

Research Paper

Anger & Hostility; Traits of Type A & Type D Personality and its Association with Cardiovascular Diseases

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ABSTRACT

Under the branch of psychoneuroimmunology, the etiology of cardiovascular diseases (CVD) has often been linked with types of personalities. Personality type A, and the behavior linked known as Type A Behaviour Pattern (TABP), and Personality Type D have been predominantly studied across the world concerning Coronary Heart Diseases (CHD) since they present the two extremes of personalities. Most of the findings point towards the hypothesis which suggests that personality type A or/and personality type D are more prone to CHD, and cancer because of the two prominent traits namely; anger and hostility. This paper aims to review and summarize the existing literature on the relationship between the two personalities and cardiovascular diseases. The biomarkers that were used in most of the studies for the prognosis of CVD were Troponin I, Cortisol levels, and Left Ventricle Ejection Fraction. After analyzing the data, it was found that the link between the personalities and CVD is due to the abundance of negative affective traits like anger and hostility. According to J. Suls, these traits are the cause for “stress exposure and reactivity, exaggerated autonomic function, reduced heart rate variability, platelet aggregation, and inflammation”. On the contrary, traits such as optimism, conscientiousness, openness to experience, and curiosity (also known as ‘cardioprotective’ personality traits) were seen as protective factors against the development of CVDs. Hence, the ascertainment of the cause of CVD with respect to personality characteristics is plausible to present a clearer view of the risk factors associated with CVDs.

Keywords: *Cardiovascular Diseases, Type A Behaviour Pattern, Personality Type D, Anger, Hostility, Traits*

As defined by P.J. Corr and G. Matthews in The Cambridge handbook of personality psychology (2020), the concept of Personality can be viewed as the characteristic sets of behaviors, cognitions, and emotional patterns that evolve from and are interlinked to biological and environmental factors”. Popular theorists such as Sigmund

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Received: June 13, 2021; Revision Received: July 27, 2021; Accepted: August 14, 2021

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Freud, Alfred Adler, Gordon Allport, and Carl Rogers have studied and tried to understand Personality through biological, cognitive, learning, and trait-based theories, as well as psychodynamic, and humanistic approaches (Engler & Barbara, 2008). Different individuals can be categorized into different personality types. These Personality Types are based on a set of personality traits that are representative of behavioral tendencies. The Personality Traits can be seen as the fundamental units that constitute a Personality Type. It can be defined as “broad dimensions of individual differences between people that relate to how we engage with our social worlds” (Stephens & Molloy, 2007). Personality Types can be useful to predict or forecast a range of outcomes with moderate consistency, including quality of social and family relationships, marital status and satisfaction, occupational choices, political attitudes, and criminality (Ozer & Benet-Martinez, 2006).

The two personality types under focus in this paper are Type A and Type D. Type A Behavioural Pattern (TABP) was first described by Friedman and Rosenman at the end of the 1950s (Friedman & Rosenman, 1959). They discuss TABP in the book “*Type A Behavior: Its Diagnosis and Treatment*” and explain the three major psychological characteristics/behavior patterns or symptoms of TABP. The first is free-floating hostility attitude, which can be triggered by minor incidents. The second trait is that of time urgency and impatience, which causes irritation and exasperation usually described as being “short-fused”. And lastly, the competitive drive, which causes stress and an achievement-driven mentality. Hence, the most prominent characteristics are intrinsic insecurity and an insufficient degree of self-esteem. (Friedman, 1996). He assessed TABP in individuals who are “engaged in a chronic incessant struggle to achieve more and more in less and less time, thus giving rise to a sense of time urgency, and who usually, but not always, exhibit a free-floating but well-rationalized hostility” (Kornitzer, 1985).

Type D personality was first identified by Johan Denollet, a Belgian psychologist and researcher, while he clinically observed cardiac patients, by gathering empirical evidence and aligning it with existing theories of personality type. Denollet as an independent predictor of mortality in patients with heart disease” in 1996 (Denollet, 2013). Type D personality is defined as the joint tendency towards negative affectivity (e.g., worry, irritability, gloom) and social inhibition (e.g., reticence and a lack of self-assurance) (Denollet et al., 1996). Type D personality individuals are predicted to exhibit increased negative emotions in response to most of the stressful and non-stressful situations and they tend to not share these emotions with others because of a fear of disapproval or rejection.

Type A and Type D personality are seen as predictors for poor health and more adverse cardiac events in individuals with a variety of CVD. Literature on CVD and personality has shown psychological factors including characteristics such as anger, hostility, and anxiety of Type A and Type D personality to indicate the pathogenesis of the cardiovascular disease. (Kornitzer, 1985; Sher, 2005).

Personality Type and Neural Circulatory Control, a study conducted in 2001 emphasizes that TABP is associated with increased risk of cardiovascular disease, also including hypertension, myocardial infarction (heart attack), and CHD. This is specifically due to increased anger and cynicism levels, which cause greater cardiovascular reactivity to stress (Schroeder et al., 2000). In Type D personality, similar risk factors are observed, thereby developing episodic risk factors like depression and anxiety that are related to CVD (Kop, 1997; Pedersen & Denollet, 2003). In another study conducted from Sahoo et al.

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(2018), symptoms of exhaustion, depression, fatigue might just increase the severity of the cardiac events of the individual. The diagnosis for the same was done through bio-markers, Troponin I, and Myoglobin. These cardiac enzymes were habitually used to examine the effect of personality type and its severity on CVD. High myoglobin and troponin-I levels suggest that the individual suffers from larger damage to the myocardium.

In forthcoming years however, no significant overlap between TABP and CHD was found, despite heavy funding and intense research (Petticrew et al., 2012). The research failed to link type A personality to the occurrence of CHD to a significant degree, but research conducted on specific traits and emotions did show significance between them and the occurrence of CHDs. To put this paper in perspective, it can be understood that personalities are the sum of traits, and hence research conducted on these traits would provide substantiating relations between CHDs and their predictors under the purview of personalities. Literature in existence provides ample understanding that characteristics or traits of personalities are better indicators of CHDs than personalities themselves. It is suggested that a deeper analysis of personality characteristics would provide for a more comprehensive view of risk factors of CHDs (Sahoo et al., 2018). Keeping this in mind, and from the aforementioned gatherings, a distinction can be made between traits that aid the formation of CHDs and those which do not, across type A and Type D personalities. Epidemiological research conducted on TABP has shown that the personality is inconsistent in terms of being used as a predictor of CAD, but when traits like hostility and antagonistic behavioral tendencies were gauged via questionnaires, predictions could be made about future cardiac diseases (Suls, 2013). Similarly, atherosclerosis progression (Low et al., 2011).

A study conducted by Davidson et al. (2010) in Nova Scotia suggested that lower constructive anger scores and higher destructive anger justification predicted an increased risk of CHD in 10 years.

PERSONALITY

In *Personality: A psychological Interpretation*, Allport described personality as “the dynamic organization within the individual of those psychophysical systems that determine his unique adjustments to his environment”. Which later in 1961 changed to “the dynamic organization within the individual of those psychophysical systems that determine his characteristic behavior and thought.” Personality mainly focused on how people were different from one another and how they were alike. Through years of study and research by theorists, individuals can be categorized into different personality types. These personality types give us an insight into how they engage themselves with the social world around them (G. Allport, 1937).

The interest in the role of personality and cardiovascular diseases (CVD) grew almost 50 years back when the concept of Type A behavior was studied and researched. Type A personality, as mentioned in the introduction, is a complex compound of hostility, impatience, anger, dominance, anxiety, and an extreme sense of urgency. In 1981, the National Institute of Heart, by analyzing diverse existing data and studies concluded that TABP is an independent risk factor, along with predicative traditional risk factors such as hypertension, anxiety, hypercholesterolemia, and tobacco abuse (Review Panel, 1981). Ravaja, Keltikangas Jarvinen, and Keski-Vaara (1996) show an association between TABP and the manifestations of coronary diseases. However, a body of epidemiological studies

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(which measures the risk of a particular illness or death which is exposed or among the population compared to the risk in an identical unexposed population) presents contrary evidence. Numerous long-term epidemiological studies have failed to study associations between TABP and coronary diseases (Myrtek, 1995). Regardless of these negative results, there is a relative agreement that different components from the TABP would exert or influence risk factors to CVD. Therefore, recent studies suggest that anger and hostility are one of the pathogenic cores for TABP and heart disease (Moscoso, 2000; Palmero et al., 2002; Rajava et al., 1996; and Smith, 1992). Other researchers have also observed depression as a key component of TABP, which is treated as an independent predictor of future CVD. Increased heart rate, high vascular inflammation leading to myocardial infarction (heart attack), had linkages to depressive experiences of the individuals. Situational attributes of TABP, ones which threaten self-esteem, pose as risk factors to CVD. Perfectionism also contributes as risk factor to CVD.

TYPE D PERSONALITY CHARACTERISTICS RELATED TO CVD

Negative attribution (NA), simply refers to the tendency of experiencing negative emotions across situations. Social Inhibition (SI) refers to the tendency to prevent the expressions of these emotions through overt behaviour in any social interaction. Type D personality individuals tend to be very irritable, mostly anxious, have a pessimistic outlook on life, have a fear of rejection and disapproval which is why they have a tendency of not sharing their feelings with others (Pedersen & Denollet, 2003). In the personality spectrum, type D individuals are high on both NA and SI, thereby marking them extremely vulnerable to heart disease. Research has established association of Type D personality with poor health quality of life and poor prognosis in cardiac patients and CVD. (Aquarius, Denollet, Hamming, Henegouwen, & De Vries, 2007; Pedersen et al., 2006; Schiffer, Pedersen, Widdershoven, & Denollet, 2008; Schiffer et al., 2005) (Denollet, Vaes, & Brutsaert, 2000; and Denollet et al., 2006).

Another meta-analysis determined that Type D personality can be considered as independent predictor of poor health and various other major cardiovascular diseases, and have similar cardiovascular risk factors (Martens, Mols, Burg, & Denollet, 2010; and O'Dell et al., 2011). Type D individuals are at high risk of depression, anxiety, irritability, and also display negative emotions like anger, hostility, NA, and SI. Negative attribution (NA) in Type D personality is largely associated with the individual being more vulnerable to anxiety, depression, and hostility. Social Inhibition (SI) in this personality is largely associated with increased vulnerability to interpersonal stress and failure to adapt to their surroundings. Both NA and SI factors of Type D personality are associated with greater cortisol reactivity to stress.

PSYCHOLOGICAL TRAITS THAT INFLUENCE CVD

Anger

From the aforementioned observations and independent study of research on type A and type D personalities, two traits were found to be the leading cause, if not the only cause, that would influence the onset of CHDs. Philip Morris's and McKee's research (2012) to link TABP with CHD did fail, but it brought to light the scope of investigation of type A personality and "risk" behavior which would, in turn, result in the onset of CHD. This notion was supported by the Framingham study (1980) and the western collaborative group, both of which supported the idea of TABP being a contributor to CHD. Observations were noted that suggested that CAD patients were at an increased risk of future events if they

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scored high on suppressed anger (Suls, 2013). Anger was also noted for reducing the time between recurrent cardiac events. Constructive anger scores and subsequent high destructive anger scores were indicators of increased risk of CHDs over a 10-year timeline. Another study conducted by Tetsuya Ohira and others showed a correlation between anger and carotid artery thickening in a multi-ethnic study of atherosclerosis in those who were CHD-free.

Hostility

Hostility, another shared trait between the two personalities, has been linked to showing a 2-fold increase in possible ischemic heart disease (IHD) over a 10-year timeline. postmenopausal women who were administered anger-in and cynicism questionnaires over three years, and a higher cynical distrust score showed a significant prediction of atherosclerosis. A positive relationship between depressive symptoms- characteristic traits of both personalities, and changes in calcification of arteries also exists (Silverman et. al., 2014).

As a culmination of what has been discussed earlier, in a paper titled personality type and neural circulatory control (Schroeder et. Al., 2000) it was concluded that responsiveness of the sympathetic nervous system is unlikely to mediate a link between personality and CVD. The paper however, did not negate the possible linkage of CVD and emotional stress and anger, both of which are traits specific to both type A and type D personalities.

In the studies conducted on the etiology of cardiovascular diseases (CVD) with respect to Personality Types, the researchers used multiple kinds of personality tests and/or Structured Interview (SI) to determine the personality type of the participants. In a study conducted by Negative Attribution (NA) and Social Inhibition (SI) as both are the traits that are essential for Personality Type D (O'Dell et al., 2011). DS-14 questionnaire tests these two components of type D personality with 14 items on a scale from 0 (false) to 4 (true) (Denollet et al., 1996). The hospital anxiety and depression scale (HADS), is used to measure depression & anxiety and the Holmes and Rahe stress scale measures the amount of stress experienced by an individual in the past year. The HADS is a fourteen-item Zigmund and Snaith (1983). "The scale includes a list of 43 stressful life events (e.g., death of a spouse) that can contribute to illness" (Holmes & Rahe, 1967; Garcia-Retamero et al., 2016). These scales were used by Rocio Garcia-Retamero, Dafina Petrova, Antonio Arrebola-Moreno, Andres Catena, and Jose A. Ramirez-Hernandez in their study on Type D personality and its relation to the severity of acute coronary syndrome in patients with recurrent cardiovascular disease (Garcia-Retamero et al., 2016).

Similarly, to measure the TABP, researchers tend to use the Minnesota Multiphasic Personality Inventory (MMPI-2) which consists of 3 components; Type A, anger, and cynicism. The MMPI-2 type A scale is made up of 19 items on time urgency, competitiveness, and hostile attitudes. These items require the participant(s) to choose between true and false. According to the data analysis, a higher score on the Type A scale resonates with traits like "hard-driving, fast-moving, and work-oriented individuals who frequently become impatient, irritable, and annoyed" (Schroeder et al., 2000). Other scales of TABP include Framingham Type A Behavior Pattern Scale, Finnish Type A Scale, and Jenkins Activity Survey.

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Troponin I

An abundance of studies is suggestive of the roles psychosocial and behavioral risk factors play in the etiology and pathogenesis of CHDs. Distinctively, all of these studies concern themselves with type A and type D personalities, since they both present behavior patterns associated with heightened baseline parameters such as heart rate and elevated levels of aggression, cynicism, impatience, and irritation. All psychological parameters such as the ones mentioned above are measured on scales through questionnaires. For their biological implications to be understood, one must use Biomarkers. Biological markers, are a set of broad-range measures that are used to understand what is happening in a cell or an organism at a given moment. From the perspective of this paper, the biomarkers are used to measure objective medical signs that help detect the presence or progress of a disease, as well as the effects of treatment, if any. Elevated base rates are not only indicative of the personality traits, but also the implications of said personalities. To measure the implication of these personality traits biomarkers are utilized. As discussed earlier in the paper, troponin I becomes an important biomarker when assessing cardiac damage due to personality traits of both type A and type D personalities. Troponins, of which there are multiple types, are a group of proteins that are found in both skeletal as well as cardiac (heart) muscles. When looked for via a blood test, amounts of troponin I found to become an indicator of damage to the heart. In usual laboratory settings, the levels of troponin I found in the body normally are undetectable. When the heart undergoes damage due to cardiomyopathy (weakening of heart muscles) or other heart diseases, levels of troponin I elevate, which is picked up via blood tests. Higher amounts of troponin are suggestive of a heart attack, and the levels remain elevated for subsequent 10-14 days.

Cortisol levels

Both the personalities have fairly different traits making them unique, although these traits cause similar heightened levels of distress in individuals. Common traits of TAPB and Personality type D are negative affective emotions of anger and hostility. According to Leo Sher in the Review on Type D personality: the heart, stress, and cortisol, “Type D personality are characterized by the joint tendency to experience negative emotions and to inhibit these emotions while avoiding social contact with others” (Sher, 2005). Similarly, TABP is associated with increased heart rate, and sympathetic nerve responses to mental and physical stress (Schroeder et al., 2000). Their negative affective traits lead to elevated cortisol levels which can be seen as a mediating factor for the association between personality types and proneness to cardiovascular diseases. Emotions such as anxiety, fear, and panic are associated with the release of cortisol which is a naturally occurring hormone in the human body produced mainly by the Adrenal gland. It maintains levels of blood pressure, blood sugar, metabolism, and control stress. There are multiple studies that documents and proves the relation between negative affection emotions (which are caused due to personality type A and D traits) using structured laboratory stressors, such as public speaking and mental arithmetic (Al'absi et al., 1997) and aversive stimulation (Lovallo et al., 1990).

Both type A and type D personalities have heightened baseline stress levels, and hence a higher baseline secretion of cortisol to counteract. Studies have shown that a higher secretion of cortisol has been associated with Coronary Artery Calcification (CAC). CAC scores above 3 are confident markers of a CHD event (Silverman et al., 2014). Cortisol is connected with the etiology of coronary heart disease because of many reasons including the fact that it inhibits the growth hormone and gonadal axes. Existing studies on related topics

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suggest that growth hormone deficiency of appropriate levels of growth hormone can cause a relatively higher risk for premature cardiovascular diseases in adults (Erfurth et al., 1999; Hew et al., 1998). Lack of growth hormone and gonadal axes can also aggravate the accumulation of visceral fat. This can lead to “dyslipidemia and, along with hypercortisolism, insulin resistance, hyperinsulinism, and their sequelae” (Gold & Chrousos, 2002; Sher, 2005).

Left Ventricle Ejection Fraction

The final biomarker that needs discussion is the left ventricle ejection fraction. Ejection fraction is a measurement of the blood that is pumped out of the heart with each contraction. An evaluation of the ejection is indicative of the functioning of the heart. When the heart contracts, blood is pushed out from the two lower chambers, which are known as ventricles. No matter how fast or forceful the contraction is, the heart never manages to push out all of the blood from the ventricles, but an ideal range is defined between 50-75% of the total volume of blood. Left ventricle ejection fraction refers to the fraction of blood that is pushed out by the left ventricle. The Left ventricle is studied because it pumps out oxygenated blood to the aorta, which directs blood across the body. Research shows us that the Type D personality is an independent predictor of decreased left ventricular ejection fraction (Mankad, 2021).

CARDIOPROTECTIVE TRAITS

Keeping true to the idea of an equal and opposite presence in the universe, there are traits such as optimism, conscientiousness, openness to experience, humor, and curiosity that can adversely affect the onset of CHDs. As is with any psychological trait, the practice or denunciation of traits can adversely affect the body. Conscientiousness is the desire to complete one’s job thoroughly and satisfactorily, and studies show those who score high on Conscientiousness, are subsequently at a reduced risk of CHDs. Similarly, an optimistic attitude had negatively affected relative risks for CHDs in older men (Kubzansky et al., 2001).

Humor, a trait linked inversely with both personalities, has been found to inversely affect the possibility of CHD occurrence. Humor has also been known to affect CHD inversely even when risk factors such as alcohol consumption, cigarette smoking, high cholesterol, and such were noted in the patients (Clark et al., 2001).

Specifically in the type D personalities, it has been found that if forgiveness as a trait was practiced, it significantly reduced the aortic blood pressure and that promoting forgiveness can be explored as an intervention to those patients who suffer from CAD.

CONCLUSION

Type A personality have traits such as competitiveness, and impatience whereas type D personality has traits such as sadness, and pessimism. It can be stated that Type D and Type A personality traits have raised the tendency to experience negative emotions. These negative emotions then lead to subsequent biological changes which can lead to cardiovascular diseases. Both these personality types have some similar traits which heighten the level of stress in individuals. In this paper, we have discussed various biomarkers such as troponin, left ventricle ejection fraction, which help detect the implications of such processes on the body. The common negative traits of type A and type D personality can be established as a huge risk factor for CVD. In conclusion, personality

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traits such as anger, hostility, negative attribution, social inhibition of type D and type A personality have posed to be independent risk factors for CVD in individuals. Whereas personality traits such as optimism, conscientiousness, forgiveness, openness to experience, humor, and curiosity are considered to be cardioprotective, and can inversely affect the possibility of CHD occurrence.

In the paper we have focused on two particular traits; Anger and Hostility being prone to develop cardiovascular diseases in Personality type A and D. This can be seen as one of the possible interpretation of the research done on Personality types with respect to CVD but there can also be other interpretations. Therefore, there is a need for further research in this area to develop feasible ways to tackle CVD biologically and psychologically.

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Acknowledgement

We would like to express our sincere gratitude to Dr. Eappen Thiruvattal, PhD, PDDM, Associate Professor, University of Dubai and Samanvitha Santusht, 2nd year student in B.Sc Biology and B.Ed., Azim Premji University, Bangalore. Lastly, we would also like to extend our gratitude to Christ (Deemed to be) University for providing us with this opportunity through the CNS Study Group.

Conflict of Interest

The author(s) declared no conflict of interest.

How to cite this article: Vaishnavi A., Jayan K. M., Mathur P. & Reddy K. J. (2021). Anger & Hostility; Traits of Type A & Type D Personality and its Association with Cardiovascular Diseases. *International Journal of Indian Psychology*, 9(3), 711-720. DIP:18.01.068.20210903, DOI:10.25215/0903.068