ISSN: 2690-0726

Research Article

Journal of Educational & Psychological Research

A Study on the Research Methodology of Integrating Borderline Personality Disorder (BPD) And Type 2 Diabetes (T2D) in Chronic Disease Management, Utilizing A Hypothetical Case with a Synthesized Psychological Profile as the Stress Factor in a Real T2D Patient, Applying the Viscoplastic Energy Theory from the GH-Method of Math-Physical Medicine (No. 1052, VGT #450)

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Submitted: 2024, Mar 26; **Accepted**: 2024, Apr 16; **Published**: 2024, Apr 22

Citation: Hsu, G. C. (2024). A Study on the Research Methodology of Integrating Borderline Personality Disorder (BPD) And Type 2 Diabetes (T2D) in Chronic Disease Management, Utilizing A Hypothetical Case with a Synthesized Psychological Profile as the Stress Factor in a Real T2D Patient, Applying the Viscoplastic Energy Theory from the GH-Method of Math-Physical Medicine (No. 1052, VGT #450). *J Edu Psyc Res, 6*(1), 01-09.

Abstract

The author revisited his previous paper (No. 591, VGT # 12, dated 2/1/2022) and opted to expand this research by emphasizing research methodology, merging cases of borderline personality disorder (BPD) and type 2 diabetes (T2D) into a single hypothetical case. This approach involved using his own T2D data, substituting his stress factors with a synthesized BPD profile based on his acquired knowledge in psychology.

The relationship between glucose surges in diabetic patients and emotional stress resulting from borderline personality disorder (BPD) might be explained at below:

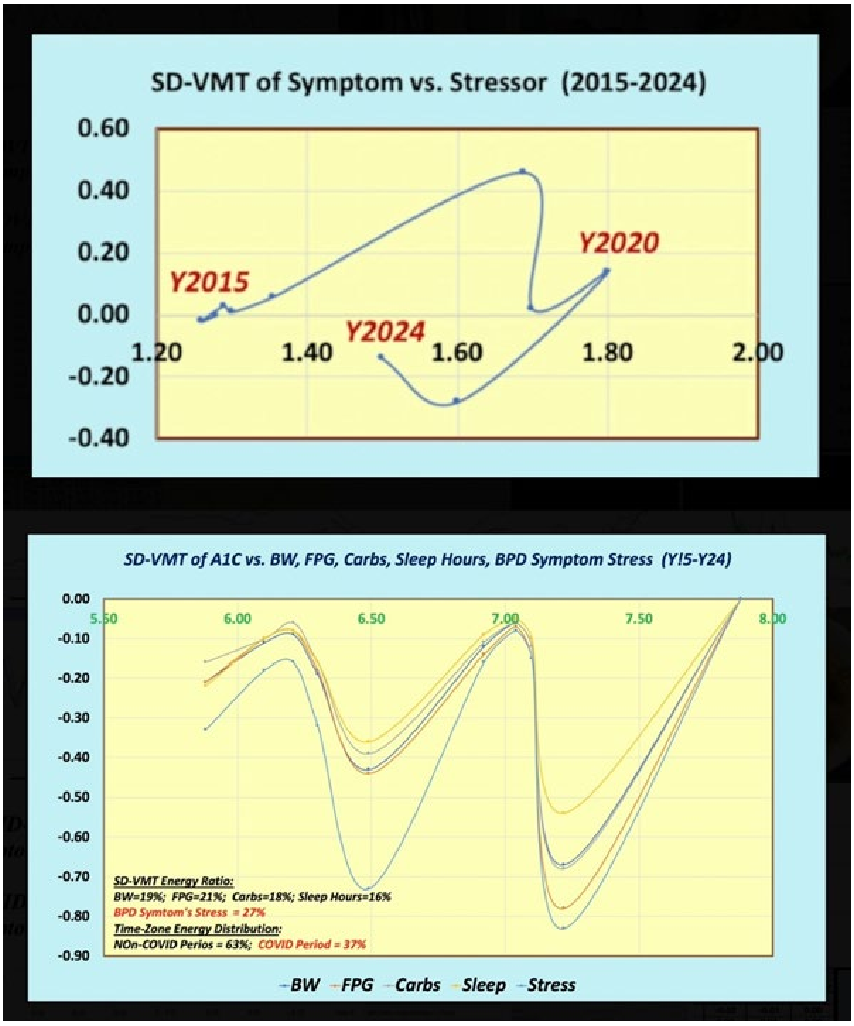
1. ***Emotional Stress and Glucose Control:*** *Patients with BPD experience intense emotional fluctuations and stress, which can lead to physiological changes affecting blood glucose levels. Stress hormones like cortisol and adrenaline can increase glucose levels by stimulating gluconeogenesis and reducing insulin sensitivity, leading to glucose surges in diabetic patients.*
2. ***Impact of Glucose Surges on Emotional Stability:*** *Conversely, glucose surges in diabetic patients can affect their emotional state. Fluctuating glucose levels can lead to mood swings, irritability, and exacerbation of BPD symptoms, creating a challenging cycle of emotional and physiological instability.*
3. ***Behavioral Interactions:*** *The impulsive behavior often associated with BPD can affect diabetes management, leading to poor dietary choices, inconsistent medication adherence, and neglect of glucose monitoring, all of which can contribute to glucose surges.*
4. ***Psychological and Physiological Stress Response:*** *The chronic stress of managing diabetes, especially with coexisting BPD, can lead to a heightened stress response, further destabilizing glucose levels and emotional regulation.*

In summary, *three key insights emerge:*

1. *During the past 10-years period, the stress symptoms resulted from BPD conditions of this hypothetical patient having both T2D and BPD, measuring 0.13 energy amount from the psychological domain, which accounted for 5% of the total T2D energy amount of 2.76 within the pathophysiological domain.*
2. *The influential factor of stress induced by BPD contributed to 27% of the total SD-VMT T2D energy amount.*
3. *Across ten years, the three COVID years represented 37% of the total energy (63% within non-COVID years), signifying consistent psychological impact on this hypothetical patient with both T2D and BPD.*

Key Message

Even with a hypothetical case study, it shows that understanding the interplay between BPD and T2D is essential for comprehensive patient care, underscoring the need for integrated treatment plans addressing both psychological and physiological aspects.



1. Introduction

Since 2002, the author has deepened his knowledge of abnormal behavior psychology, managing psychotherapy centers between 2006 and 2010, helping about 200 abused women and children. Confidentiality limits sharing specifics, but those experiences have informed the stress factor in this hypothetical BPD study of this article.

Psychology, often empirical, typically expresses stressors, symptoms, and treatments verbally rather than quantitatively, relying on statistical rather than natural sciences like physics or math. The author, having studied over 100 psychology textbooks and 500 clinical reports in personality disorders, sought to create scientific formulas for studying abnormal psychology, emphasizing a quantifiable and precise approach, integrating physical observation, mathematical modeling, and AI, beyond just statistics.

Faced with ethical concerns and confidentiality challenges in collecting data for personality disorder research, he eventually abandoned applying his math-physical medicine (MPM) method directly to his psychology research work. However, in 2010, confronting life-threatening type 2 diabetes, he initiated the GH-Method: math-physical medicine methodology on studying metabolism and chronic diseases, producing over 1,000 published medical papers. This particular paper marks a rare application of MPM to abnormal psychology, with the author keen on continuing his psychology research and valuing peer feedback in this domain.

The author revisited his previously published paper (No. 591, VGT # 12, dated 2/1/2022) and opted to expand this research by emphasizing research methodology, merging cases of borderline personality disorder (BPD) and type 2 diabetes (T2D) into a single hypothetical case. This approach involved using his own T2D data, substituting the influential factor of stress with a synthesized BPD profile based on his acquired knowledge in psychology during 2002 through 2010.

1.1. Biomedical Information

The following sections contain excerpts and concise information drawn from multiple medical articles, which have been meticulously reviewed by the author of this paper. The author has adopted this approach as an alternative to including a conventional reference list at the end of this document, with the intention of optimizing his valuable research time. It is essential to clarify that these sections do not constitute part of the author's original contribution but have been included to aid the author in his future reviews and offer valuable insights to other readers with an interest in these subjects.

Relationships between diabetic patient's glucose surge versus the patient also has emotional stress resulted from borderline personality disorders:

The relationship between glucose surges in diabetic patients and emotional stress resulting from borderline personality disorder (BPD) might be explained at below:

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4. ***Psychological and Physiological Stress Response:*** The chronic stress of managing diabetes, especially with coexisting BPD, can lead to a heightened stress response, further destabilizing glucose levels and emotional regulation.

2. Methods

2.1. Borderline Personality Disorder

The author will explore BPD stressors, including root causes and subsequent triggers, as well as behavioral symptoms covering outputs, diagnosis, and treatment.

Personality disorders (PD) represent enduring patterns of thought, feeling, and behavior that are stable over time. Among the 15 categorized disorders, PD encompasses 11 subtypes, including borderline personality disorder (BPD). BPD manifests as a consistent pattern of instability in interpersonal relationships, self-image, mood, and marked impulsiveness, often starting in early adulthood across various contexts.

This discussion integrates definitions and insights from the DSM-IV, a critical resource in psychology and psychotherapy, with the author's nine years of self-study and clinical research on 200 psychological patients. The author utilizes the DSM-IV to establish general guidelines for his mental index mathematical model, laying the groundwork for his research in a quantitative framework.

Here are ten stressors for Borderline Personality Disorder (BPD), detailing their origins and subsequent effects or symptoms:

- Parental Factors: Includes parental separation or loss during adolescence or young adulthood, often tied to experiences of abandonment and possibly parental abuse.
- Abuse: Encompasses physical, verbal, emotional, and sexual abuse during adolescence or young adulthood. Emotional abuse, such as neglect, abandonment, or verbal cruelty, can severely impact self-identity, self-image, self-worth, and self-confidence, with some parents inflicting abuse under the guise of "love."
- Family Dynamics: Having many first-degree relatives with psychological stress increases the likelihood of developing PD by five times. Dysfunctional family environments can lead to various PD types, with siblings often displaying different PD patterns, including borderline and antisocial personality disorders.
- Gender Prevalence: Females are more frequently affected by BPD, representing about 75% of cases, while males make up 25%. BPD constitutes a significant portion of all PD cases in the general population.
- Flashbacks: Stemming from traumatic early life experiences, flashbacks act as stressors, triggering abnormal behaviors and reactions in BPD patients, akin to enduring a persistent "bad dream."
- Polarized Thinking: BPD individuals often perceive the world in extremes, categorizing everything and everyone as wholly good or bad. This “black-and-white” thinking affects their interpersonal relationships, leading to issues like anger, panic, depression, despair, and mood swings.
- Interpersonal Relationships: Characterized by unstable and intense connections, BPD patients may oscillate between idealizing and devaluing others, resulting in vehement emotional expressions and subsequent emotional turmoil.
- Life Challenges: BPD individuals frequently struggle with life's challenges, affecting their education, career, social interactions, and family relationships, leading to difficulties in maintaining long-term commitments in various aspects of life.
- Abandonment Issues: Stemming from early life, abandonment experiences persist as a core stressor in BPD, influencing many behavioral symptoms and often leading to extreme reactions.
- Special Stimuli: ***BPD patients typically have a limited capacity to handle unexpected or challenging situations, reacting more intensely to stimuli like the COVID-19 pandemic.*** This can lead to complex, cascading behavioral responses, exemplified by the compounded stresses during quarantine periods.

Next, the author will discuss ten principal behavioral symptoms observed in patients with Borderline Personality Disorder (BPD). This analysis draws from a comprehensive review of nearly 100 textbooks and over 500 clinical reports, accumulated over 24 years, and includes insights from the DSM-IV. It also incorporates nine years of the author's psychology clinical experience, gained through overseeing five psychotherapy centers and treating 200 patients. It is important to note that these behavioral symptoms can evolve over time and may vary with age. Patients in their 30s and 40s often exhibit more stability in their relationships and vocational activities. After a decade, about 50% of these individuals may no longer display behaviors that fulfill the complete diagnostic criteria for BPD.

1. ***Fear of Abandonment:*** This is a core issue in Borderline Personality Disorder (BPD), often leading to frantic measures to avoid real or imagined abandonment. It intertwines with other symptoms like intense relationships,

poor self-image, and feelings of emptiness and loneliness, driving a pervasive fear of separation or rejection.

2. ***Unstable Interpersonal Relationships:*** Individuals with BPD experience intense, sometimes overwhelming emotions in their relationships, swinging from deep affection to intense dislike or hatred upon separation. This volatility can result in impulsive actions and polarized views, occasionally manifesting as promiscuity, contributing to personal and relational distress.
3. ***Identity and Self-Image Disturbance:*** For those with BPD, potential separation or rejection can drastically alter their self-perception, affecting their emotions, thoughts, and actions. External changes, like the pandemic, may exacerbate these self-image disruptions. Early abuse or trauma can impair their ability to discern between objective realities and their internal world, leading to frequent changes in goals, values, and relationships.
4. ***Impulsiveness:*** Individuals with BPD might engage in harmful impulsive behaviors like excessive spending, gambling, promiscuity, substance abuse, or binge eating. While not all with BPD exhibit such impulsivity, those displaying multiple such behaviors are likely experiencing more severe symptoms.
5. ***Suicidal Behavior and Self-Harm:*** Recurrent suicidal attempts or self-harm in BPD patients often signify a deep-seated plea for help. While these actions can provide temporary relief or validation of existence, they pose significant dangers, with a notable risk of successful suicide attempts, particularly in younger adults.
6. ***Mood Swings:*** BPD-associated mood swings are brief but intense, posing lifelong challenges. These fluctuations strain relationships, leading caregivers to tread cautiously. The emotional instability can also indirectly affect the physical health of those around them, linking BPD with broader family and health dynamics.
7. ***Emptiness and Loneliness:*** A pervasive sense of emptiness and loneliness characterizes many with BPD, driving behaviors like constant activity or cleaning, distinct from obsessive-compulsive tendencies. This chronic void can escalate to risky behaviors, including suicide attempts.
8. ***Uncontrollable Anger:*** Intense, often inappropriate anger is common in BPD, leading to regret and self-reproach. This cyclical pattern of anger and remorse can undermine relationships and personal stability, affecting academic, professional, and domestic life.
9. ***Paranoid Ideation and Dissociation:*** Under extreme stress, individuals with BPD may experience transient paranoia or dissociation as a defense mechanism, usually short-lived but intense, reflecting an abnormal coping strategy.
10. ***Fear of Separation or Rejection:*** Small incidents can provoke intense fear of separation or rejection in those with BPD, leading to desperate attempts to rectify self-induced crises. The resulting emotional turmoil, combining anger, panic, loss, and despair, illustrates the complex challenges faced in managing BPD.

2.2. GH-Method: Math-Physical Medicine (MPM) Methodology

The "GH-Method: math-physical medicine" (MPM) is a research methodology developed by the author for his biomedical research. It posits that all systems—political, economic, engineering, biological, chemical, or psychological—have inputs (causes or triggers) and outputs (consequences or symptoms) with inherent connections that may be simple or complex. These systems can be observed or measured, providing physical evidence of their underlying structures.

In MPM, observed phenomena (like behaviors, symptoms, or responses) are logically organized and analyzed to hypothesize underlying causes, using physics principles. However, directly applying physics equations is impractical due to the unique conditions of biomedical or psychological systems. Instead, understanding these phenomena leads to hypotheses testing through mathematical and engineering models, aided by computer science tools for validation.

If mathematical analysis disproves a hypothesis, a new one is formulated until a viable equation or formula emerges, simplifying understanding and predicting future outcomes. The author's 22-year self-study in psychology and internal medicine, particularly endocrinology, aims to distill complex research into formulas easy for patients to understand and apply.

2.3. Elasticity, Plasticity, Viscoelasticity and Viscoplasticity

The Difference Between Elastic Materials and Viscoelastic Materials

(from "Soborthans, innovating shock and vibration solutions")

What are elastic materials?

Elasticity is the tendency of solid materials to return to their original shape after forces are applied on them. When the forces are removed, the object will return to its initial shape and size if the material is elastic.

What are viscous materials?

Viscosity is a measure of a fluid's resistance to flow. A fluid with large viscosity resists motion. A fluid with low viscosity flows. For example, water flows more easily than syrup because it has a lower viscosity. High viscosity materials might include honey, syrups, or gels – generally things that resist flow. Water is a low viscosity material, as it flows readily. Viscous materials are thick or sticky or adhesive. Since heating reduces viscosity, these materials don't flow easily. For example, warm syrup flows more easily than cold.

What is viscoelastic?

Viscoelasticity is the property of materials that exhibit both viscous and elastic characteristics when undergoing deformation. Synthetic polymers, wood, and human tissue, as well as metals at high temperature, display significant viscoelastic effects. In some applications, even a small viscoelastic response can be significant.

Elastic behavior versus viscoelastic behavior:

The difference between elastic materials and viscoelastic materials is that viscoelastic materials have a viscosity factor and the elastic ones don't. Because viscoelastic materials have the viscosity factor, they have a strain rate dependent on time.

Purely elastic materials do not dissipate energy (heat) when a load is applied, then removed; however, a viscoelastic substance does.

2.4. The Following Brief Introductions are Excerpts from Wikipedia:

"Elasticity (physics):

Physical property when materials or objects return to original shape after deformation

*In physics and materials science, **elasticity** is the ability of a body to resist a distorting influence and to return to its original size and shape when that influence or force is removed. Solid objects will deform when adequate loads are applied to them; if the material is elastic, the object will return to its initial shape and size after removal. This is in contrast to plasticity, in which the object fails to do so and instead remains in its deformed state.*

The physical reasons for elastic behavior can be quite different for different materials. In metals, the atomic lattice changes size and shape when forces are applied (energy is added to the system). When forces are removed, the lattice goes back to the original lower energy state. For rubbers and other polymers, elasticity is caused by the stretching of polymer chains when forces are applied.

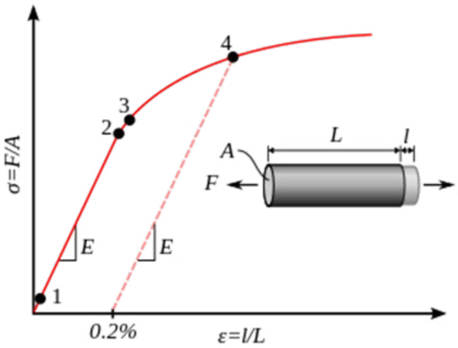
Hooke's law states that the force required to deform elastic objects should be directly proportional to the distance of deformation, regardless of how large that distance becomes. This is known as perfect elasticity, in which a given object will return to its original shape no matter how strongly it is deformed. This is an ideal concept only; most materials which possess elasticity in practice remain purely elastic only up to very small deformations, after which plastic (permanent) deformation occurs.

In engineering, the elasticity of a material is quantified by the elastic modulus such as the Young's modulus, bulk modulus or shear modulus which measure the amount of stress needed to achieve a unit of strain; a higher modulus indicates that the material is harder to deform. The material's elastic limit or yield strength is the maximum stress that can arise before the onset of plastic deformation.

Plasticity (physics):

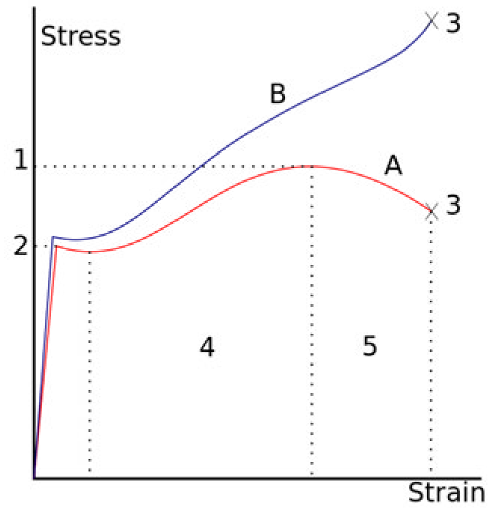
Deformation of a solid material undergoing non-reversible changes of shape in response to applied forces.

*In physics and materials science, **plasticity**, also known as **plastic deformation**, is the ability of a solid material to undergo permanent deformation, a non-reversible change of shape in response to applied forces. For example, a solid piece of metal being bent or pounded into a new shape displays plasticity as permanent changes occur within the material itself. In engineering, the transition from elastic behavior to plastic behavior is known as yielding.*



Stress–strain curve showing typical yield behavior for nonferrous alloys.

1. True elastic limit
2. Proportionality limit
3. Elastic limit
4. Offset yield strength



A stress–strain curve typical of structural steel.

- *1: Ultimate strength*
- *2: Yield strength (yield point)*
- *3: Rupture*
- *4: Strain hardening region*
- *5: Necking region*
- *A: Apparent stress (F/A0)*
- *B: Actual stress (F/A)*

Plastic deformation is observed in most materials, particularly metals, soils, rocks, concrete, and foams. However, the physical mechanisms that cause plastic deformation can vary widely. At a crystalline scale, plasticity in metals is usually a consequence of dislocations. Such defects are relatively rare in most crystalline materials, but are numerous in some and part of their crystal structure; in such cases, plastic crystallinity can result. In brittle materials such as rock, concrete and bone, plasticity is caused predominantly by slip at microcracks. In cellular materials such as liquid foams or biological tissues, plasticity is mainly a consequence of bubble or cell rearrangements, notably T1 processes.

For many ductile metals, tensile loading applied to a sample will cause it to behave in an elastic manner. Each increment of *load is accompanied by a proportional increment in extension. When the load is removed, the piece returns to its original size. However, once the load exceeds a threshold – the yield strength – the extension increases more rapidly than in the elastic region; now when the load is removed, some degree of extension will remain.*

Elastic deformation, however, is an approximation and its quality depends on the time frame considered and loading speed. If, as indicated in the graph opposite, the deformation includes elastic deformation, it is also often referred to as "elasto-plastic deformation" or "elastic-plastic deformation".

Perfect plasticity is a property of materials to undergo irreversible deformation without any increase in stresses or loads. Plastic materials that have been hardened by prior deformation, such as cold forming, may need increasingly higher stresses to deform further. Generally, plastic deformation is also dependent on the deformation speed, i.e. higher stresses usually have to be applied to increase the rate of deformation. Such materials are said to deform visco-plastically."

Viscoelasticity:

Property of materials with both viscous and elastic characteristics under deformation

*In materials science and continuum mechanics, **viscoelasticity** is the property of materials that exhibit both viscous and elastic characteristics when undergoing deformation. Viscous materials, like water, resist shear flow and strain linearly with time when a stress is applied. Elastic materials strain when stretched and immediately return to their original state once the stress is removed.*

Viscoelastic materials have elements of both of these properties and, as such, exhibit time-dependent strain. Whereas elasticity is usually the result of bond stretching along crystallographic planes in an ordered solid, viscosity is the result of the diffusion of atoms or molecules inside an amorphous material.

In the nineteenth century, physicists such as Maxwell, Boltzmann, and Kelvin researched and experimented with creep and recovery of glasses, metals, and rubbers. Viscoelasticity was further examined in the late twentieth century when synthetic polymers were engineered and used in a variety of applications. Viscoelasticity calculations depend heavily on the viscosity variable, η. The inverse of η is also known as fluidity, φ. The value of either can be derived as a function of temperature or as a given value (i.e. for a dashpot).

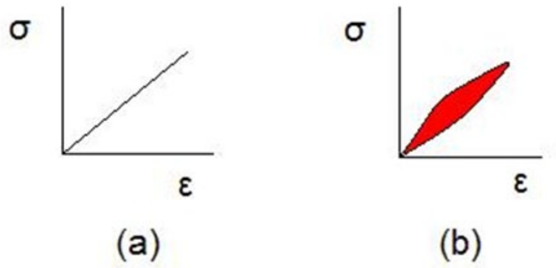
Depending on the change of strain rate versus stress inside a material, the viscosity can be categorized as having a linear, non-linear, or plastic response. When a material exhibits a linear response, it is categorized as a Newtonian material. In this case the stress is linearly proportional to the strain rate. If the material exhibits a non-linear response to the strain rate, it is categorized as Non-Newtonian fluid. There is also an interesting case where the viscosity decreases as the shear/strain rate remains constant. A material which exhibits this type of behavior is known as thixotropic. In addition, when the stress is independent of this strain rate, the material exhibits plastic deformation. Many viscoelastic materials exhibit rubber like behavior explained by the thermodynamic theory of polymer elasticity.

Cracking occurs when the strain is applied quickly and outside of the elastic limit. Ligaments and tendons are viscoelastic, so the extent of the potential damage to them depends both on the rate of the change of their length as well as on the force applied.

A viscoelastic material has the following properties:

- ***hysteresis is seen in the stress–strain curve***
- ***stress relaxation occurs: step constant strain causes decreasing stress***
- ***creep occurs: step constant stress causes increasing strain***
- ***its stiffness depends on the strain rate or the stress rate.***

Elastic versus viscoelastic behavior



Stress–strain curves for a purely elastic material (a) and a viscoelastic material (b). The red area is a hysteresis loop and shows the amount of energy lost (as heat) in a loading and unloading cycle. It is equal to

$\oint \sigma d\varepsilon$

where σ is stress and ε is strain.

*Unlike purely elastic substances, a viscoelastic substance has an elastic component and a viscous component. **The viscosity of a viscoelastic substance gives the substance a strain rate dependence on time.** Purely elastic materials do not dissipate energy (heat) when a load is applied, then removed. However, a viscoelastic substance dissipates energy when a load is **applied, then removed. Hysteresis is observed in the stress–strain curve, with the area of the loop being equal to the energy lost during the loading cycle.** Since viscosity is the resistance to thermally activated plastic deformation, a viscous material will lose energy through a loading cycle. Plastic deformation results in lost energy, which is uncharacteristic of a purely elastic material's reaction to a loading cycle.*

*Specifically, viscoelasticity is a molecular rearrangement. When a stress is applied to a viscoelastic material such as a polymer, parts of the long polymer chain change positions. This movement or rearrangement is called "**creep**". Polymers remain a solid material even when these parts of their chains are rearranging in order to accompany the stress, and as this occurs, it creates a back stress in the material. When the back stress is the same magnitude as the applied stress, the material no longer creeps.*

When the original stress is taken away, the accumulated back stresses will cause the polymer to return to its original form. ***The material creeps, which gives the prefix visco-, and the material fully recovers, which gives the suffix -elasticity.***

Viscoplasticity:

Viscoplasticity is a theory in continuum mechanics that describes the rate-dependent inelastic behavior of solids. Rate-dependence in this context means that the deformation of the material depends on the rate at which loads are applied. The inelastic behavior that is the subject of viscoplasticity is plastic deformation which means that the material undergoes unrecoverable deformations when a load level is reached. Rate-dependent plasticity is important for transient plasticity calculations. The main difference between rate-independent plastic and viscoplastic material models is that the latter exhibit not only permanent deformations after the application of loads but continue to undergo a creep flow as a function of time under the influence of the applied load.

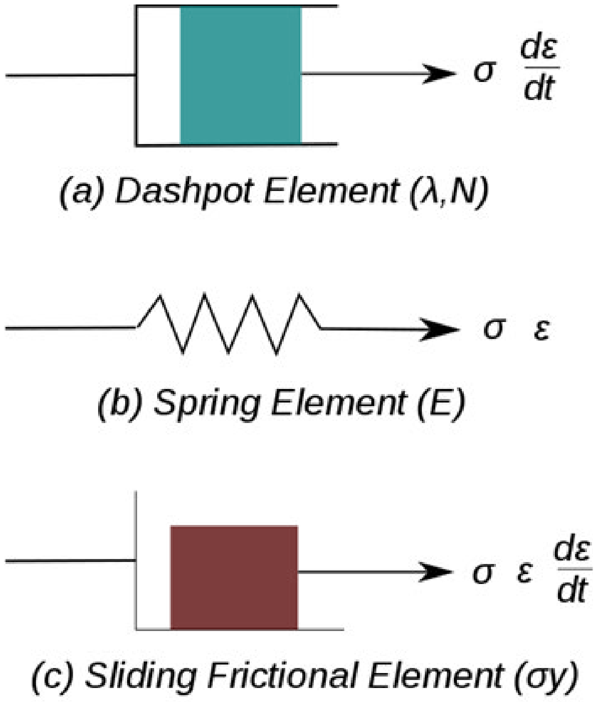


Figure 1: Elements Used in One-Dimensional Models of Viscoplastic Materials

The elastic response of viscoplastic materials can be represented in one-dimension by Hookean spring elements. Rate-dependence can be represented by nonlinear dashpot elements in a manner similar to viscoelasticity. Plasticity can be accounted for by adding sliding frictional elements as shown in Figure 1. In the figure E is the modulus of elasticity, λ is the viscosity parameter and N is a power-law type parameter that represents non-linear dashpot [σ(dε/dt)= σ = λ(dε/dt)(1/N)]. The sliding element can have a yield stress (σy) that is strain rate dependent, or even constant, as shown in Figure 1c.

Viscoplasticity is usually modeled in three-dimensions using overstress models of the Perzyna or Duvaut-Lions types. In these models, the stress is allowed to increase beyond the rate-independent yield surface upon application of a load and then allowed to relax back to the yield surface over time. The yield surface is usually assumed not to be rate-dependent in such models. An alternative approach is to add a strain rate dependence to the yield stress and use the techniques of rate independent plasticity to calculate the response of a material.

For metals and alloys, viscoplasticity is the macroscopic behavior caused by a mechanism linked to the movement of dislocations in grains, with superposed effects of inter-crystalline gliding. The mechanism usually becomes dominant at temperatures greater than approximately one third of the absolute melting temperature. However, certain alloys exhibit viscoplasticity at room temperature (300K). For polymers, wood, and bitumen, the theory of viscoplasticity is required to describe behavior beyond the limit of elasticity or viscoelasticity.
In general, viscoplasticity theories are useful in areas such as

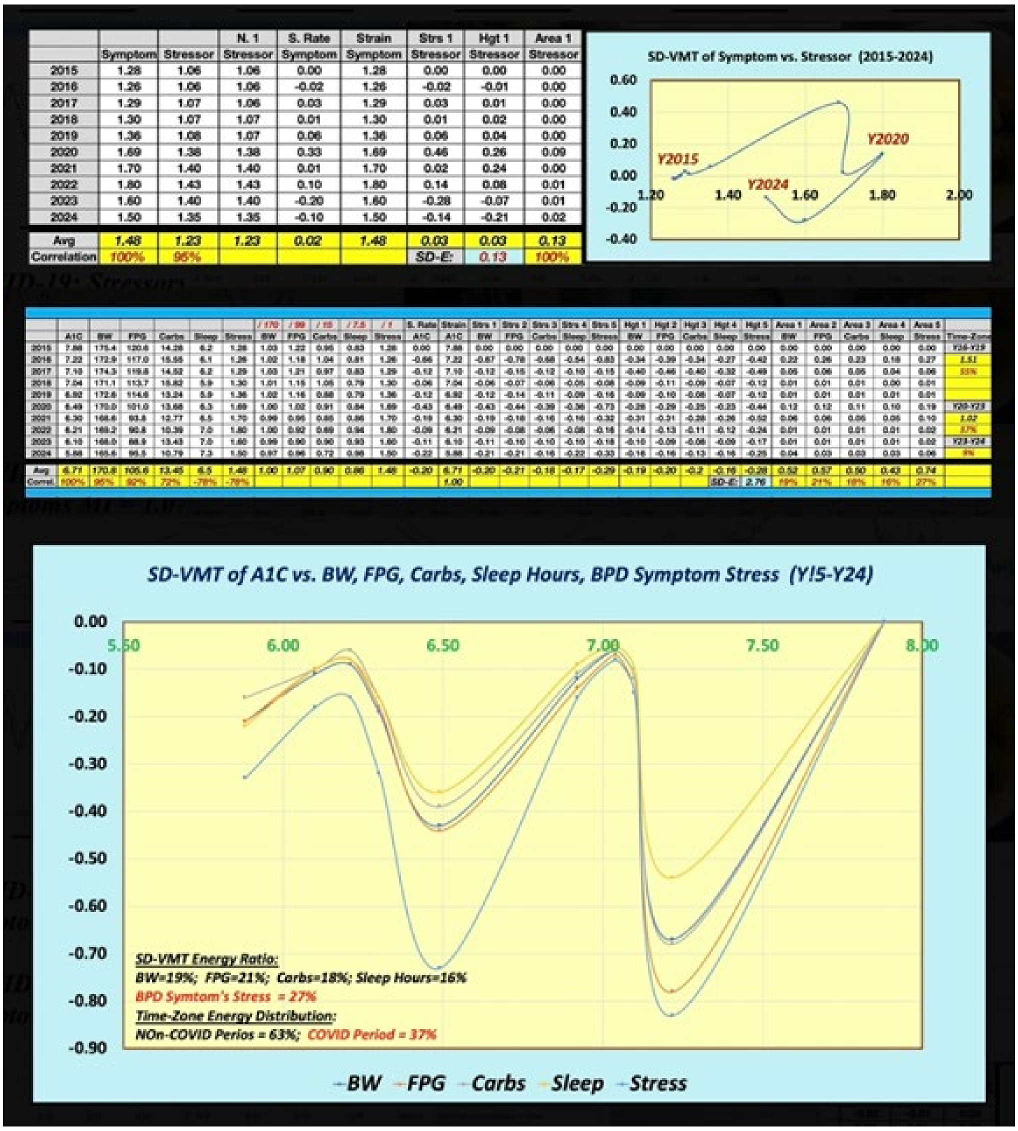
- *the calculation of permanent deformations,*
- *the prediction of the plastic collapse of structures,*
- *the investigation of stability,*
- *crash simulations,*
- *systems exposed to high temperatures such as turbines in engines, e.g. a power plant,*
- *dynamic problems and systems exposed to high strain rates.*

Phenomenology

For a qualitative analysis, several characteristic tests are performed to describe the phenomenology of viscoplastic materials. Some examples of these tests are

1. *hardening tests at constant stress or strain rate,*
2. *creep tests at constant force, and*
3. *stress relaxation at constant elongation.*

3. Results



	Symptom	Stressor	N. 1 Stressor	S. Rate Symptom	Strain Symptom	Strs 1 Stressor	Hgt 1 Stressor	Area 1 Stressor
2015	1.28	1.06	1.06	0.00	1.28	0.00	0.00	0.00
2016	1.26	1.06	1.06	-0.02	1.26	-0.02	-0.01	0.00
2017	1.29	1.07	1.06	0.03	1.29	0.03	0.01	0.00
2018	1.30	1.07	1.07	0.01	1.30	0.01	0.02	0.00
2019	1.36	1.08	1.07	0.06	1.36	0.06	0.04	0.00
2020	1.69	1.38	1.38	0.33	1.69	0.46	0.26	0.09
2021	1.70	1.40	1.40	0.01	1.70	0.02	0.24	0.00
2022	1.80	1.43	1.43	0.10	1.80	0.14	0.08	0.01
2023	1.60	1.40	1.40	-0.20	1.60	-0.28	-0.07	0.01
2024	1.50	1.35	1.35	-0.10	1.50	-0.14	-0.21	0.02
Avg	1.48	1.23	1.23	0.02	1.48	0.03	0.03	0.13
Correlation	100%	95%				SD-E:	0.13	100%

Figure 1: Shows Data Tables and SD-VMT Energy Analysis Results

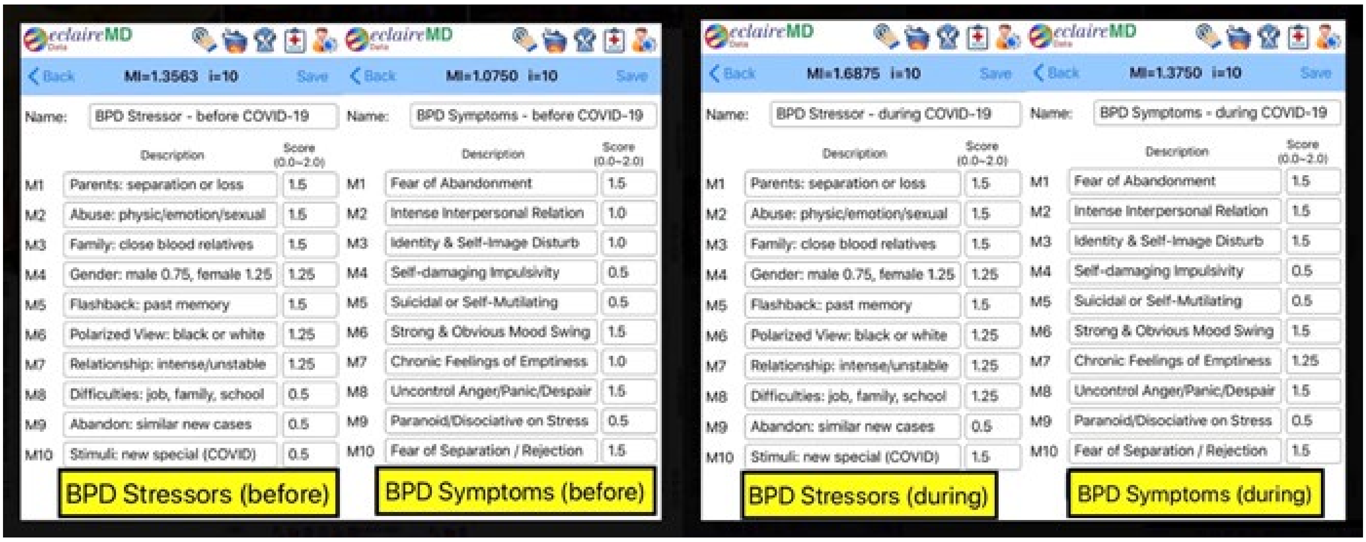


Figure 2: Shows Quantified Scores of Both Causes (Stressors) and Symptoms (Strains) of BPD Case

4. Conclusions

In summary, three key insights emerge:

1. During the past 10-years period, the stress symptoms resulted from BPD conditions of this hypothetical patient having both T2D and BPD, measuring 0.13 energy amount from the psychological domain, which accounted for 5% of the total T2D energy amount of 2.76 within the pathophysiological domain.
2. The influential factor of stress induced by BPD contributed to 27% of the total SD-VMT T2D energy amount.
3. Across ten years, the three COVID years represented 37% of the total energy (63% within non-COVID years), signifying consistent psychological impact on this hypothetical patient with both T2D and BPD.

Key Message

Even with a hypothetical case study, it shows that understanding the interplay between BPD and T2D is essential for comprehensive patient care, underscoring the need for integrated treatment plans addressing both psychological and physiological aspects.

References

For editing purposes, majority of the references in this paper, which are self-references, have been removed for this article. Only references from other authors' published sources remain. The bibliography of the author's original self-references can be viewed at www.eclairemd.com.

Readers may use this article as long as the work is properly cited, and their use is educational and not for profit, and the author's original work is not altered.

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