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The Roles of Personality Types and Coping Mechanisms in Coronary Heart Disease: A Systematic Review

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ABSTRACT

CHD is the number 1 cause of death globally. Personality type has been widely studied as a risk factor for CHD, although it is still debated. This article aims to identify the personality type and mechanism of personality type that cause CHD and whether coping mechanisms are intermediaries of these mechanisms or not. Articles were selected using the PRISMA method and 32 articles were obtained for analysis. Personality types cause CHD through 3 mechanisms, namely, behavioural, psychological and biological mechanisms that are interrelated, where personality types are also related to coping mechanisms. Although the articles obtained about coping mechanisms were limited, it was found that the avoidance coping mechanism was one of the intermediaries between Type D personality and CHD.

Keywords: coping mechanism, coronary heart disease, personality trait, risk factor, systematic review

INTRODUCTION

Heart disease is leading cause of death globally compared to other causes (WHO, 2017). In the United States, coronary heart disease (CHD) accounts for 1 in 7 deaths (AHA, 2018). CHD (coronary artery disease) is a pathological process in the coronary arteries of the heart due to blockage of coronary arteries by atherosclerotic plaque (Lemos & Omland, 2017; Willerson & Holmes, 2015). There are many risk factors that cause CHD, one of which is psychosocial factor. Individuals who are continuously exposed to psychosocial factors are at higher risk for CHD (Virtanen et al., 2018). Personality type is related to the risk of heart disease, but the importance of personality in heart disease is still controversial (Lee et al., 2014).

Personality shows the overall mindset (cognition), feeling (emotion), and behaviour of a person that affect health conditions (Stuart, 2016). Personality types that are estimated to be risk factors for CHD are type D personality and type A personality (Lohse, Rohrmann, Richard, Bopp, & Faeh, 2017; Steca et al., 2016). Type D personality has negative affect and social inhibition characteristics that are predicted as psychosocial risk factors that affect the prognosis of CHD (Kupper & Denollet, 2018). Type D personality was significantly associated with the occurrence of plaque susceptibility, whereas Type A personality was not so (Larson, Barger, & Sydeman, 2013). Research conducted on populations in Japan showed that Type A personality did not predict CHD events, and it was found that Type B behaviour patterns in men showed an increased risk of CHD (Ikeda, Iso, Kawachi, Inoue, & Tsugane, 2008). This finding indicates that the kinds of personality types that are at risk of causing CHD are still not clearly known.

The mechanism of personality type being a risk factor for coronary heart disease was estimated through biological and behavioural processes (Kupper & Denollet, 2018). Coping is one of the behavioural mechanisms that is predicted to explain the effects of personality types on CHD. Coping covers the response and methods used by individuals to overcome a situation (O'Shea, 2010). Coping mechanism is related to medical, psychological, cultural, social, and individual experiences and personalities (Shives, 2012). Research on personality types and coping mechanisms showed that patients with type D personality used maladaptive coping mechanisms in dealing with their illnesses (O'Shea, 2010).

What type of personality that can cause CHD and how the type of personality mechanism causes CHD, whether coping mechanism is a mediator in the mechanism or not, are still unknown because of the literature that showed contradiction. Thus, this systematic review aims to identify the personality types associated with CHD and the mechanism of personality types causing CHD, and whether coping mechanisms are intermediaries of these mechanisms or not.

METHODOLOGY

The research method in this research was systematic review. Systematic review began with searching in three databases, namely Science Direct, Clinical Key, and Direct Open Access Journal (DOAJ). Article search in electronic database was conducted in March 2019 and no grey literature was searched. Searching for articles employed three keywords, namely, 'coronary heart disease', 'personality trait', and 'coping mechanism'. These three keywords were combined with the conjunctions "and" and "or". This process was conducted in each database.

Articles obtained in the search process were then selected based on inclusion and exclusion criteria. The inclusion criteria in the systematic review were studies that discuss personality types associated with CHD and coping mechanisms associated with CHD. Articles must be available in full text, published between 2015 and 2019,

and were cross-sectional studies, cohort studies, case studies, and Randomized Controlled Trial studies. Meanwhile, the exclusion criteria were articles that are not research articles, such as commentaries, editorials, reviews, and scientific statements. Articles that did not use English and focused on intervention, instruments, and mortality were also excluded.

Article quality was assessed using appropriate JBI Critical Appraisal tools. Studies that met 60% of the JBI checklist were included in this review. Articles were critically assessed and selected by two reviewers. Articles with uncertain quality were assessed by other reviewers to determine inclusion in the review. Thirty two articles were in accordance with JBI, the inclusion and exclusion criteria of this review. The reasons why most articles were not included in this review were that the articles discussed CHD mortality, and the articles did not discuss personality types related to CHD. Article selection is illustrated in Figure 1 while a summary of articles that met the systematic review criteria can be seen in Table 1.

RESULTS

A total of 32 studies were obtained based on the selection process and included in the systematic review. Most studies were conducted in western countries, with the majority were conducted in the Netherlands (n = 18.75%), U.S (n = 15,625%) and Germany (n = 12.5%). Studies were also often conducted in other countries in the Europe (n = 31.25%), including Russia, Romania, Finland, Hungary, Italy, France, Austria, and Spain, and in the Asian Countries (n = 15,625%), such as Iran, South Korea, Japan, and China. Only two studies were conducted in Australia (n = 6.25%) (Allen, Vella, & Laborde, 2015; Allott et al., 2015).

The participants of the studies were healthy individuals, individuals with alcohol dependence, individuals with diabetes, and individuals with heart disease. Participants were between 20 and 66 years old, but the majority of participants were over 50 years old (62.5%). The number of participants of studies was at least 59 participants (Janson & Rohleder, 2017) and at most 14,446 participants (Airagnes et al., 2017), with the percentage of female participants was 18% to 62.9% and the percentage of male participants was 37.1% to 82%.

All studies included in the systematic review were quantitative studies with the majority of studies employed cross-sectional study design (75%). A total of 4 studies used a cohort study design (12.5%) and 3 studies used case-control studies (9.38%). Only one study used the Randomized Controlled Trial study design (Kim et al., 2016).

Personality Types and Their Relations to Coronary Heart Disease: The relations between personality types and heart disease were first studied by Friedman and Rosenman (1959) who found out that individuals with Type A personalities tended to experience excessive stress and were strongly associated with CHD. In addition, Type D personality was found in one in four CHD patients. Type D personality predicted an increase in morbidity, mortality, poorer quality of health, and prognosis for CHD (Kupper & Denollet, 2018) . The current literature showed that personality types and characteristics were related to the development of heart disease (Sahoo, Kumar, Padhee, & Singla, 2018) through the mechanism that can be seen in Figure 2.

Personality Types and Behaviour Factors: Adherence to treatment recommendations included adherence to medications, adherence to dietary, adherence to sports recommendations, adherence to self-care, and consultation to health practitioners related to Type D personality characteristics, which are openness, conscientiousness, optimism, neuroticism, and agreeableness, but not positively related to positive affect (Iakovleva, Shchelkova, Lubinskaya, & Nikolaeva, 2018; Liu et al., 2018; Nefs et al., 2015; Van Montfort, Denollet, Widdershoven, & Kupper, 2016). Dietary behaviour, such as consumption of unhealthy food and fruit consumption, was related to Type D personality, conscientiousness, and anger (Abraham et al., 2015; Allen et al., 2015; Nefs et al., 2015) while only conscientiousness was related to exercise (Abraham et al., 2015). Smoking was associated with Type D personality, conscientiousness, and neuroticism, but was not related to Type A personality (Eugen, Cornelia, & Aurelia, 2015; Nefs et al., 2015; Weston & Jackson, 2015). Type D personality, negative affect, and hostility were related to alcohol use (Airagnes et al., 2017; Nefs et al., 2015; Patock-Peckham, Canning, & Leeman, 2018). Personality characteristics associated with positive health behaviours were conscientiousness, openness, and agreeableness while extraversion was associated with negative health behaviours (Allen et al., 2015).

Personality Types and Psychological Factor: According to psychological factors, stress was related to Type D personality, Type A personality, and hostility (Chauvet-Gélinier et al., 2016; Habibović et al., 2018; Pimple et al., 2015; Van Montfort, Denollet, Vermunt, Kupper, & Widdershoven, 2017). Type D personality, Type A personality, anger, and optimism were associated with anxiety (Chauvet-Gélinier et al., 2016; Habibović et al., 2018; Kim et al., 2016; Nefs et al., 2015; Pimple et al., 2015; Versteeg, Roest, & Denollet, 2015). Almost all personality types and personality characteristics were associated with depression, including Type D personality, conscientiousness, openness, agreeableness, neuroticism, negative affect, sociability, anger, and optimism (Abraham et al., 2015; Aluja, Malas, Lucas, Worner, & Bascompte, 2018; Elovainio et al., 2015; Habibović et al., 2018; Kim et al., 2016; Lambertus et al., 2018; Nefs et al., 2015; Pimple et al., 2015; Romswinkel, König, & Hajek, 2018). Physical and mental health status was only related to optimistic characteristics (Habibović et al., 2018). Type D personality and perfectionism were associated with trust in the treatment (Esmaeili, Dehghani, & Chabokinezhad, 2016; Liu et al., 2018). Loneliness was only related to Type D personality (Nefs et al., 2015).

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Figure 1. PRISMA Flow Chart for Systematics Review
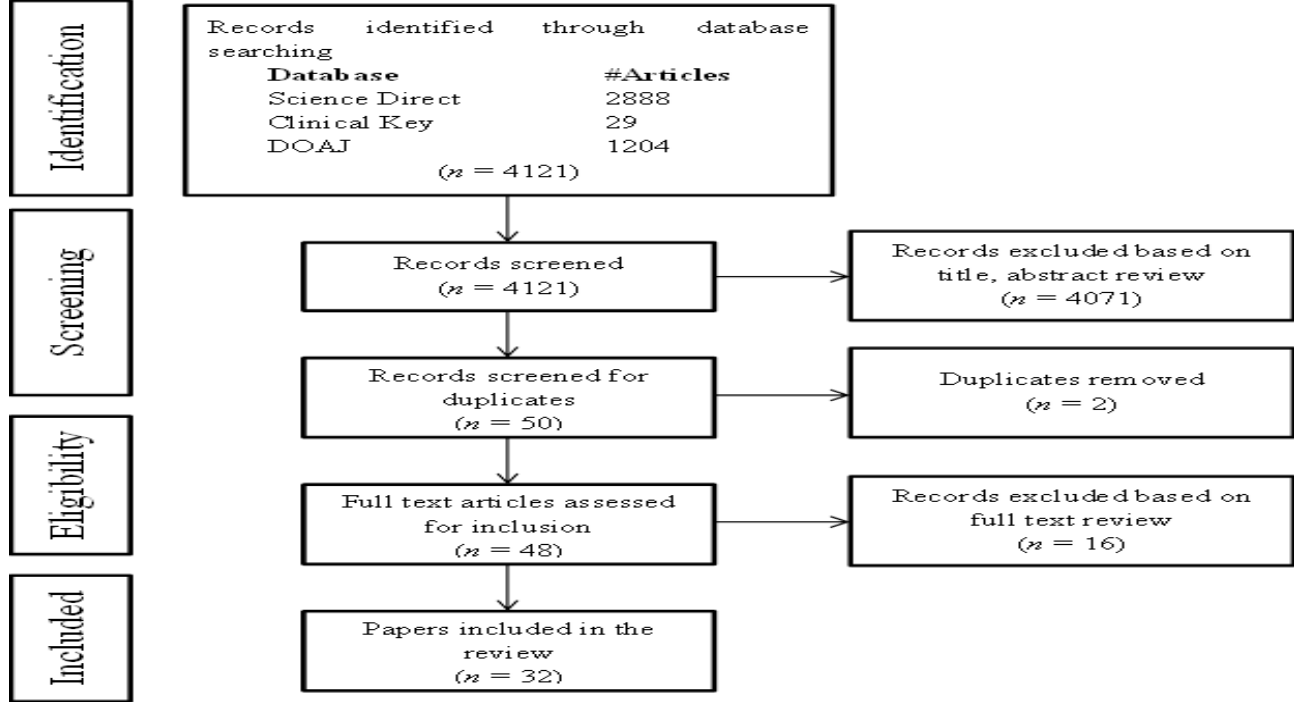

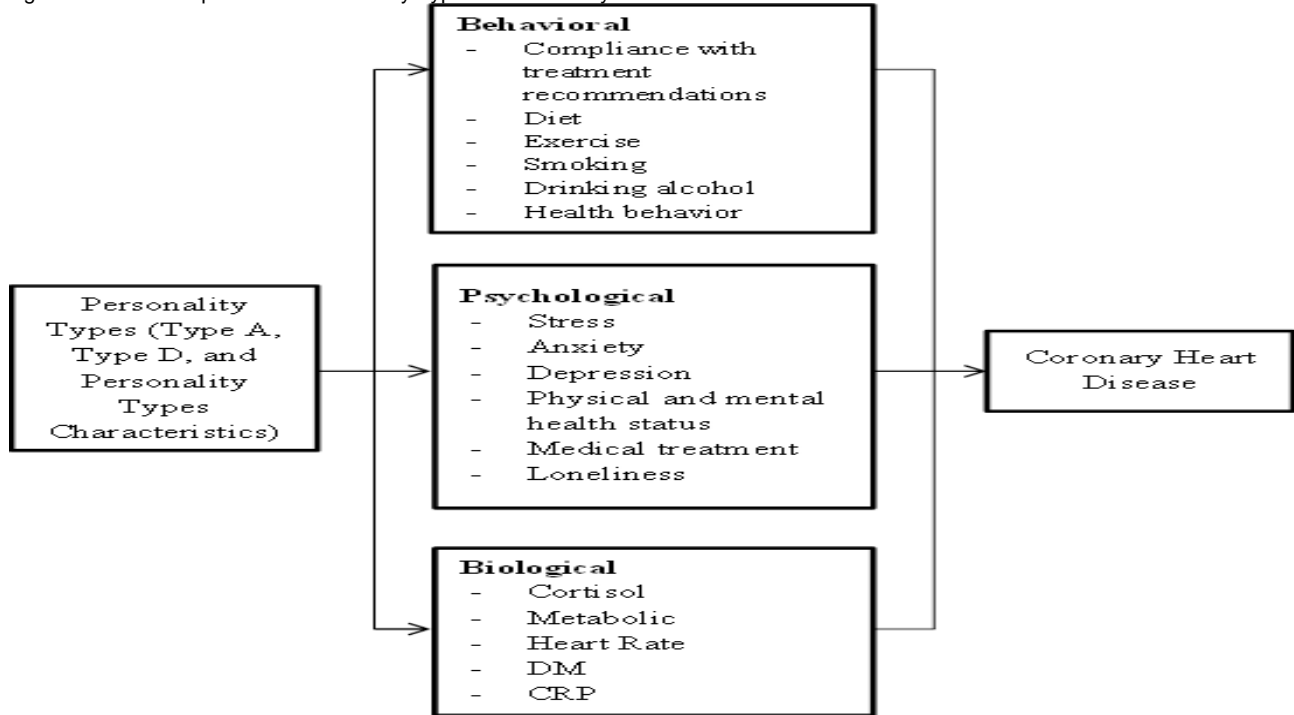Figure 2. Relationship between Personality Types and Coronary Heart Disease

Figure 3. Relationship of Coping Mechanisms with Personality Types and Coronary Heart Disease
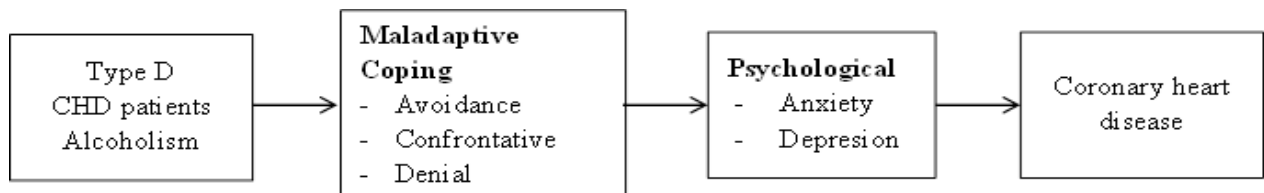
Table 1. Summary of Articles Included in the Study (n = 32)

No	Journal Identity	Conclusions (Main Findings)
1	Nefs et al., 2015	- Type D Type D was significantly related to barriers to medication, non-compliance with diet and exercise recommendations, consumption of unhealthy foods, lack of consultation with health professionals, loneliness, anxiety, and depression. - Type D was significantly related to smoking and alcoholism (compared to non-Type D, (NA + / SI + only)), - Type D was significantly associated with an increase in BMI.
2	Abraham et al., 2015	- Anger was significantly related to diet, exercise, smoking, waist circumference, and depression. - Anger was significantly related to DM.
3	Chauvet-Gélinier et al., 2016	Type A was negatively related to BMI and plasma CRP level and was an independent factor in plasma CRP. Type A was not related to HbA1C and duration of DM. Type A was significantly related to stress and anxiety.
4	Van Montfort, Denollet, Widdershoven, & Kupper, 2016	Optimism was significantly related to medication adherence. Positive affect was not related to participation in cardiac rehabilitation.
5	Van Montfort, Denollet, Vermunt, Kupper, & Widdershoven, 2017	High hostility was significantly related to high work stress. High psychological stress was significantly associated with emotion-focused coping or maladaptive coping.
6	Chauvet-Gélinier et al., 2017	Type A was not related to HbA1C and glycemic control.
7	Van Montfort, Kupper, Widdershoven, & Denollet, 2018	High stress (Type D + moderate coping level) was significantly associated with high emotions, low positive affect, low medication adherence.
8	Esmaeili, Dehghani, & Chabokinezhad, 2016	Healthy patients and individuals showed differences in negative perfectionism, action uncertainty, parental expectation, and personal standards.
9	Omran, Sadeghpour, Yaghoubi, & Shamsi, 2017	Avoidance coping and confrontative coping were more common in CHD patients than in healthy individuals.
10	Iakovleva, Shchelkova, Lubinskaya, & Nikolaeva, 2018	Patients who adhere to treatment were associated with significant conscientiousness, openness, as well as low agreeableness and neuroticsm.
11	Pimple et al., 2015	Anger was significantly related to mental stress, anxiety, and depression. Mental stress was significantly related to blood pressure and heart rate.
12	Eugen, Cornelia, & Aurelia, 2015	Type A was not related to smoking behaviour.
13	Elovainio et al., 2015	Negative affect was significantly related to depression Sociability ↓ and negative emotions were significantly related to depression ↑
14	Weston & Jackson, 2015	Conscientiousness ↑ + neuroticism ↓ were significantly related to smoking more per day. Conversely, conscientiousness ↑ + neuroticism ↑ indicated smoking less per day.
15	Versteeg, Roest, & Denollet, 2015	Type D was significantly associated with persistently high anxiety.
16	Allen, Vella, & Laborde, 2015	Positive health behaviour was associated with decreased extraversion and increased openness, agreeableness, and conscientiousness. Fruit consumption was significantly related to conscientiousness.
17	Allott et al., 2015	Emotion-focused coping was significantly associated with perceived stress.
18	Kim et al., 2016	Extraversion, agreeableness, and conscientiousness ↑ were significantly related to HDRS ↓ Neuroticism ↑ was significantly related to HDRS ↑
19	Fang et al., 2016	High denial was significantly related to prodromal symptoms and less likely to be related to depressed mood, anxiety. There was no denial difference in the risk of heart disease and the severity of infarction.
20	Nemcsik et al., 2017	Hyperthymic affective temperament was significantly related to CAD (predictor and presence).
21	Murdock, LeRoy, & Fagundes, 2017	Hostility was significantly related to cortisol sensitivity (if HF-HRV was caused by low stress).
22	Cerea, Bottesi, Grisham, Vieno, & Ghisi, 2017	Alcohol use disorder (AUD) was significantly related to avoidance coping (dispositional coping).
23	Janson & Rohleder, 2017	Coping was not related to salivary cortisol. Denial coping and distraction may be related.
24	Airagnes et al., 2017	Hostility was significantly related to alcohol consumption.
25	Romswinkel, König, & Hajek, 2018	Optimism was significantly related to depression where increased optimism decreased depression due to work stress.
26	Liu et al., 2018	Type D was significantly related to ↓ self-care trust ↓ self-care compliance, and self-care confidence. Type D was related to HF.
27	Gramer, Haar, & Mitteregger, 2018	Type D was significantly related to HR and HR recovery in men.
28	Lambertus et al., 2018	Type D was significantly related to depression, anxiety, dysthymia, obsessive compulsive, avoidant personality, and social phobia.
29	Patock-Peckham, Canning, & Leeman, 2018	Guilt and shame were included as negative affect. Guilt was significantly related to low impaired control, which caused low alcohol consumption. Shame ↑ was significantly related to high impaired control, which was related to high alcohol consumption.
30	Aluja, Malas, Lucas, Worner, & Bascompte, 2018	Type D was significantly related to depressive symptoms and anxiety, but negatively related to impulsive sensation seeking and sociability. NA and SI were significantly related to depression and anxiety and negatively related to impulsive sensation seeking.
31	Ohseto et al., 2018	Extraversion was significantly associated with metabolic syndrome (increased waist circumference, TG, blood pressure, fasting blood sugar) Extraversion was significantly related to metabolic syndrome score, but there was no personality type associated with the presence of metabolic syndrome.
32	Habibović et al., 2018	Optimism was significantly related to depression, anxiety, physical and mental health status. Type D was significantly related to distress throughout 12-month of follow-up.

Personality Types and Biological Factors: Sensitivity to cortisol was related to hostility (Murdock, LeRoy, & Fagundes, 2017), whereas plasma CRP levels were negatively related to Type A personality (Chauvet-Gélinier et al., 2016). Type D personality was also associated with heart rate and heart rate recovery in men (Gramer, Haar, & Mitteregger, 2018). Meanwhile, diabetes mellitus, which is a risk factor for CHD, was associated with anger and fasting blood sugar level was associated with extraversion, but there were no relations of duration D, glycemic control, and HbA1c with Type A personality (Abraham et al., 2015; Chauvet-Gélinier et al., 2016, 2017; Ohseto et al., 2018). Type D personality, Type A personality, extraversion, and anger were associated with metabolic conditions, such as BMI, waist circumference, triglycerides, and blood pressure (Abraham et al., 2015; Chauvet-Gélinier et al., 2016; Nefs et al., 2015; Ohseto et al., 2018). Meanwhile, optimism had a direct relationship with coronary artery disease (Nemcsik et al., 2017).

Personality Types and Coping Mechanisms: Type D personality was related to avoidance coping or maladaptive coping (Lambertus et al., 2018; Van Montfort et al., 2017), whereas individuals with Type D personality who have moderate coping levels were associated with high emotion, low positive effect, anxiety, and depression (Van Montfort, Kupper, Widdershoven, & Denollet, 2018). Based on this systematic review, patients with CHD tended to use avoidance coping and confrontative coping strategy (Omran, Sadeghpour, Yaghoubi, & Shamsi, 2017). Individuals with coping focus on emotions were related to stress (Allott et al., 2015). Alcoholism was associated with denial coping mechanisms (Cerea, Bottesi, Grisham, Vieno, & Ghisi, 2017) and individuals with denial coping were associated with anxiety and depression (Fang et al., 2016). Coping mechanism was also thought to be related to cortisol, but this finding still needs further research (Janson & Rohleder, 2017). The relations between coping mechanisms, personality types, and CHD can be seen in Figure 3

DISCUSSION

Personality types cause CHD through three mechanisms, namely, behavioural mechanism, psychological mechanisms, and biological mechanisms. Behavioural mechanism showed that personality influenced health through less healthy behaviours and lack of behaviour to improve health (Sahoo et al., 2018). This study found that behaviours that influence CHD include noncompliance with treatment recommendations, whether it is drug, diet, or exercise recommendations, lack of consultation to health practitioners, inappropriate dietary behaviour, lack of physical activity, smoking, drinking alcohol, and negative health behaviours. Individuals with Type D personality tended to favor poor lifestyle, adhere to less physical activity and less varied diet, not limit fat intake, and have low adherence, causing Type D patients to have worse outcomes (Mommersteeg, Kupper, & Denollet, 2010). Inappropriate health behaviours that cause obesity, metabolic dysfunction, and endothelial dysfunction will lead to hypertension, DM, dyslipidemia, inflammation, and thrombosis, which are risk factors for coronary heart disease (Brydon et al., 2005).

Psychosocial factors also have an important role in risk fac tors for coronary heart disease (Khayyam-nekouei, Neshatdoost, Yousefy, Sadeghi, & Manshaee, 2013). Psychological factors, such as stress, anxiety, depression, trust in medication, and loneliness are associated with coronary heart disease. It is very difficult to study and measure the magnitude of the effects of psychosocial factors on coronary heart disease, because these factors vary greatly and differ in each case (Khayyam-nekouei et al., 2013; Lemos & Omland, 2017). Psychological stress conditions activate the sympathetic nervous system that regulates heart rate, catecholamine release, and HPA axis (Brydon et al., 2005). Type D personality was the initial stage of coronary artery disease (Heidari et al., 2018) and associated with anxiety and depression. Personality type was significantly related to anxiety in CHD populations (Wihastuti, Fajaruddin, Nasution, Kumboyono, & Lestari, 2017). Additionally, depression is related to the stability of atherosclerotic plaque. Exposures to psychosocial factors continuously had an impact on unhealthy behaviour, this was mechanism of how psychosocial factors indirectly affect CHD (Sims et al., 2017).

Biological mechanisms showed that certain personality types were related to individual physiological responses (Sahoo et al., 2018). In this study, it was found that personality was related to metabolic conditions (waist circumference, triglycerides), inflammatory response (CRP), autonomic nervous system response (HR and blood pressure), DM, and HPA axis function (cortisol). Diabetes mellitus causes coronary heart disease through mechanisms related to oxidative stress, inflammation, and accelerated atherosclerotic plaque formation (Tousoulis, 2017). For example, hostility that caused inflammatory and metabolic diseases may be mediated by cortisol (Mommersteeg et al., 2010). However, when individuals were able to control the nature of hostility and were able to regulate these thoughts, hostility no longer caused cortisol sensitivity (Murdock et al., 2017).

Synthesis of knowledge about the relations of personality types, coping mechanisms, and CHD from the latest literature may increase patient outcomes and increase understanding of the mechanism of personality types and coping strategies in causing coronary heart disease. In this review, studies were mainly conducted in western countries, only five studies were conducted in Asia, four studies were related to personality types, and one study was related to coping mechanisms (Iakovleva et al., 2018; Kim et al., 2016; Liu et al., 2018; Ohseto et al., 2018; Omran et al., 2017). This finding showed the lack of research on the relations between personality types, coping mechanisms, and CHD conducted in the Asian context. Different cultural diversity and treatment systems potentially influenced the perceptions and behaviour of health professionals (Chan, Khong, & Wang, 2017). Failure to consider culture in professional action could hamper the ability of health practitioners to provide health care (Napier et al., 2017). Therefore, it is very important to conduct further research on the relations of personality types, coping mechanisms, and coronary heart disease in the Asian context.

Individual personality types cause individuals to tend to use certain coping strategies in dealing with certain condition. The maladaptive coping mechanisms have adverse physiological and behavioural effects (Sahoo et al., 2018). For example, individual with Type D personality has a tendency to use avoidance coping mechanisms. Psychosocial factors were managed by each individual through coping mechanisms in order to provide outcomes on health behaviour (Svensson et al., 2016).

Based on the results of a systematic review, personality types are associated with coronary heart disease through behavioural mechanisms, psychological mechanisms, and biological mechanisms. Type A personality, Type D personality, and personality characteristics were found to be related to coronary heart disease through one or two of the mechanisms mentioned, but only Type D personality was through the three mechanisms. In addition, how coping mechanisms relate to personality types and CHD has not been uncertainly known due to limited articles related to coping mechanisms. Therefore, further research needs to discuss and emphasize the personality and characteristics in detail, including coping mechanisms of each personality and how personalities and coping mechanisms cause CHD.

CONCLUSION

This systematic review showed that personality types and personality characteristics were associated with CHD. The personality mechanism that caused CHD consisted of three mechanisms, namely, behavioural mechanism, psychological mechanism, and biological mechanism. Personality type was also related to coping mechanisms where there was a tendency for certain coping mechanisms in a personality type. In addition, coping mechanisms were associated with risk of coronary heart disease, and CHD patients tended to have certain coping mechanisms, but these findings need to be further observed. Nurses need to intervene according to the personality type of the patient so that they are able to modify and identify maladaptive personalities to improve outcomes of patients with CHD.

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