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Humour, Mirth, or Laughter in Neurology, Nervous Disorders and Diseases

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Abstract

The available research on humor, mirth, or laughter in neurology, nervous disorders, and diseases is sparse and fragmented. This review attempts to collect, collate, and evaluate available evidence afresh in this research paper. Although descriptive, the included literature covers around eighty peer-reviewed published articles written exclusively on the chosen theme. The anatomical, organic, evolutionary, and functional basis is delineated before specific neurological disease conditions are invoked to understand how humor is believed to be generated, appreciated, or can be even used as an adjunct form of therapy to ameliorate these conditions. The opportunities and challenges for humor research in the contemporary scenario for neurology are summarized with a plea for more empirical work in this direction.

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Introduction

This descriptive review highlights the humor-laughter found in keyword searches of published works on neurological diseases and disorders. The terms "disease" and "disorder" are used interchangeably in everyday speech. A disorder is explained as a disruption to the usual bodily functions. A disease is defined as the pathological response of the body to external or internal factors that disrupted body functions. Disorders can be physical, mental, structural, genetic, behavioural, or emotional (Cooper, 2004) [1]. Reviews from this same published source have covered introductory topics on theories and developmental aspects of humor applied to children, the elderly, and persons with disabilities-impairments [2a-2d].

Method

From a database of over 900 entries covering all categories of humor currently available to the author, this narrative examines nearly 80 peer-reviewed research articles on the theme. The entries were compiled based on a thorough examination of online secondary data sources as enumerated after keyword searches of terms like those in the title of this article. Both offline/online searches with standard publication identifiers were compiled, coded, categorized, and classified by title, theme, year, and names of author/s or journals. Search engines included Google Scholar, JSTOR, PUBMED, PsycINFO, ERIC, and the Web of Science until March 31, 2023. Newsletters, periodicals, in-house magazines, proceedings of seminars, webinars, or conferences, mimeographs, video or audio materials, and unpublished pre-doctoral doctoral or post-doctoral dissertations were excluded. Incomplete, misleading, repeated, and unverified cross references from available full text articles and books were also excluded.

Two independent coders who were mutually blinded were used to conduct inter-observer reliability assessments on at least 25% of the entries in the entire sample.

The official mandate's ethical guidelines were strictly observed [3].Using SPSS/PC, a descriptive and interpretive statistical analysis was conducted [4]. [5] recommendations were used to analyse effect sizes

Results

The collected information on references to humour, mirth, or laughter in neurology, nervous disorders, and diseases was organized into a harvest plot according to their publication dates, decade of publication, and format (books, book chapters, original research articles based on experimental, observational, or empirical data, reviews, or essays).

Format

The majority of the publications included in this compilation (N = 33;40.25%) are data-based empirical research papers, followed by descriptive essays (N= 19;21.17%),case studies or reports (N = 11; 13.42%), reviews (N = 10;12.20%), and so forth. There aren't many published books or book chapters that focus solely on humor in neurology, nerve disorders, and diseases. As of yet, there is no grand theory explaining this.

Timelines

Based on timelines in the enlisted database, the earliest available publication is a general essay on ***aphonogelia***-a rare neurological symptom characterized by the inability to laugh audibly [6]. Another early genetic study on laughter-provoking stimuli debated whether humor is innate or acquired [7]. Other publications of the 1930s are descriptive essays/case reports of brain-damaged patients showing

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Table 1: Harvest plot showing the frequency distribution of compiled literature on humor, mirth, or laughter in neurology, nervous disorders and diseases.

Variable	N	%
Format		
Data-based Empirical	33	40.25
Descriptive Essays	19	23.17
Case Studies/Reports	11	13.42
Reviews	10	12.20
Chapters	4	4.88
Books	3	3.66
Theory	2	2.44
Timelines		
<=2000	25	30.49
2001-2010	18	21.95
2011-2020	29	35.37
2020>	10	12.20
Topics		
Dementia	15	18.29
Pathological Laughter/ALS	14	17.07
Localization	9	10.98
General	7	8.54
Therapy/Training/Intervention	6	7.32
Epilepsy	6	7.32
Neural/Neurology	4	4.88
Parkinsons	3	3.66
Phylogeny	3	3.66
Psychopathy	2	2.44
Multiple Sclerosis	2	2.44
Genetics	2	2.44
Others (Stroke, Theory, Elderly, Disability…)	9	2.44
Total	82	100.00

pathological laughing and crying [8,9].The first experimental inquiry in this bibliography on neurology-linked themes targets right-hemisphere-damaged patients. The finding is that surprise-not, coherence is the basis for humor in such brain-damaged persons [10]. This is followed by another book chapter carrying a short narrative on the neuropsychological perspective of humour [11].

Later explorations covered the biological basis or correlate, including genetic, evolutionary, anatomical, endocrine, and physiology of humor [12-15]. Smiling and laughter are not unique to humans. The cerebral organization of laughter has been studied from the evolutionary perspective in squirrel monkeys, apes, gorillas, bonobos, orangutans and juvenile chimpanzees [16].wherein playful tickling and biting evoke laughter described as part of the ***false alarm theory*** in the neurology and evolution of humor [17]. Human infants are also noticed to smile in the first five weeks of extrauterine life. Laughter emerges later by about four months. About 16 different types of smiles are detected, such as scornful, mocking, social, or faked, as part of infant face recognition [18].

Early attempts to review, collate, and evaluate studies from the fragmented evidence on the neurology of mirth, laughter, and humor have implicated the frontal cortex, the medial ventral prefrontal cortex, the right and left posterior (middle and inferior) temporal regions, and possibly the cerebellum to varying degrees [19,20]. A consensus based on ***neuropsychology approaches*** is that humor is essentially a right hemisphere function, as evidenced consistently by the loss of appreciation for sarcasm by studies of brain damage in those areas [21-24]. As part of the limbic system, the amygdala and hippocampus are implicated in the human brain in the production of laughter [25]. Disease or damage to these areas is recorded as testimonies of the resulting pathological crying and laughter [26] failure to distinguish lies from jokes [24] .loss of sensitivity to verbal humor [10]. As shown in cases of traumatic brain injury [27]. Similarly, gelatophobics showed greater activation than non-gelatophobics in the areas of the dorsolateral prefrontal cortex in response to hostile and non-hostile jokes, thereby hinting at the neural correlates of humor appreciation [28].

Ablation studies have shown how basic levels of cognition but not necessarily one's sense of humor are affected [29]. Anecdotal reports of survivors with agenesis of the corpus callosum having average IQ suggest a diminished appreciation of the subtleties involved in the appreciation of jokes during social interactions [30]. The brain-behavior correlation for humor comprehension and appreciation is affected after generalized brain injury or cerebellar degeneration [31,32]. An altered sense of humor is noted in conditions like dementia [33] relapsing-remitting multiple sclerosis [34]. systemic sclerosis[35]. amyotrophic lateral sclerosis [36] .cognitive impairments [37]. Parkinson's [38] and cerebellar degeneration [32]. For example, suits et al (2012) showed that verbal, visual, motor, and tactile humor appreciation and comprehension were significantly lower among preschool children with epilepsy than in matched healthy controls. In rare instances, there are reports of temporary or permanent loss of sense of humor [39].

Topics

This list of compiled publications covers a wide range of topics related to humor in neurology, nervous disorders, and diseases. The most frequently targeted disease conditions for studying humor are dementia, pathological laughter, epilepsy, multiple sclerosis, and stroke. The therapeutic or treatment potential of humor in nervous diseases are minimally mentioned in few publications.

(i) Dementia

Research on patients with dementia has postulated whether their humor styles (adaptive or maladaptive) are predictive of the strong or weaker purpose they hold in their daily life [40-41]. recorded how discourse comprehension rather than single-word comprehension was impaired in Alzheimer's Disease and Frontotemporal Dementia as compared to healthy controls. Despite these deficits and the recognition of an organic basis, positive humor is shown to have a vital role as complementary and alternative medicine [42] in ameliorating the quality of life by maintaining sustaining an enduring relationship strength between people with dementia and their carers throughout the disease [43-45]. Further, the use of medical clown stand-up comedy and improvisation workshops on people with early stages of dementia has shown therapeutic benefits as improvements in memory, learning, sociability, communication, and self-esteem in these patients [46,47]. Objective and empirical studies on this population are still plagued by the absence of a standard or valid behavioural observation system that covers aspects like humor style, response, and contribution, which was attempted to be fixed in a recent study [48].

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(ii) Pathological Laughter

Some nervous disease and mental illness conditions like vascular pseudobulbar palsy, motor neuron disease, Gilles de la Tourette Syndrome, Angelman Syndrome, psychopathy, personality disorders, schizophrenia, and bipolar disorder have earned a stereotype that such persons laugh unexpectedly, disruptively, incorrectly, or uncontrollably. Names like nervous-pathological laughter, emotional lability, or dysregulation disorder are used to designate these conditions. Other terms like dysprosopeia, or sham mirth have been used to refer to pathological laughter [49,50]. There is also a version of Gelastic epilepsy with seizures in which laughter is the major symptom. Although ictal laughter appears mechanical and unnatural, sometimes it can be mistaken as normal. The hypothalamus, frontal and temporal poles have been implicated in this type of laughter [51-58].Humorous cartoons on everyday life situations used as an indicator of neuropsychological deficits failed to elicit the desired levels of humor in patients with temporal lobe epilepsy [59].

"Normal" laughter is typically caused by tickling, social cues, and laughing gas. First described by German neurologists H. Oppenheim and M. Jastrowitz, the term ***Witzelsucht***(for joking addiction) refers to a set of pure and rarely neurological symptoms characterized by a tendency to make puns, tell inappropriate jokes, or relate pointless stories in socially inappropriate situations. These patients typically lack insight into their condition. An early observation noted how pathological laughing and crying are a sign of occurrence or recurrence of tumors in the brainstem [60,61]. Others have attributed the symptoms to decreased blood flow in the right frontal lobe tumors, poor concentration, extreme distractibility, and difficulty with visuospatial tasks as seen on Wisconsin Card Sorting Test [62,63].

Therapeutic Humor

Therapeutic humor is used as an adjunct or form of complementary medicine to relieve pain or stress and improve a person's sense of well-being involving the use of exercises, clowns, comedy movies, books, games, or puzzles. Also called several variants like laughter yoga therapy, hospice, or medical humor, the nomenclature varies with the purpose, by whom, how, or type of settings where they are used. At a very early time in history, forced laughter and crying along with atropine or atropine-like drugs were found to be effective in the control or modification of motor discharge seen in Parkinson's Disease [64].

Humor based therapies have been tried on many nervous disorders like organic and psychogenic epilepsy [65,66].mild cognitive impairments [67] and Parkinson's disease (Bega et al. 2017; DeCaro & Brown, 2016) [68,69]. Humor-based therapies claim adjunct value to the main course of organic medicine-based interventions to even alter the functional processing of certain areas in the brain [70,71]. So much so, a dose of non-offensive or non-derogatory humor (Wear et al. 2006) [72]. is recommended to carers for routine home or nursing management of neuropsychiatric patients (van der [73-75]. But, there are doubts about whether humor in psychotherapy can be ever taught [76].

Conclusion

There are both claims and counterarguments on the therapeutic benefits of humor. There is a lack of consensus on what is humor and what are its components. The overall quality of evidence is anecdotal and low with a substantial risk of bias in all studies. Non-humorous laughter attains a higher effect size than humorous laughter. Humor research in neurology needs to attain maturity. More careful "clinical trial" research needs to be mounted to determine the conditions under which humor works best if at all they work. There have been different outcomes with different populations. The type of patient, the kind of humor, the type and severity of illness, the psychosocial contexts should be considered. Laughter-inducing therapies could be cost-effective treatments are at best hold promise as low-cost complementary or adjunct to main therapy. More methodologically rigorous research is needed to provide evidence for this promise.

An often repeated line is: Laughter is the best medicine. Children are recorded to laugh around 150-400 times per day. An average adult laughs 15-20 times a day. Humor is the antidote to stress, pain, and conflict. A 10-minutes of laughter and a few hours of pain-free sleep per day do not cost anything. It is noted that 13 muscles are used in smiling, while 47 muscles are strained in frowning. Laughter increases oxygen flow, relaxes muscles, helps fight infection, and energizes and increases breathing. It adds days to one's lifespan. Laughter-induced brain stimulation improves alertness, creativity, and memory. With so many advantages, humor can stand as first line of treatment for seniors or persons with neurological challenges.

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