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ORIGINAL PAPER

SAFETY DETERMINANTS OF CARDIOVASCULAR DISEASES

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Highlights

- This study addresses scientific gaps concerning cardiovascular patients' experiences with threats.
- The study applies an interdisciplinary approach to cardiovascular patients' vulnerability.
- The findings provide insights for developing strategies to reduce the risk of cardiovascular diseases.

Abstract

Background: Researchers from the fields of safety studies and internal medicine (cardiology) conducted a cross-sectional interdisciplinary study aimed at determining the impact of patients' experiences with various forms of violence, psychological, physical, and digital as well as hazards such as floods, fires, earthquakes, traffic accidents, crime (theft and fraud), and political violence (war) on the onset and progression of cardiovascular diseases. **Material and Methods:** To assess the relationships between the variables, a quantitative research design was employed. The questionnaire was administered to 302 patients in a pre-operative department. The results of this exploratory study were presented using descriptive statistics, non-parametric analysis (Mann-Whitney U test) and simple linear regression models. **Results:** The key results highlight a consistent link between all assessed threats to personal safety and adverse cardiovascular outcomes. Statistical analysis, conducted through the combined lens of safety studies and cardiology, underscores the need for further research, particularly into the effects of digital violence, theft, fraud, and traffic accidents on the cardiovascular health of the broader population. **Conclusions:** Given that a substantial proportion of participants had been involved in traffic accidents and that this experience was statistically linked to cardiovascular conditions, the study highlights an urgent need for further research in this area. Med Pr Work Health Saf. 2026;77(3)

Key words: hazards, cardiovascular disease, violence, natural disasters, traffic accidents, safety threats

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INTRODUCTION

Social determinants of cardiovascular diseases (CVDs) have been the focus of numerous scientific studies, primarily within the field of biomedical sciences [1]. Impacts of work-related CVDs had also been the subject of significant scientific studies [2]. The central theme in previously conducted research concerned the influence of socioeconomic factors [3] and psychological factors [4] on both the onset and progression of cardiovascular conditions. A thorough review of the literature reveals a well-established base of scientific knowledge on the correlation between CVDs and prior experiences of physical violence [5], psychological violence [6], as well as exposure to natural disasters such as floods [7], earthquakes [8], and to war-related events [9].

However, this review also reveals a lack of repetitive and systematic research into the relationship between CVDs and other forms of threats, including experiences of digital violence among adults and broader population exposure to fires, traffic accidents, fraud and theft. In the Serbia, the legacy of war, along with decades of political and socioeconomic instability, has created a chronically stressful environment, contributing to a rising prevalence of CVDs [10,11]. Considering the wide range of safety risks and threats stemming from ongoing economic and social challenges, researchers from the fields of safety studies and biomedical sciences have initiated a study aimed at examining the impact of individuals' experiences with specific threats to personal safety on the occurrence of CVDs.

The subject of this interdisciplinary, cross-sectional research project "Safety Determinants of Cardiovascular Diseases" is a comprehensive investigation into how exposure to various forms of violence (psychological, physical, digital), hazards (floods, fires, earthquakes, traffic accidents), crime (theft, fraud) and political violence (war) may influence the development of CVDs. Given that cor-

relations between several of these threats and cardiovascular conditions remain insufficiently explored, the primary aim of the study is to investigate and describe these associations in detail.

MATERIAL AND METHODS

A cross-sectional study was conducted through a survey of 302 patients at the pre-operative department of the Dedinje Cardiovascular Institute in Belgrade, Serbia. The questionnaire was divided into 2 sections. The first section comprised questions related to sociodemographic variables, while the second section focused on respondents' perceptions of security threats and the occurrence of CVDs. The quantitative research design required prior operationalization of the variables reflecting the study's core concepts. To guide the implementation of the research, 1 general and 4 specific hypotheses were formulated.

The general hypothesis stated:

- Threats to patients' personal safety influence the occurrence of CVDs.

The specific hypotheses were as follows:

- Patients' experiences with psychological, physical and digital violence affect the occurrence of CVDs.
- Patients' experiences with floods, fires, earthquakes and traffic accidents affect the occurrence of CVDs.
- Being a victim of theft or fraud influences the occurrence of CVDs.
- Patients' experiences with wartime events affect the occurrence of CVDs.

Statistics

The data collected through the survey were analyzed using the statistical software IBM SPSS v. 26 (IMP Corp., Armonk, NY, USA). The results were presented using descriptive statistics, non-parametric analysis (Mann-Whitney U test) and simple linear regression models.

Ethics

This research was conducted in compliance with the law of the Serbia and it was carried out in accordance with the World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. The Ethical Board of Dedinje Cardiovascular Institute approved this research (decision number: 4805/23.09.24). The privacy rights of human subjects have been observed and informed consent was obtained for conducting the survey with patients.

Theoretical framework

The fundamental postulates of vulnerability theory provide a suitable framework for the theoretical foundation of the research presented in this paper. The theory's broad applicability, including threat identification, vulnerability assessment, consequence analysis and the development of risk reduction strategies, offers an opportunity both to verify existing scientific knowledge and to integrate new insights into the evolving discourse on vulnerability [12].

Given that vulnerability is a highly dynamic variable, it is conceptualized in the literature as both a dependent and an independent variable across a range of general sciences and academic disciplines, each contributing distinct interpretations of the phenomenon [13]. The concept encompasses multiple dimensions – economic, ecological, social, physical, psychological and others – which may be manifested at various analytical levels, from individuals and social groups to local communities, and further to national, regional and global scales [14]. These complexities necessitate the development of research designs that are sensitive to the spatial and temporal dimensions of vulnerability [14].

In the present study, physical, psychological, social and economic threats to the safety of patients diagnosed with CVDs were examined. Particular attention was given to confirming the thesis of unequal social distribution of risk [15], emphasizing how vulnerability is not only multifaceted but also unequally experienced across different population groups.

RESULTS

The sample consisted of 302 patients, hospitalized at Dedinje Cardiovascular Institute in Belgrade, Serbia, at the time of self-reported cardiovascular conditions assessment. More than two-thirds of the sample were male. One respondent did not provide an answer to the gender question. The age of the participants was mean±standard deviation (M±SD) 65.77±10.09 years. The educational structure of the sample indicates that the majority of the participants (more than a half) had completed secondary education, while the smallest proportion held a master's degree. The response options also included the Ph.D. degree, which none of the participants selected. Just under three-quarters of the participants (70.67%) reported being married, while the smallest proportion (1.33%) indicated that they were in a relationship. Two participants did not respond to this question. The remaining respondents reported being single

(6.67%), divorced (4.67%), or widowed (16.67%). The results indicate that the vast majority of the participants (approx. 92%) are parents, while only 7.62% reported not having children. All the participants responded to this question, meaning the presented percentages are valid.

A total of 298 participants responded to the question regarding employment status. Of those, slightly less than one-third reported being employed, while the remaining participants indicated they were unemployed. A particularly notable finding is that nearly one-third of the participants (32.78%) did not respond to the question related to personal monthly income. Among the remaining respondents, the highest proportion reported a monthly income of <RSD 50 000 (<EUR 427), while the smallest number indicated earnings >RSD 120 000 (>EUR 1024). The participants were also asked whether their job involved any specific type of burden. They were presented with a set of response options and could select multiple choices using checkboxes. Nearly two-thirds of the participants (N = 197, 65.23%) reported experiencing some form of job-related strain. The most frequently selected option was "moderately demanding physical work," while the least frequently reported were "intellectual work" and "sedentary work."

In the examined sample, 284 participants (94.04%) responded to the question about their physical activity. Among them, the vast majority reported not engaging in any physical activities (76.06%), while only 1.41% indicated that they were professionally engaged in sports. The remaining participants reported engaging in sports recreationally. When it comes to the smoking status of the sample, data were available for 296 participants, while 6 participants did not respond to this question. Among those who did, the results indicated that the majority were non-smokers (76.35%). Furthermore, regarding the smoking status of the participants' household members, 6 participants (1.99%) did not respond to this question. Among the remaining respondents, just under two-thirds reported that their household members were non-smokers (63.85%).

The participants were also asked whether they suffered from several different illnesses. First, they were asked about their hypertension status. A total of 286 participants (94.70%) responded to this question. Among them, approx. two-thirds reported having hypertension (64.34%). The obesity status of the participants was also examined. Eleven participants (3.70%) did not respond to this question. Among the remaining respondents, just under two-thirds reported not being obese (60.82%), while the rest identified as obese. Next, the sample structure was examined based on diabetes status. Eleven participants (3.70%) did not respond to this question. Among the remaining respondents, 65.98% reported not having diabetes, while slightly over one-third (34.02%) indicated they had been diagnosed with diabetes. Finally, participants were asked about their elevated cholesterol status. A total of 290 respondents (96%) answered this question. Among them, the prevalence of high cholesterol was relatively evenly distributed. Specifically, 43.10% reported having elevated cholesterol levels, while the remainder indicated they did not have high cholesterol. At the end of this section, the history of CVD in the participants' families was also examined. A total of 294 respondents (97.30%) answered the question regarding the family history of CVDs. Among them, 165 participants (56.10%) reported a family history of CVD, while the remaining 43.90% reported no such history. The participants who reported a family history of CVDs were asked about their relationship to the affected relatives. The majority indicated a connection to their mother (54.55%) and father (49.09%), while other types of kinship were less frequently reported. Finally, these participants were asked to specify which CVDs were present in their family history. The most frequently self-reported conditions were myocardial infarction (13.33%) and stroke (9.09%).

Description of the subsample of participants with experience of safety threats

The subsample consisted of 187 participants from the initial sample. Those were the participants with experience of any kind of safety threats examined in this research. Almost three-quarters of the subsample were male. The mean age of participants was M±SD 64.35±10.34 years. The educational structure of the subsample also indicates that the majority of participants (more than a half) had completed secondary education, while the smallest proportion held a master's degree. The response options also included the Ph.D. degree, which none of the participants selected.

Almost three-quarters of the participants (71%) reported being married, while the smallest proportion (1.60%) indicated that they were in a relationship. One participant did not respond to this question. The remaining respondents reported being single (7.00%), divorced (5.40%), or widowed (15.10%). The results indicate that the vast majority of the participants (92.50%) are parents, while only 7.50% reported not having children. All the participants responded to this question, meaning the presented percentages are valid.

A total of 183 participants responded to the question regarding their employment status. Of those, slightly more than one-third reported being unemployed, while the remaining participants indicated they were employed. Nearly one-third of the participants (N = 61, 32.70%) did not respond to this question. Among the remaining respondents, the highest proportion reported a monthly income of <RSD 50 000 (<EUR 427) and RSD 50 000–80 000 (EUR 427–683) while the smallest number indicated earnings >RSD 120 000 (>EUR 1024). The participants were also asked whether their job involved any specific type of burden. They were presented with a set of response options and could select multiple choices using checkboxes. Nearly two-thirds of the participants reported experiencing some form of job-related strain. The most frequently selected option was "light physical work," while the least frequently reported was "sedentary work."

In the examined sample, 181 participants (96.80%) responded to the question about physical activity. Among them, the vast majority reported not engaging in any physical activity (72.40%), while only 1.10% indicated that they were professionally engaged in sports. The remaining participants reported engaging in sports recreationally.

When it comes to the smoking status of the subsample, data were available for 185 participants, while 2 participants did not respond to this question. Among those who did, the results indicate that the majority are non-smokers (74.59%). Furthermore, regarding the smoking status of the participants' household members, 1 participant (0.50%) did not respond to this question. Among the remaining respondents, just under two-thirds reported that their household members were non-smokers (62.90%).

The participants were also asked whether they suffered from several different illnesses. First, they were asked about their hypertension status. A total of 178 participants (95.20%) responded to this question. Among them, approx. two-thirds reported having hypertension (66.85%). The obesity status of the subsample was also examined. Four participants (2.20%) did not respond to this question. Among the remaining respondents, just above one half reported not being obese (55.74%), while the rest identified as obese. Next, the sample structure was examined based on diabetes status. Five participants (2.70%) did not respond to this question. Among the remaining respondents, 63.19% reported not having diabetes, while slightly over one-third (36.81%) indicated they had been diagnosed with diabetes.

Finally, the participants were asked about their elevated cholesterol status. A total of 182 respondents (95.03%) answered this question. Among them, the prevalence of high cholesterol was relatively evenly distributed. Specifically, 43.41% reported having elevated cholesterol levels, while the remainder indicated they did not have high cholesterol. The history of CVDs in the participants' families was also examined in this subsample. A total of 183 respondents (97.90%) answered the question regarding the family history of CVDs. Among them, 111 participants (60.70%) reported a family history of CVD, while the remaining 39.30% reported no such history. The participants who reported a family history of CVDs were asked about their relationship to the affected relatives. The majority of 111 participants indicated a connection to their father (54.05%) and mother (48.65%), while other types of kinship were less frequently reported. Finally, these participants were asked to specify which CVDs were present in their family history. The most frequently self-reported cardiovascular conditions were myocardial infarction (16.22%) and stroke (9.01%).

Inferential statistics results

The effect of experiences involving various forms of safety threats on the occurrence of CVDs, as well as on the worsening of CVD symptoms due to such experiences, was examined. The analysis included the impact of 3 types of violence: physical, psychological and digital. In addition, the effects of experiences with different hazards – namely fire hazard, floods, earthquakes, traffic accidents, theft, fraud and armed conflict hazard – were also assessed. The data were processed using IBM SPSS v. 26. Given the considerable disproportion in the number of participants who reported experiencing these safety threats, and the resulting violation of the assumption of variance homogeneity, all models were tested using nonparametric analysis for comparing 2 independent samples, employing the Mann-Whitney U statistics. Furthermore, in the case of violence-related experiences, the participants were also asked to report the specific forms of violence they had encountered. To examine the correlation between the presence and worsening of cardiovascular symptoms and the number of different types of violent experiences, simple linear regression was conducted.

Effects of experience with physical violence

The effects of physical violence experience were examined first. Within the existing fund of scientific knowl-

edge, numerous scientific sources have confirmed the correlation between physical violence and CVDs [5]. In the analysed sample, 43 participants responded affirmatively to the question regarding their experience with physical violence, while 250 participants reported no such experience. Nine participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced physical violence significantly increases the mean rank of participants on the item related to cardiovascular health issues caused by physical violence experience, as well as on the item concerning worsening of CVD symptoms due to physical violence experience. The results of the analysis are presented in Table 1.

The participants were asked to indicate the type of physical violence they had experienced using a checkbox format, allowing them to select multiple response options. The most frequently reported form of physical violence was a blow to the specific part of the body (N = 25). Table 2 presents the number of participants who selected each of the offered response options.

Given the very small number of responses for each specific type of physical violence, it was not possible to examine the significance of the effects of individual types of violence on cardiovascular health problems. Therefore, the analysis focused on whether the number of different types of physical violence experienced by the participants predicted a greater occurrence of CVDs or worsening of their symptoms. Results of the linear regression analysis indicate that the number of types of physical violence positively predicts both cardiovascular health issues caused by physical violence experience ($R^2 = 0.204$, $F(1, 294) = 76.781$, $p < 0.001$, $\beta = 0.455$, $t = 8.762$, $p < 0.001$) and worsening of CVD symptoms due to physical violence experience ($R^2 = 0.191$, $F(1, 294) = 70.715$, $p < 0.001$, $\beta = 0.440$, $t = 8.409$, $p < 0.001$), suggesting that a greater number of violent experiences is associated with poorer cardiovascular health outcomes.

Effects of experience with psychological violence

Positive correlations between experience with various forms of psychological violence and CVDs have been confirmed in numerous scientific studies [6]. Further, the effects of psychological violence experience were examined. In the sample, 50 participants responded affirmatively to the question regarding their experience with psychological violence, while 238 participants reported no such experience. Fourteen participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced psychological violence significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by psychological violence experience, as well as on the item concerning worsening of CVD symptoms due to psychological violence experience. The results of the analysis are presented in Table 1.

The participants were then asked to indicate the type of psychological violence they had experienced using a checkbox format. The most frequently reported form of psychological violence was verbal violence (N = 29). The Table 2 presents the number of participants who reported any of the offered violence forms.

An interdisciplinary team of researchers examined whether the number of different types of psychological violence experienced by the participants predicted a greater occurrence of CVDs or worsening of their symptoms. Results of the linear regression analysis indicate that the number of types of psychological violence positively predicts both cardiovascular health issues caused by psychological violence experience ($R^2 = 0.385$, $F(1, 286) = 181.033$, $p < 0.001$, $\beta = 0.623$, $t = 13.455$, $p < 0.001$) and worsening of CVD symptoms due to psychological violence experience ($R^2 = 0.409$, $F(1, 286) = 199.511$, $p < 0.001$, $\beta = 0.641$, $t = 14.125$, $p < 0.001$), suggesting that a greater number of violent experiences is associated with more cardiovascular health problems.

Effects of experience with digital violence

Regarding the impact of digital violence on CVDs, the researchers conducted so far have been predominantly related to the adolescent population [16]. In this research, however, the effects of digital violence experience were examined only in the patients >18 years of age. In the sample, 9 participants responded affirmatively to the question regarding their experience with digital violence, while 274 participants reported no such experience. Nineteen participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced digital violence significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by digital violence experience, as well as on the item concerning worsening of CVD symptoms due to digital violence experience. The results of the analysis are presented in Table 1.

The participants were then asked to indicate the type of digital violence they had experienced using a checkbox format. The most frequently reported form of digital violence was unauthorized surveillance of private digital

Table 1. Effects of safety threats on cardiovascular health among patients undergoing pre-operative assessment at the Dedinje Cardiovascular Institute, October 2024 – January 2025, Belgrade, Serbia

Variable	Participants (N = 302) [n]	Mean rank	Mann-Whitney U test	p
Violence				
physical				
cardiovascular health issues caused by physical violence experience	293		3875.00	<0.001
yes	43	181.88		
no	250	141.00		
worsening of CVD symptoms due to physical violence experience	293		3875.00	<0.001
yes	43	181.88		
no	250	141.00		
psychological				
cardiovascular health issues caused by psychological violence experience	288		1904.00	<0.001
yes	50	225.42		
no	238	127.50		
worsening of CVD symptoms due to psychological violence experience	288		2261.00	<0.001
yes	50	218.28		
no	238	129.00		
digital				
cardiovascular health issues caused by digital violence experience	283		688.00	<0.001
yes	9	202.56		
no	274	140.01		
worsening of CVD symptoms due to digital violence experience	283		829.00	<0.001
yes	9	186.89		
no	274	140.53		
Fire hazard experience				
cardiovascular health issues caused by fire hazard experience	283		1852.50	<0.001
yes	36	214.04		
no	247	131.50		
worsening of CVD symptoms due to fire hazard experience	283		2099.50	<0.001
yes	36	207.18		
no	247	132.50		
Flood experience				
cardiovascular health issues caused by flood experience	277		2629.00	<0.001
yes	38	189.32		
no	239	131.00		
worsening of CVD symptoms due to flood experience	277		2748.50	<0.001
yes	38	186.17		
no	239	131.50		
Earthquake experience				
cardiovascular health issues caused by earthquake experience	280		5616.00	<0.001
yes	72	166.50		
no	208	131.50		

Table 1. Effects of safety threats on cardiovascular health among patients undergoing pre-operative assessment at the Dedinje Cardiovascular Institute, October 2024 – January 2025, Belgrade, Serbia – cont.

Variable	Participants (N = 302) [n]	Mean rank	Mann-Whitney U test	p
Earthquake experience – cont.				
worsening of CVD symptoms due to earthquake experience	280		6136.00	<0.001
yes	72	159.28		
no	208	134.00		
Traffic accident experience				
cardiovascular health issues caused by traffic accident experience	280		5103.00	<0.001
yes	91	178.92		
no	189	122.00		
worsening of CVD symptoms due to traffic accident experience	280		5197.50	<0.001
yes	91	177.88		
no	189	122.50		
Theft experience				
cardiovascular health issues caused by theft experience	285		3616.00	<0.001
yes	59	194.71		
no	226	129.50		
worsening of CVD symptoms due to theft experience	285		4181.00	<0.001
yes	59	185.14		
no	226	132.00		
Fraud experience				
cardiovascular health issues caused by fraud experience	280		1567.00	<0.001
yes	21	195.38		
no	259	136.05		
worsening of CVD symptoms due to fraud experience	280		1563.50	<0.001
yes	21	195.55		
no	259	136.04		
Armed conflict hazard experience				
cardiovascular health issues caused by armed conflict experience	284		1230.00	<0.001
yes	38	233.13		
no	246	128.50		
worsening of CVD symptoms due to armed conflict experience	284		1353.00	<0.001
yes	38	229.89		
no	246	129.00		

CVD – cardiovascular disease.

communication by other persons (N = 2) and posting inappropriate and untrue information (N = 2). Table 2 presents the number of participants who reported any of the offered violence forms. Finally, it was examined whether the number of different types of digital violence experienced by the participants predicted a greater occurrence of CVDs or worsening of their symptoms. Results of the linear regression analysis indicate that the number of types of digital violence positively predicts both cardiovascular health issues caused by digital violence experience ($R^2 = 0.202$, $F(1, 300) = 76.998$, $p < 0.001$, $\beta = 0.452$, $t = 8.775$, $p < 0.001$) and wors-

Table 2. Distribution of responses per type of physical, psychological, digital violence among patients undergoing pre-operative assessment at the Dedinje Cardiovascular Institute, October 2024 – January 2025, Belgrade, Serbia

Type of violence	Participants (N = 302) [n]
Physical violence	
a blow to the specific part of the body	25
slapping	9
suffering cuts	1
suffering burns	1
being hit by objects	0
attempted strangulation	0
firearm threat	1
cold weapon threat	1
other	4
Psychological violence	
verbal abuse (threats and insults)	29
stalking	9
forced isolation	5
financial violence	3
emotional manipulation	12
ignoring	7
mobbing	9
Digital violence	
restriction of digital communication and access to the internet	1
unauthorized monitoring of private digital communication by other persons	2
posting inappropriate or untrue information about participants	2
hacking social media accounts of participants	1
online harassment and bullying	1

ening of CVD symptoms due to digital violence experience ($R^2 = 0.092$, $F(1, 300) = 31.554$, $p < 0.001$, $\beta = 0.308$, $t = 5.617$, $p < 0.001$), suggesting that here as well, a greater number of violent experiences is associated with more cardiovascular health problems.

Effects of experience with fire hazard

During an in-depth search of the existing fund of scientific knowledge, the researchers concluded that the previous researches have predominantly been conducted on samples of people who are professionally engaged in fire protection [17]. In this research, an interdisciplinary team of researchers studied the effects of fire hazard experience on subjects who were rather victims of fire and not professionals. In the sample, 36 participants responded to have had such an experience, while 247 participants reported no such experience. Nineteen participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced a fire hazard significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by fire hazard experience, as well as on the item concerning worsening of CVD symptoms due to fire hazard experience. The results of the analysis are presented in Table 1.

Effects of experience with flood

The topic of experience with floods and correlation with CVDs is present in the databases of scientific research [7]. This research examined the effects of flood experience. In the sample, 38 participants responded to have had flood experience, while 239 participants did not have it. Twenty-five participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced floods significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by flood experience, as well as on the item concerning worsening of CVD symptoms due to flood experience. The results of the analysis are presented in Table 1.

Effects of experience with earthquake

In the context of the onset or worsening of CVDs, the impact of experience with earthquakes has been thoroughly investigated in scientific studies [8]. In this research also, the effects of earthquake experience were examined. In the sample, 72 participants responded to have had experience with earthquake, while 208 participants did not have it. Twenty-two participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced an earthquake significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by earthquake experience, as well as on the item concerning worsening of CVD symptoms due to earthquake experience. The results of the analysis are presented in Table 1.

Effects of traffic accident experience

The topic of the influence of experience of traffic accidents and the connection with CVDs has not been sufficiently researched and there is a noticeable absence of empirical research on the given topic. The traffic safety researches published so far have examined traffic accidents

caused by drivers who had died or had a cardiovascular attack while driving [18,19] and development of posttraumatic stress disorders in traffic accidents victims [20].

In this study, the researchers examined the effects of traffic accident experiences on cardiovascular health. In the sample, 91 participants responded to have had experience with traffic accident, while 189 participants did not have it. Twenty-two participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced a traffic accident significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by traffic accident experience, as well as on the item concerning worsening of CVD symptoms due to traffic accident experience. The results of the analysis are presented in Table 1.

Effects of experience with theft

A review of the literature revealed a modest fund of scientific results related to the experience of theft and fraudulent transactions and CVDs [21]. In this study, the effects of theft experience were examined further. In the sample, 59 participants responded to have had such experience, while 226 participants reported no such experience. Seventeen participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced theft significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by theft experience, as well as on the item concerning worsening of CVD symptoms due to theft experience. The results of the analysis are presented in Table 1.

Effects of experience with fraud

The effects of fraud experience on cardiovascular occurrences have not been sufficiently examined so far [21]. In the sample, 21 participants responded to have had fraud experience, while 259 participants did not report it. Twenty-two participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced fraud significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by fraud experience, as well as on the item concerning worsening of CVD symptoms due to fraud experience. The results of the analysis are presented in Table 1.

Effects of armed conflict hazard experience

The impact of experience with armed conflict and the impact of the mentioned experience on cardiovascular health has been investigated in numerous studies with the given topic [9]. The present research also examined the effects of armed conflict hazard experience. In the sample, 38 participants responded to have had experience with armed conflict hazard, while 246 participants reported not to have had it. Eighteen participants did not provide a response. The results from the Mann-Whitney U test indicate that having experienced an armed conflict hazard significantly increases the mean rank of the participants on the item related to cardiovascular health issues caused by armed conflict hazard experience, as well as on the item concerning worsening of CVD symptoms due to armed conflict hazard experience. The results of the analysis are presented in Table 1.

DISCUSSION

The study surveyed a total of 302 patients at the preoperative department of the Dedinje Cardiovascular Institute in Belgrade, Serbia. Of these, 187 patients reported experiencing ≥1 form of personal safety threat. Specifically, the data revealed the following experience distributions: physical violence – 43 patients, psychological violence – 50 patients, digital violence – 9 patients, fire – 36 patients, earthquake – 72 patients, traffic accident – 91 patients, theft – 59 patients, fraud – 21 patients, war-related threats – 38 patients.

The results of presented empirical study confirmed general and specific hypothesis drawn from scarce studies previously conducted on similar subject. The strength of the conducted study is reflected in the fact that the results indicated very important and insufficiently researched correlation between different forms of safety threats and the occurrence or worsening of symptoms of CVDs. The presented study filled the scientific gap related to the correlation between traffic accidents and CVDs and indicated the need to carefully monitor the cardiovascular health of persons who were involved in traffic accidents, frauds, digital violence and thefts. The future research directions should be designed to fill the scientific void in terms of correlation of CVDs and mentioned forms of violence and accidents. The limited number of previously conducted studies narrowed down the possibility of a thorough comparison of the findings and indicated the necessity of conducting research that will explore deeper the relation between safety threats and CVDs. The presented interdisciplinary study did not assess the clinical progression or severity of CVDs through medical testing but rather explored associations between exposure to adverse safety-related

factors and the presence or worsening of cardiovascular conditions. The future studies should incorporate objective clinical indicators and longitudinal medical assessments in order to more rigorously evaluate the relationship between exposure to safety-related stressors and CVD progression.

CONCLUSIONS

Through an extensive review of scientific literature, researchers from the fields of safety studies and cardiology identified numerous studies supporting the connection between CVDs and prior exposure to physical and psychological violence, as well as experiences with floods, earthquakes, and armed conflict. However, the review of literature also revealed a lack of repetitive research specifically examining experiences that precede the onset or worsening of CVDs – particularly those related to exposure to fires, fraud, and theft within the general population, as well as traffic accidents, and digital violence experienced by adults.

To address these gaps, an interdisciplinary cross-sectional study was conducted using a quantitative research design, with the goal of confirming the existing findings and generating new scientific insights into the factors contributing to the development or exacerbation of CVDs.

Using the Mann-Whitney U test and simple linear regression analysis, statistically significant relationships were confirmed between these experiences and the occurrence or worsening of CVDs. Vulnerability theory served as the analytical framework for interpreting the consequences of these experiences. The findings underscore the need for continued exploration into the confirmed correlations between the variables, particularly those involving traffic accidents, digital violence, fires, fraud, and theft, in order to establish proper strategies of prevention and risk reduction of cardiovascular events caused by the studied factors. Given that the largest number (91) of participants had been involved in traffic accidents and that this experience was statistically linked to self-reported cardiovascular conditions, the study highlights an urgent need for further research in this area.

The small number of respondents in some safety threats exposure categories limits the generalizability of the findings. The results in those clusters should be interpreted as preliminary evidence that may serve as the basis for future large-scale research studies. The mentioned limitations of this study lead to the conclusion that the results should not be interpreted as definitive causal evidence, but rather as an exploratory indication of potential associations that warrant further validation in larger and more representative cohorts. This exploratory cross-sectional study emphasized the necessity of conducting future longitudinal studies with larger samples to confirm the observed correlations between variables.

Based on future findings, tailored strategies and action plans should be developed to reduce the risk of CVDs and prevent the worsening of symptoms among patients with preexisting cardiovascular conditions.

AUTHOR CONTRIBUTIONS

Research concept: Jelena Dinić
Research methodology: Jelena Dinić
Collecting material: Olivera Đokić, Slobodan Tomić
Statistical analysis: Jelena Dinić
Interpretation of results: Jelena Dinić, Olivera Đokić, Slobodan Tomić
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