2018). Why "trauma-related dissociation" is a misnomer in courts: a critical analysis of Brand et al.(2017a, b). *Psychological Injury and Law*, *11*(4), 370-376.

[130] Brand, B. L., Dalenberg, C. J., Frewen, P. A., Loewenstein, R. J., Schielke, H. J., Brams, J. S.,& Spiegel, D.(2018). Trauma-related dissociation is no fantasy: Addressing the errors of omission and commission in Merckelbach and Patihis (2018). *Psychological Injury and Law*, *11*, 377-393.

[131] van Heugten–van der Kloet, D., Merckelbach, H., Giesbrecht, T.,& Broers, N.(2014). Night-time experiences and daytime dissociation: A path analysis modeling study. *Psychiatry research*, *216*(2), 236-241.

[132] Freyd, J. J.(1996). *Betrayal trauma: The logic behind forgetting childhood abuse.* Cambridge, MA: Harvard University Press.

[133] Freyd, J. J.(1997). Violations of power, adaptive blindness, and betrayal trauma theory. *Feminism & Psychology*, 7, 22–32.

[134] Gómez, J. M., Kaehler, L. A.,& Freyd, J. J.(2014). Are hallucinations related to betrayal trauma exposure? A three-study exploration. *Psychological Trauma: Theory, Research, Practice, and Policy*, *6*(6), 675.

[135] Marks, D. F.(1988).The psychology of paranormal beliefs. *Experientia*, 44, 332–337.

[136] Hofmann, A.,& Ott, J.(1980). *LSD, my problem child* (Vol. 5). New York: McGraw-Hill.

[137] Luke, D. P.,& Kittenis, M.(2005). A preliminary survey of paranormal experiences with psychoactive drugs. *Journal of Parapsychology*, *69*(2), 305.

[138] Wiseman, R., and Watt, C.(2006). Belief in psychic ability and the misattribution hypothesis: A qualitative review. *British Journal of Psychology*, *97*(3), 323-338.

[139] Kirsch, I., and Council, J. R.(1992). Situational and personality correlates of hypnotic responsiveness. In E. Fromm and M. R. Nash (Eds.), Contemporary hypnosis research (pp. 267–291). New York: Guilford.

[140] Thalbourne, M. A.(2000). Transliminality: A review. International Journal of Parapsychology, 11(2), 1–34.

[141] Glicksohn, J.,& Barrett, T. R.(2003). Absorption and hallucinatory experience. *Applied Cognitive Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition*, *17*(7), 833-849.

[142] Parra, A., & Argibay, J.C. (2012). Dissociation, absorption, fantasy proneness and sensation-seeking in psychic claimants. *Journal of the Society for Psychical Research*, *76*(909), 193.

[143] Gow, K. M., Hutchinson, L.,& Chant, D.(2009). Correlations between fantasy proneness, dissociation, personality factors and paranormal beliefs in experiencers of paranormal and anomalous phenomena. *Australian Journal of Clinical & Experimental Hypnosis*, *37*(2).

[144] Marks, D. F.(1995). New directions for mental imagery research. *Journal of Mental Imagery, 19*(3-4), 153-167.

[145] Parra, A.(2015). Seeing rare things with the mind's eye: Visual imagery vividness and paranormal/anomalous experiences. *Australian Journal of Parapsychology*, *15*(1), 37.

[146] Tomkins, S.(1962). *Affect Imagery Consciousness, Volume I: The Positive Affects*. New York: Springer.

 doi:10.20944/preprints201906.0269.v1

[147] Brewin, C.R., Gregory, J.D., Lipton, M. and Burgess, N.(2010). Intrusive images in psychological disorders: Characteristics, neural mechanisms, and treatment implications. *Psychological Review*, 117(1), 210.

[148] Varese, F., Barkus, E.,& Bentall, R. P.(2012). Dissociation mediates the relationship between childhood trauma and hallucination-proneness. *Psychological Medicine*, *42*(5), 1025-1036.

[149] Bailey, T., Alvarez-Jimenez, M., Garcia-Sanchez, A. M., Hulbert, C., Barlow, E.,& Bendall, S.(2018). Childhood trauma is associated with severity of hallucinations and delusions in psychotic disorders: a systematic review and meta-analysis. *Schizophrenia Bulletin*, *44*(5), 1111-1122.

[150] McGrath, J. J., McLaughlin, K. A., Saha, S., Aguilar-Gaxiola, S., Al-Hamzawi, A., Alonso, J.,...& Florescu, S.(2017). The association between childhood adversities and subsequent first onset of psychotic experiences: a cross-national analysis of 23 998 respondents from 17 countries. *Psychological medicine*, *47*(7), 1230-1245.

[151] Muenzenmaier, K. H., Seixas, A. A., Schneeberger, A. R., Castille, D. M., Battaglia, J.,& Link, B. G.(2015). Cumulative effects of stressful childhood experiences on delusions and hallucinations. *Journal of Trauma & Dissociation*, *16*(4), 442-462.

[152] Pilton, M., Varese, F., Berry, K.,& Bucci, S.(2015). The relationship between dissociation and voices: a systematic literature review and meta-analysis. *Clinical Psychology Review*, *40*, 138-155.

[153] Perona-Garcelán, S., Carrascoso-López, F., García-Montes, J. M., Ductor-Recuerda, M. J., López Jiménez, A. M., Vallina-Fernández, O.,...& Gómez-Gómez, M. T.(2012). Dissociative experiences as mediators between childhood trauma and auditory hallucinations. *Journal of Traumatic Stress*, *25*(3), 323-329.

 doi:10.20944/preprints201906.0269.v1

[154] Cole, C. L., Newman-Taylor, K.,& Kennedy, F.(2016). Dissociation mediates the relationship between childhood maltreatment and subclinical psychosis. *Journal of Trauma & Dissociation*, *17*(5), 577-592.

[155]Mauritz, M.W., Goossens, P.J., Draijer, N., van Achterberg, T.(2013). Prevalence of interpersonal trauma exposure and trauma-related disorders in severe mental illness. *European Journal of Psychotraumatology,* 4 (1), 19985.

[156] Birchwood, M., Meaden, A., Trower, P., Gilbert, P.& Plaistow, J.(2000). The power and omnipotence of voices: subordination and entrapment by voices and significant others. *Psychological Medicine*, 30, 337–344.

[157] Porges, S. W.(2017). *The pocket guide to the polyvagal theory: The transformative power of feeling safe*. W. W. Norton and Company. Kindle Edition.

[158] Sejnowski, T. J., & Churchland, P. S. (1989). Brain and cognition, Foundations of cognitive science.

[159] Petersen, S. E., & Sporns, O. (2015). Brain networks and cognitive architectures. *Neuron*, *88*(1), 207-219.

[160] Edlow, B. L., McNab, J. A., Witzel, T., & Kinney, H. C. (2016). The structural connectome of the human central homeostatic network. *Brain connectivity*, *6*(3), 187-200.

[161] Bentham, J. (1789). *An Introduction to the Principles of Morals and Legislation.* Privately published.

[162] Fechner, G. T. (1848). Über das Lustprinzip des Handelns. *Zeitschrift für Philosphie und philosophische Kritik*--Neue Folge, 19. 1-30, 163-194.

[163] Freud, S., & Jones, E. (Ed.). (1922). Beyond the pleasure principle. International psychoanalytical library: Vol. 4. (C. J. M. Hubback, Trans.). London, England.

 doi:10.20944/preprints201906.0269.v1

[164] Cannon, W. B. (1932). *The wisdom of the body.* New York, NY, US: W W Norton & Co.

[165] Leknes, S.,& Tracey, I.(2008). A common neurobiology for pain and pleasure. *Nature Reviews Neuroscience*, *9*(4), 314.

[166] Elliot, A. J.(1999). Approach and avoidance motivation and achievement goals. *Educational psychologist*, *34*(3), 169-189.

[167] Selye, H. (1956). *The stress of life.* New York, NY, US: McGraw-Hill.

[168] Kunz, E.(2014). Henri Laborit and the inhibition of action. *Dialogues in clinical neuroscience*, *16*(1), 113.

[169] Gray J.A., & McNaughton, N.(2000). The NeuroPsychology of Anxiety: An Enquiry into the Functions of the Septo-hippocampal System. 2nd ed. Oxford: Oxford University Press; McNaughton, N., DeYoung, C. G.,& Corr, P. J.(2016). Approach/avoidance. In *Neuroimaging personality, social cognition, and character* (pp. 25-49).

[170] Leknes, S. and Tracey, I.(2008). A common neurobiology for pain and pleasure. *Nature Reviews Neuroscience*, 9(4), 314.

[171] Lang, P.J. and Bradley, M.M.(2010). Emotion and the motivational brain. Biological Psychology, 84(3), 437–450.

[172] Elliot, A.J.(1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, 34(3), 169–189.

[173] Bolles, R.C.(1970). Species-specific defense reactions and avoidance learning. *Psychological Review*, 77(1), 32.

[174] Wichers, M., Kasanova, Z., Bakker, J., Thiery, E., Derom, C., Jacobs, N. and van Os, J.(2015). From affective experience to motivated action: Tracking reward-seeking and punishment-

avoidant behaviour in real-life. *PloS One,* 10(6), e0129722.

[175] Schauer, M., and Elbert, T.(2010). Dissociation following traumatic stress. *Zeitschrift fur Psychologie*, 218(2):109–127.

[176] Rabeyron, T.,& Watt, C.(2010). Paranormal experiences, mental health and mental boundaries, and psi. *Personality and Individual Differences*, *48*(4), 487-492.

[177] Sar, V., Alioğlu, F., Akyüz, G.(2014). Experiences of possession and paranormal phenomena among women in the general population: are they related to traumatic stress and dissociation?. *Journal of Trauma and Dissociation*, *15*(3), 303-318.

[178] Scimeca, G., Bruno, A., Pandolfo, G., La Ciura, G., Zoccali, R. A.,& Muscatello, M. R.(2015). Extrasensory perception experiences and childhood trauma: A Rorschach investigation. *The Journal of Nervous and Mental Disease*, *203*(11), 856-863.

[179] Parra, A.(2019). Negative Experiences in Childhood, Parental Style, and Resilience Among People Reporting Paranormal Experiences. *The Journal of Nervous and Mental Disease*, *207*(4), 264-270.

[180] Wahbeh, H., McDermott, K.,& Sagher, A.(2018). Dissociative Symptoms and Anomalous Information Reception. *Activitas Nervosa Superior*, *60*(3-4), 75-85.

[181] Cook, A., Spinazzola, J., Ford, J., Lanktree, C., Blaustein, M., Cloitre, M.,... Mallah, K.(2017). Complex trauma in children and adolescents. *Psychiatric Annals*, *35*(5), 390-398.

[182] Chu, J. A., Dill, D. L.(1990). Dissociative symptoms in relation to childhood physical and sexual abuse. *The American Journal of Psychiatry*, *147*(7), 887.

[183] Ross, C. A., Joshi, S., Currie, R.(1990). Dissociative experiences in the general population. *American Journal of Psychiatry*, *147*(11), 1547-1552.

[184] Putnam, F.W., Carlson, E.B., Ross, C.A., Anderson, G., Clark, P., Torem, M. et al. (1996).

Patterns of dissociation in clinical and nonclinical samples. *Journal of Nervous & Mental Diseases,* 184(11):673-9.

[185] Spitzer, C., Klauer, T., Grabe, H. J., Lucht, M., Stieglitz, R. D., Schneider, W., Freyberger, H. J.(2003). Gender differences in dissociation. *Psychopathology*, *36*(2), 65-70.

[186] Maaranen, P., Tanskanen, A., Honkalampi, K., Haatainen, K., Hintikka, J., , H.(2005). Factors associated with pathological dissociation in the general population. *Australian & New Zealand Journal of Psychiatry*, *39*(5), 387-394.

[187] Steuwe, C., Lanius, R. A., Frewen, P. A.(2012). Evidence for a dissociative subtype of PTSD by latent profile and confirmatory factor analyses in a civilian sample. *Depression and Anxiety*, *29*(8), 689-700.

[188] Wolf, E. J., Lunney, C. A., Miller, M. W., Resick, P. A., Friedman, M. J.,Schnurr, P. P.(2012a). The dissociative subtype of PTSD: A replication and extension. *Depression and Anxiety*, *29*(8), 679-688.

[189] Wolf, E. J., Miller, M. W., Reardon, A. F., Ryabchenko, K. A., Castillo, D.,& Freund, R.(2012b). A latent class analysis of dissociation and posttraumatic stress disorder: Evidence for a dissociative subtype. *Archives of General Psychiatry*, *69*(7), 698-705.

[190] McLaughlin, K. A., Koenen, K. C., Hill, E. D., Petukhova, M., Sampson, N. A., Zaslavsky, A. M.,& Kessler, R. C.(2013). Trauma exposure and posttraumatic stress disorder in a national sample of adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, *52*(8), 815-830.

[191] Stein, D. J., Koenen, K. C., Friedman, M. J., Hill, E., McLaughlin, K. A., Petukhova, M.,... Bunting, B.(2013). Dissociation in posttraumatic stress disorder: evidence from the world mental health surveys. *Biological psychiatry*, *73*(4), 302-312.

[192] Minakowska-Gruda, I.(2006). Relations and Differences among Three Kinds of Imagery

 doi:10.20944/preprints201906.0269.v1

Related Traits: Visual Cognitive Style, Imagery Vividness and Imagination Immersion. *Imagination, Cognition and Personality*, *26*(1), 43-63.

[193] Roe, C. A., Morgan, C. L. (2002). Narcissism and belief in the paranormal. *Psychological reports*, *90*(2), 405-411.

[194] Brewin, C. R., Andrews, B., Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of consulting and clinical psychology*, *68*(5), 748.

[195] Craig, W. M., Harel, Y. (2001). Bullying, physical fighting and victimization. *Young people's health in context: International report from the HBSC*, *2*, 133-144.