

ABO BLOOD TYPE AND OTHER BIOLOGICAL VARIABLES RELATED WITH COPING MECHANISMS

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Abstract

When dealing with everyday life problems, people use a variety of coping strategies, depending on the actual situation and on their psychological and biological constitution. Biological variables may have a role in influencing the stress response and, thus, the use of specific coping mechanisms. The aim of our study was to examine this association. We have measured the preference for specific coping strategies using The Coping Orientation to Problems Experienced Inventory (Carver, Scheier, Weintraub, 1989). As biological variables we have considered the ABO blood type, the RH, sex and age of our respondents. Our sample is composed of 265 people, 85 from Bulgaria and 180 from Romania. Out of them, 62 of are men and 203 women. The mean age of the respondents is 32,08 years. The distribution of the blood types in our sample is: 90 blood type O, 113 blood type A, 42 blood type B and 20 blood type AB. A number of 173 respondents have positive Rh, while 54 have negative Rh (38 of the respondents do not know their Rh). Descriptive analysis shows that the most used coping mechanisms are: positive reinterpretation, planning and direct approach of problems. Seeking instrumental social support or emotional social support and acceptance are also preferred. The strategies less preferred are denial, behavioral disengagement and substance use. While the Rh shows no relevance for coping in the univariate analysis, the blood type appears to create a difference in using the social support dimension ($F=2.742$ $p=.044$), with the A blood type being the last willing to make use of such support. We have also found differences between men and women. Women obtain significantly higher scores ($p<.05$) on the scales measuring venting of emotions, the use of social support, active coping, planning and religious coping. Age shows positive correlations with active coping, planning and religious coping ($p=.001$), and negative correlations with mental disengagement and substance use ($p=.01$). We have also considered the joint influence of the biological variables upon the coping style, using GLM ANOVA-based statistical models. We have found some interaction effects, mainly for Rh and sex; for example, for the problem-focused dimension, we have found the highest mean for women with negative Rh ($F=5,60$, $p=.019$). Based on the results we can conclude that the coping profile of each person is complex and can be linked to specific biological variables.

Keywords: stress, coping strategies, biological variables, ABO blood type, interaction of factors

1. INTRODUCTION

What is coping

We use coping strategies to adapt to stressful events; and the strategies we choose depend on the actual situation we are in, our life circumstances, our personality structure (neuroticism, resilience, optimism and so on) and our biology. Every person has a unique pattern of coping, personal

preferences for combination of strategies and time sequences of using certain strategies. For every one of us, something, sometimes, works.

Coping implies cognitive, emotional, behavioral and biochemical responses used to handle situations we perceive as difficult and manage negative emotions associated with those. Coping may be defined as the efforts we consciously or unconsciously employ to prevent or deal with stressful events and to regulate emotional distress. The coping style has a direct influence on behavior and wellbeing; it prevents anxiety, sadness, social maladjustment.

There are numerous life situations that can be perceived as stressful and, thus, generate stress. They do not necessarily refer to something severe (exposure to violence, loss of someone dear), but to virtually everything in our daily lives (for example, a bad mark on a evaluation, a disagreement at the workplace, an unexpected change in our daily program or tasks, a delay of the public transport, a headache, an outfit that does not fit us well and so on). In general, current or foreseen events that generate a negative emotional response can be considered stressors. High-intensity, high frequency, high duration of unpleasant events puts us under a lot of stress. Also, sudden, unpredictable, unavoidable, uncontrollable events have a higher potential to generate stress – but not in all individuals.

Among many personality differences is the one regarding the way we approach life difficulties – our *coping style*. Not everyone reacts the same to an event, and even the same person can have different reactions depending on context. Some people perceive an event as overwhelming, whereas others perceive it as ordinary. Another intervening factor is how we perceive our personal resources – if we think that we can manage, we will actually adapt better.

Depending on those individual perceptions, we can see different reactions to stressors. Those reactions include concrete behaviors (for example, a student failing an exam begins learning for the next session), as well as physiological and dispositional changes (such as self-blame or anger). Some persons, although may worry a little, are well motivated to overcome the difficulty; others become anxious, avoid the problem, or feel angry. This last category, on the long term, may develop emotional problems (depression, unhappiness) and/or somatic disease (such as cardiac disease) (Lazarus and Folkman, 1984).

The first scientists that studied stress (Walter Cannon, Hans Selye) focused on its physiological side and on its negative effects. Hans Selye, for example, spoke of stress in terms of a chain of attempts to adapt, attempts often leading to exhaustion. But he later made the distinction between the so-called eustress (a benefic stress, that mobilizes us to overcome difficulties) and the so-called distress (the harmful side of stress) (Selye, 1984). When we speak of stress, we usually refer to distress.

The unique way an individual reacts to a stressor was a subject of much scientific interest; it emerged the point of view that between the stressor and the stress response lies the individual, with his particular traits and coping strategies.

Richard S. Lazarus and Susan Folkman proposed the transactional model of stress, asserting that the individual reaction depends on the cognitive evaluation process. Stress appears if the individual perceives a discrepancy (be it real or imaginary) between the requests of a situation and personal (biological, psychological, social) resources. There are two dimensions being assessed: the nature of the event for the individual (there are different significances that can be attributed to an event: positive, irrelevant or stressful – and this may be a loss, a threat or a challenge) and the personal resources to cope (coping style, perceived self-efficacy, personal vulnerabilities, contextual variables) (Lazarus and Folkman, 1984).

The coping style emerged as an individual characteristic that modulates the stress response. Lazarus & Folkman (1984) used the term ‘coping mechanisms’ to refer to the processes used by individuals to regulate their behavioral and emotional reactions to stress. In other terms, the coping strategies are cognitive, affective and behavioral responses used in order to reduce or control stress. Some examples of coping strategies are: planning and taking action, seeking social and emotional support, or, as opposite, social and emotional withdraw, avoidance, denial.

Every individual has his unique style, his unique pattern of stress response, developed throughout life and depending on the concrete circumstances. In a particular situation, a person may prefer initially a certain type of response, but if this doesn’t work or the situation later allows for a more appropriate approach, the person chooses another strategy. People permanently adjust their coping style; coping is, of course, a dynamic adaptive process.

In addition, strategies tend to associate with one another, to organize in clusters (Heffer & Willoughby, 2017).

Types of coping strategies

There are a lot of coping strategies that we can think of and that were, of course, described in the literature also. Various authors have not only detailed what they considered the main coping strategies, but also tried to classify those strategies.

Many agree with the dichotomy problem focused coping – emotion focused coping proposed by R.S. Lazarus and his associates (Miclea, 1997).

Problem focused strategies (also known as problem-based or instrumental strategies) are used to solve (at least partially) the problem itself – for example, by clearly defining it, seeking information, distinguish alternative possible responses, deciding for a course of action, planning what to do and taking direct action. They imply active behavioral and cognitive strategies. For example, if a student fails an exam, he / she begins to study for the next exam. Emotion-based or palliative strategies are used to manage personal emotions, to reduce distress. For the previous example, the student may cry or talk to someone close in the attempt to calm down.

The two types of coping complement each other. Doing something about solving the problem reduces distress, and emotional regulation makes it easier to decide what to do next. On the other hand, excessive avoidance of problems may block or delay necessary action; some strategies may perturb each other (Carver & Conner-Smith, 2010; Bruchon-Schweitzer, 2001).

Parker and Endler (1992) proposed an alternative model, distinguishing three coping styles. Besides task-oriented coping and emotion-oriented coping, they added the avoidant strategies (avoiding the problems and the associated emotions by engaging in distracting activities, such as watching movies or shopping). Avoidant strategies are passive ones, implying ignoring the problems, giving up the fight.

But maybe the best solution was that of C. Carver and his associates; they proposed a four-factor structure, confirmed by many authors afterwards (Carver, Scheier & Weintraub, 1989; Crașovan & Sava, 2013): problem focused coping, emotion focused coping, searching for social support way of coping, and avoidant coping.

The time frame of coping was also considered. Authors like Pearling and Schooler speak of preventive mechanisms used in the anticipation of a stressful event and mechanism used after the actual event (Miclea, 1997). Schwarzer and Knoll (2003) proposed the terms reactive coping for reactions to present stressors. For future events, they speak of anticipatory coping, if events are certain

to happen, and preventing coping, if the future situation is uncertain. In addition, they proposed the concept of proactive coping – coping oriented towards personal growth, the habit of perceiving stress as eustress, as a mobilizing factor (Schwarzer & Knoll, 2003).

Other authors classify coping strategies according to their functional efficiency in managing stress (Miclea, 1997).

Functional or adaptive strategies (for example, planning, positive reevaluation, problem solving, reflection on what could be done, seeking social support, the use of relaxation techniques) are associated with positive outcomes (finding solutions, overcoming the situation, managing emotions), thus preventing or reducing stress. They are reasonable and healthy coping attempts.

Dysfunctional or maladaptive coping includes strategies such as task avoidance, self-blaming, rumination, withdrawn, drinking and so on. They are ineffective strategies, do not solve the problem, and can even worsen it on the long term, leading to anxiety. We said on the long term because, on the short term, they can be adaptive. Avoidance, for example, a coping mechanism used frequently by many people confronted with stress, can help manage intense stress, but prevents taking action on the long term.

Some coping strategies are efficient in some contexts and inadequate in others (Baqtayan, 2015). For example, you can avoid a visit to an unpleasant relative, but you cannot avoid work tasks.

Coping mechanisms are mainly conscious (and thus partly controllable), opposing somehow the so-called defensive mechanisms, that are mainly unconscious (and thus uncontrollable). Defensive mechanism is a term proposed by psychoanalysts to refer to Self's failure to cope with stress. Initially considered pathological reactions, defensive mechanisms were later described as having a potential to help the person adapt. Not all of them – some are truly ineffective (for example, denial of the objective reality, or repression – the holdback in the unconscious of traumatic memories). But others, such as constructive humor, anticipating and sublimation are considered mature, adaptive, and at least partly conscious. That is why some defensive mechanisms described by psychoanalysts are also analyzed as coping mechanisms by other authors. Although differences exist, nevertheless; defensive mechanisms are ...defensive, totally unconscious, and employed always post-event. Coping strategies (a concept proposed by cognitivists) are conscious (they have a goal – positive adaptation), and are employed both pre and post event. Coping is defined as a set of conscient efforts to control or tolerate requests that overwhelm our resources (Miclea, 1997).

The border between automatic (nonvoluntary) coping attempts and voluntary, purpose-oriented reactions is not so strict, as unconscious coping attempts can, in time, become conscious (Carver & Connor-Smith, 2010).

Another classification of coping strategies refers to the nature of the reactions. Garnefski and colleagues, for example, focused on the so-called cognitive-emotional coping strategies (Garnefski et. al., 2001). In general, four types of responses can be described: behavioral coping, cognitive coping, emotional coping and biochemical coping (changes in our hormones/ secretory glands) (Miclea, 1997).

Charles Carver's view on coping

In our paper we used a questionnaire proposed by C. Carver, as we will detail in the methodological part – a questionnaire assessing cognitive, emotional and cognitive dimensions of coping. Carver has a somehow unique view on coping, that we agree with.

To start with, let us say that Charles Carver (1947-2019) was a Professor of Psychology at the University of Miami (*Charles Carver's official page*, University of Miami). Carver was interested much in the way people try to deal with difficult or stressful life situations (particularly health crises) and self-regulation processes (coping reactions; goal-setting; self-criticism).

He was interested both in coping as a trait (what people generally do and feel when they experience stress) and in coping as a specific response used in a particular situation / period of time.

When analyzing scores on the COPE questionnaire, he said, we must first look at each scale separately, and then see its relation to other variables, plus the pattern of strategies one person uses (we could hardly find a dominant coping style of a given person; strategies are used in clusters). If we want, he said, we may use second-order factors generated from the scales (he proposed a version with four factors, as mentioned above in this article, but maintained that on different samples we may find different factors, different combinations of scales may be appropriate for our purpose).

Carver did not agree with the tendency of many researchers to classify coping strategies as either adaptive or maladaptive. He argued that although theoretically some coping strategies are expected to be functional, while other dysfunctional, not all coping efforts yield good outcomes; it depends on the circumstances. For example, the strategy of active coping or problem-solving is a constructive one, as it implies reflection on the possible solutions, planning the necessary steps and so on; but what if the stressful situation is uncontrollable? What would then be the best coping solution? Another example would be mental and/or behavioral disengagement (for example, the person engages in alternative activities like sports or daydreaming); this strategy is usually considered maladaptive, as it does not imply any attempt to confront the stressor. But, on the short term, it offers a relief and helps the person to regulate emotions – so, the strategy is somehow functional. Chronic and uncontrollable stress may lead the person to use maladaptive coping, which is, although, perceived as functional adaptation.

Another pertinent remark that Carver made was that ‘people engage in a wide range of coping during a given period, including both of each pair of opposites’ (*Charles Carver's official page*, University of Miami). Carver spoke of (and included in his questionnaires) some pairs of polar-opposite tendencies. For example, denial and acceptance, active coping and behavioral disengagement and suppression of competing activities and mental disengagement. They are indeed antithetical, but are not mutually exclusive; is not uncommon for people to oscillate between antithetical tendencies. The COPE Inventory assesses a broad range of coping responses, including those pairs of opposites – but each scale is written as unipolar, Carver arguing that the absence of one tendency does not imply the presence of its opposite.

Variables associated with the use of coping strategies

The coping strategy a person uses in a situation depends both on the actual situation and on his/her individual characteristics.

Relevant for coping are many psychological traits, as coping mechanisms are grounded in our personality structure. Our inner structure, including enduring dispositions to behave in certain ways, makes us favor, choose certain mechanisms. Traits such as low neuroticism / anxiety, optimism, self-efficacy, self-confidence, self-determination, constructive motivation and so on favor successful coping. Resilience, the ability to manage and overcome problems in an adaptive manner, is a key resource, a protective factor in front of stress (Ma, 2024).

Cognitive abilities such as efficient planning or cognitive flexibility (the ability to rapidly adjust to changes) are also important. Positive behavioral routines, an equilibrate life style versus a stressful life-style, goal setting, time organizing and self-regulation abilities, all contribute to coping.

Previous experience in managing stress also has its role, as people acquire competencies to cope. Perceived efficiency of the coping mechanism used in the past, based on internal or external feedback, favors current adjustment. A strategy that reduced stress in the past is perceived as efficient and is more likely to be used again in the future.

Psychosocial factors have their own contribution. Perceived social support, positive interpersonal relations, the existence of social models of successful coping, favor efficient coping. On the contrary, the lack of instrumental and emotional support in the family can lead a person to avoid seeking support from others.

Besides psychosocial, psychological and behavioral characteristics, biological variables play their role in coping preferences. We will discuss here the influence of sex, age and blood type.

Sex and coping

Some studies argue that women prefer emotional coping and avoidant coping strategies, whereas men prefer active, problem-focused coping (Graves, Hall, Dias-Karch, Haischer, Apter, 2021).

Possible differences in coping preferences between men and women were investigated by I. Topuzova and colleagues. They have applied the Bulgarian adaptation of the COPE questionnaire, proposed by Carver and his colleagues (1989), on a sample of 161 individuals (32% men and 68% women). Using the independent sample t-test on raw scores, they found that women, compared to men, obtained significantly higher scores on the social, emotional and avoidant coping scales: use of instrumental social support ($p=.054$), use of emotional social support ($p\leq.001$), focus on and venting of emotions ($p\leq.001$) and behavioral disengagement ($p=.013$). Slightly higher scores were also obtained on the mental disengagement scale ($p=.109$), religious coping ($p=.053$), substance use ($p=.096$), acceptance ($p=.222$) and restraint ($p=.214$). Denial of the situation was low in both groups, with no difference. Men, in return, scored higher on the active, problem-focused coping scales: active coping ($p=.031$), planning ($p=.158$), suppression of competing activities ($p=.008$), and also on positive reinterpretation and growth scale ($p=.524$) (Topuzova, 2024).

Age and coping

In the study of I. Topuzova and colleagues (Topuzova, 2024), age was also considered in relation to coping style measured by COPE. The age of the participants was considered as a categorical variable, resulting four age categories: under 30 years (42 persons); 31-40 years (49 persons), 41-50 years (51 persons), over 50 years (19 persons). Using the Anova statistical procedure, the most pronounced differences were observed on three of the scales: behavioral disengagement ($p<.001$, with the highest values in the 41-50 years group), positive reinterpretation and growth ($p<.001$, with the highest values observed in respondents under 30 years of age) and focus on and venting of emotions ($p<.01$, with the highest values obtained by those over 50 years old).

In a similar study, conducted also in Bulgaria, Miteva and colleagues analyzed generational differences in coping preferences (Miteva, Stoyanova & Damyanova-Andreeva, 2024).

They have used a sample of 688 persons (77.8% women and 22.2% men), with ages varying between 18 to 75 years ($M=33.9$ years, $S.D.=13.9$ years). Age was also treated as a categorical variable, differentiating between four generations: Generation Z (313 respondents 18-26 years old); Generation

Y (143 respondents 27-41 years old); Generation X (186 respondents 42-56 years old) and the “paper generation” or baby boomers (46 respondents 57-75 years old). They have used the BEFO26 questionnaire, proposed by Heim, Augustiny, Blaser and Schaffner (1991), which assesses adaptive, relatively adaptive as well as maladaptive coping strategies, such as: problem analysis, making meaning, resetting one's values and maintaining self-control (all cognitive coping strategies); optimism and dilution of emotions/emotional relief (all forms of emotional coping); seeking advice and cooperation (a form of behavioral coping). They found some generational differences in preferences for dealing with stress (although the effect size was especially small). Thus, generation Z (the youngest group) scored higher than other groups on dilution of emotions/emotional relief, withdrawal/social withdrawal and making meaning and resetting one's value. Generation Y seemed to show a preference for problem analysis; this group also showed some preference for resetting one's value, optimism and seeking advice. Generation X preferred, according to this study, seeking advice, optimism, making meaning and maintaining self-control. Maintaining self-control is a strategy significantly more preferred by the oldest age group (the so-called baby boomers).

ABO blood type, Rh and coping

The hematologic ABO system is considered here because of its involvement in the biochemical response to stress, and also because of its link with personality differences.

The ABO system is the first immunological sanguine system to be discovered (by Karl Landsteiner, in 1901) and, also, the most important of all. Based on a particular distribution of the antigens (agglutinogens A and B) and antibodies (agglutinins α or α , and β or β - the homologues of antigens A and B, respectively) found on the red blood cells membrane/ in the blood plasma, it allows for the differentiation of four phenotypes (four possible combinations that can be detected through serological tests) – the four blood groups of the ABO system (Isvoranu et al., 1989). Those are: O (also known as 0 – zero, as it has no antigens, only antibodies α and β); A (A antigen, β antibody); B (B antigen, α antibody); AB (A and B antigens, no antibodies).

The ABO blood system is controlled by genes (more specifically, genes situated on the q arm of the chromosome 9) – as all blood systems.

It is argued that the classical ABO system is the most clinically important of all the approximately 30 established blood group systems (Yadav, Sankhla, Gaur, & Gupta, 2016).

Many have noted this serological diversity, as well as (for the ABO system) the difference between the phenotype and the genotype and the existence of numerous alleles for antigens A and B; this creates a lot of variation in the blood characteristics, a fact having medical and psychological correlates (Beliş et al., 1992, p. 172).

The Rhesus or Rh blood group was also considered because it is another important erythrocytic blood system. Specific for this system is a cluster of three genetically determined antigens (D, C, E), located on the same chromosome and transmitted together – that is why the Rh system is often denoted as “D”. Persons having the D antigen are called Rh-positive, while those that do not have this factor are called Rh-negative. The prevalence of the Rh-negative type is estimated at 15-17% for the white population and at lower percentages for Asia and Africa (*General data about blood groups*, n.d.).

The ABO blood type distribution is not uniform, but varies across regions and countries. In Asia, for example, the prevalence of the rare groups (B, AB) nearly doubles that from Europe.

In Romania, the ABO statistical distribution is estimated as follows: 34% of the general population is type O; 41% type A; 19% type B; 6% type AB (*General data about blood groups*, n.d.).

For Bulgaria, we have found two data sources. According to a research from 2015, the distribution is: 32.2% type O; 44.2% type A; 15.4% type B and 8.2% type AB (Dekov, Ivanov, Ivanova, Deyanov 2015). Similar percentages were obtained by Atanassova and colleagues in a more recent study, using data from the University Hospital “Saint Anna”, Sofia, Bulgaria. The dataset included 47562 Bulgarians, that were patients of that hospital anywhere between 1 January 2015 and 31 December 2021. The distribution obtained for the ABO system is: 31.87% type O; 43.66% type A; 16.36% type B and 8.11% type AB. Considering also A_1 and A_2 subtypes of A alleles, they found 91.92% A_1 and 8.09% A_2 (in the A group) and 88.52% A_1B and 11.48% A_2B (in the AB group). They have also determined the prevalence of Rh(D) antigen as being 86.38% (Atanassova, Andreev & Dimitriev, 2022).

The association between ABO blood type and a variety of disorders (such as myocardial infarction, rheumatic diseases, duodenal ulcer, tumors of the salivary glands, and some forms of cancer - such as gastric cancer) was extensively studied (Neumann, Arbogast, Chi, & Arbogast, 1992). It was found, for example, that myocardial infarction occurs with a higher rate in blood type A, whereas patients with duodenal ulcer are more likely to be blood type O.

The ABO blood type also links with stress response, as it relates to cortisol production. And not only that; it relates to neurotransmitters' production and metabolism, and thus is related to our mood and our behavior. Even more, the ABO type, as well as other serological systems, all genetically determined, can be linked with personality – because a major proportion in personality variation is genetic (and this holds especially for temperamental traits such as Extraversion or Neuroticism).

The scientific link personality / temperament and blood groups has first been made by Japanese researcher Kimata Hara, 15 years after the ABO system was discovered. Takeji Furukawa (1927), Masahiko Nomi (1971, 1988) and others (and not only Japanese – the famous English psychiatrist and psychologist Hans J. Eysenck was interested in the topic) continued this line of research (see Eysenck, 1982). Masayuki Kanazawa summarized the findings in an interesting typology, that resembles the classical Hippocratic temperament typology (Kanazawa, 2020). Broadly speaking, the *O type* corresponds to the phlegmatic, the *A type* to the melancholic, the *B type* to the sanguine and the *AB type* to the choleric. We must also say that while findings for blood types O and A were fairly consistent across studies, results for the rare groups (B and AB), usually poorly represented in the study samples, were mainly contrasting.

We will now analyze the way ABO blood type also links with stress response. This response can be measured by variations in cortisol (the so-called stress hormone) and catecholamines. Stress increases body's level of cortisol.

The gene controlling blood type also controls things like cortisol level and other processes related with the activity of the nervous system. People with type blood A tend to have more cortisol, so they are somehow prone to stress and worst at coping with stress; stress increases even more their existing cortisol level. That is why they tend to over-respond to even minor events. This is one of the reasons why blood group A has a higher rate of high blood pressure, heart attack, but also the highest rate of obsessive-compulsive neurosis. High levels of cortisol cause fatigue, exhaustion and depression. There are studies that show that, compared to blood phenotype O, blood phenotype A has higher levels of depression, anger, anxiety and score higher on the personality dimensions (such as neuroticism) hindering the development of such symptomology. Another interesting fact is that blood types B and AB can produce nitric oxide faster than the other blood types (the nitric oxide acts as a

neuromodulator in the brain, one of its roles being to inhibit the production of cortisol); this biological fact fastens their recovery from stressful situations (Yadav, Sankhla, Gaur, & Gupta, 2016).

In a research conducted in 1992, Neumann and colleagues studied the relation between perceived stress, blood type, the cortisol level and the VLDL toxicity preventing activity (Neumann, Arbogast, Chi, & Arbogast, 1992).

The authors included in the study only two blood groups, O and A, contrasting them (O vs. A). They had a total number of 25 participants, 15 with blood type A and 10 with blood type O. Participants were all white men, veterans from the local East Tennessee community, with ages varying between 46 to 72 years. The measurements were made after the last blood drawing. The participants assessed their perceived (subjective) stress level. Two biological parameters were measured: plasma cortisol and toxicity-preventing activity (a serum protein that protects against the toxic effects of VLDL – very low-density lipoproteins, a type of bad cholesterol). Significant differences were found between type O and type A participants. Subjective stress was higher in type A. Overall, stress decreased toxicity-preventing activity and increased plasma cortisol. Stress response differed between considered categories: in blood type A participants were found higher cortisol levels and also higher toxicity-preventing activity values than in type O's.

Other psychological characteristics related to perceived stress may be linked with the ABO blood type. Findings in the literature regarding the association between stress and coping at one hand and ABO type on the other hand are, nevertheless, pretty contradictory.

Yadav and colleagues conducted a cross-sectional, observational study on 226 first-year medical students. They investigated the association between blood types and psychological wellness (wellbeing) dimensions (Yadav, Sankhla, Gaur, & Gupta, 2016). The distribution of the blood types in their sample was: 39.38% type B; 27.88% type O; 25.66% type A; 7.08% type AB. For measuring wellbeing, the authors used a mini-screening psychological instrument (MMS) assessing mood disorders, anxiety disorders and psychotic disorders. Results on the screening test were treated as categorical variables (no problem / borderline zone / disorder), and thus Chi-square statistical analysis was performed to test correlations with blood types. Although some differences were observed (for example, the B type had lower percentages than the other types in the borderline and disorder-indicating zones), they were small, and the low statistical power of nonparametric tests showed no significant effect.

In a similar study conducted also on students – a sample of 315 students (181 women and 134 men) from the Lorestan University of Medical Sciences, Romiani and colleagues measured, using the DASS-21 questionnaire, three dimensions: anxiety, depression and stress. They have correlated those dimensions with the blood types of the participants (the ABO distribution in their sample was: 34% type O, 31.4% type A, 24.1% type B, 10.5% type AB), using multivariate analysis procedures. They did not find any significant differences between blood types on the above-mentioned dimensions (Romiani, Mikhak-Beyranvand & Farhady, 2022).

But in a previous study conducted in Korea at the *Korea Research Institute of Jungshin Science*, some meaningful associations between blood type and stress resistance were found (Kim & Yi, 2011). The sample they have used consisted of 4636 people (aged 20-59 years), 3221 women and 1415 men, tested between September 2006 and December 2009. The most prevalent blood type was A, followed (in descending order) by B, O and AB. The procedure they have used was to measure the brain waves of the participants (brain waves were sequentially measured from the frontal lobe), perform a fast-Fourier-transformation and subsequent analysis on the data and then diagnosing parameters of the

health condition of the human body; for this purpose, they have used a health diagnosis apparatus and method patented in Korea (*Apparatus and Method of Diagnosing Health Using Cumulative Data Pattern Analysis Via Fast Fourier Transformation*, 2006). The researchers found that type O had the highest score both in stress awareness and in stress resistance, results indicating a better ability to reduce stress.

2. MATERIALS AND METHODS

The *objectives* of our study were to assess the coping strategies that people use and to examine possible associations between the preference for specific strategies and a number of biological variables: sex; age; ABO blood type and Rh. Our general hypothesis is that people would prefer different coping strategies depending on those biological traits. We were also interested in the coping response patterns.

Measure

The test we have used to assess the different strategies people use to respond to stressful events is The *Coping Orientation to Problems Experienced Inventory* (COPE Inventory). It does not measure neither stress level, nor stress adaptability degree, but the way people try to adjust, to cope with problematic situations.

This self-report questionnaire was developed by American psychologist Charles Carver and his associates M. F. Scheier and J. K. Weintraub and is a well-known instrument for assessing coping (Carver, Scheier & Weintraub, 1989 / PsycTests Database Record – APA PsycTests 2020).

It was translated and adapted for the *Bulgarian* population by A. Rusinova-Hristova and G. Karastoyanov (2000) and for the *Romanian* population by Dănuț I. Crașovan and Florin A. Sava (2013).

The COPE questionnaire includes 60 items.

Each item refers to a particular way of coping. Each item must be assessed on a four-points Likert agreement scale, indicating the extent (in terms of how much or how frequently) of using that way of coping (1=I usually don't do this at all; 2=I usually do this a little bit; 3=I usually do this a medium amount; 4=I usually do this a lot). Thus, a low score indicates a low tendency to use the specific strategy described by the item, whereas a high score indicates a preference for that strategy.

Respondents are asked to indicate what they usually feel and do when they experience a stressful event, items being worded to assess people's general tendency, dispositional coping (not situational coping). Thus, we have used the trait version of the COPE Inventory.

Items are grouped into 15 scales (each scale having four items), thus identifying 15 coping strategies. Those are:

1. *Active coping* refers to taking concrete actions to cope with the situation (item example: "I take direct action to get around the problem");
2. *Suppression of competing activities* refers to suppression one's attention to other activities, in order to focus on the present problem (item example: "I put aside other activities in order to concentrate on this");
3. *Planning* refers to thinking what to do next, what steps to take (item example: "I try to come up with a strategy about what to do");
4. *Positive reinterpretation and growth* scale refers to the tendency to see something positive in the problematic situation, positive reframing, seeing an opportunity of growth (item example: "I try to see it in a different light, to make it seem more positive");

5. *Restraint from action* refers to the tendency to hold back and wait until the circumstances for action are favorable (item example: "I hold off doing anything about it until the situation permits");
6. *Acceptance* refers to simply accepting that the event is real, that it has occurred and that, for the moment at least, there is nothing one can do (item example: "I accept that this has happened and that it can't be changed");
7. *Religious coping* refers to the tendency to engage in religious activities as a form of coping (item example: "I pray more than usual");
8. *Focus on and venting of emotions* refers to the tendency to concentrate on and to express negative emotions (item example: "I let my feelings out");
9. *Use of instrumental social support* refers to searching instrumental support from others (information, assistance, help) (item example: "I try to get advice from someone about what to do");
10. *Use of emotional social support* refers to seeking sympathy, understanding, compassion from someone (item example: "I try to get emotional support from friends or relatives");
11. *Denial* refers to rejecting the reality of the problem (item example: "I pretend that it hasn't really happened");
12. *Mental disengagement* refers to doing something else (watching movies, visiting friends, sleeping) in order to distract oneself (item example: "I daydream about things other than this");
13. *Behavioral disengagement* refers to giving up, withdrawing from action (item example: "I give up the attempt to get what I want");
14. *Humor* refers to making jokes about the situation (item example: "I make jokes about it");
15. *Substance use* refers to alcohol or other drug use in a stressful situation (item example: "I try to lose myself for a while by drinking alcohol or taking drugs").

We must say that the two last-mentioned scales were not included in the initial version of COPE, being added later to the test.

The 15 scales can be grouped into four main dimensions: problem-focused coping (scales from 1 to 3); emotion-focused coping (scales from 4 to 7); social support coping (scales from 8 to 10); avoidant coping (scales from 11 to 13). This factor structure emerged by factor analysis statistical procedures. The *Humor* scale is usually analyzed separately (although some consider it a emotion-focused strategy). This is also the case for the *Substance use* scale, included by some in the avoidant dimension.

Many authors prefer to analyze scores on this higher, factorial, level.

As for the questionnaire's psychometric properties, the American authors have also reported acceptably high values for Alpha Cronbach's reliability (the coefficient varying from .62 to .92 for the different scales) and cited proofs for COPE's convergent and discriminant validity (Carver, Scheier & Weintraub, 1989). Similar data were reported for the Romania version of COPE. Internal consistency coefficients ranged between .48 and .92, with an average value of .70 (Crașovan & Sava, 2013).

Participants

We had a total of 265 respondents, 85 from Bulgaria and 180 from Romania. Our sample was a convenience one; respondents were our students or relatives / friends of those who agreed to participate in this study.

We have analyzed the distribution of the biological variables considered.

For the total sample, 62 were men (23%) and 203 (77%) women. The Bulgarian sample included 34 men (40%) and 51 women (60%). The Romanian sample included 28 men (16%) and 152 women (84%). We note that more than half of the men in our sample came from the Bulgarian subsample. Data were collected mainly from Psychology students (mostly, women), for Romania, and for Bulgaria, mainly from Sports students (mostly, men); the difference can thus be easily explained.

For the whole sample (valid N=263), age had a mean of 32.08, with SD=13.56 (minimum 18 years, maximum 83 years). Participants from Bulgaria had ages varying from 18 to 48 years old (m=22.04, SD=5.49, with high positive asymmetry and high, positive kurtosis); most of the respondents were 20-25 years old. In contrast, the Romanian sample had an approximately uniform distribution in the range of 20-60 years (minimum=18, maximum=83, m=36.88, SD=13.64); most of the respondents were adults. The age difference between our subsamples is explained by a concrete fact: while in Bulgaria most of the young people know their ABO type and Rh, in Romania the opposite is true! So, in Romania we have asked our older students and their older relatives to complete the test.

The ABO type distribution for the entire sample was: 90 blood type O (34%), 113 blood type A (43%), 42 blood type B (16%) and 20 blood type AB (7%). The distribution for Bulgaria (total N=85) was: 33 blood type O (39%), 32 blood type A (38%), 13 blood type B (15.5%) and 7 blood type AB (7.5%). The distribution for Romania (total N=180) was: 57 blood type O (32%), 81 blood type A (45%), 29 blood type B (16%) and 13 blood type AB (7%).

Regarding the Rh type distribution for the entire sample, we have obtained: 173 (65%) had positive Rh, 54 (20%) had negative Rh and 38 of the respondents (15%) did not know their Rh. The distribution for Bulgaria was: 63 (74%) positive Rh, 17 (20%) negative Rh, 5 (6%) people did not know their Rh. The distribution for Romania was: 110 (61%) positive Rh, 37 (21%) negative Rh, 33 (18%) people did not know their Rh.

The distribution of the ABO type among men (N=62) was: 23 (37%) type O, 24 (39%) type A, 10 (16%) type B, 5 (8%) type AB. For the women (N=203), the distribution was: 67 (33%) type O, 89 (44%) type A, 32 (16%) type B, 15 (7%) type AB. As for Rh factor, among men (N=62) we found 40 (65%) positive Rh, 12 (19%) negative Rh and 10 (16%) do not know their Rh. For women (N=203), 133 (65%) positive Rh, 42 (21%) negative Rh (a high percent, as this category is estimated at 15-20% in the general population) and 28 (14%) do not know their Rh. The crosstabulation for sex and Rh/ABO shows, for some categories, pretty small sample sizes – a fact that had an impact on the data analysis.

The process of data collection

We have administered the questionnaire in the spring of 2025, more precisely, data collection ranged from 5 of March to 15 of April for Bulgaria and from 19 February to 6 of April for Romania.

We have applied the questionnaire both in the classical paper-and-pencil form and in *Google forms*. For the Bulgarian sample, the participants filled in the COPE only in *Google forms* format. For the Romanian sample, it was convenient to collect them in both forms (we had 118 completed in *Google*

forms and 62 in the classical format; the older participants, for example, completed the COPE in the classical format).

3. RESULTS AND DISCUSSIONS

Statistical procedures

In our study we have analyzed scores both on the scale level and on the factor level. For the last purpose, we have used the initial factor structure proposed by Carver et al (1989).

When computing the scale scores, we have chosen the method used by Craşovan & Sava (2013) – that is, compute the score on a particular scale as an unweighted mean (not as a sum) of the included items. On each scale the score could thus vary between 1 to 4.

Data were analyzed using version 23 of the SPSS software.

As we have noted, the Bulgarian and the Romanian samples differed upon the measured biological variables (in the Bulgarian sample we had many young men; in the Romanian sample we had many adults and a lot of women – many of them with A blood type and/or negative Rh), but we have analyzed data as a whole. The differences found on COPE between the Romanian and the Bulgarian samples were due not to the ethnicity factor, but to those demographical and / or biological differences between our samples.

The format of the administered questionnaires did not create a significant difference in the COPE responses; the small differences found can be attributed to the subsample characteristics (i.e., most of the oldest respondents completed the test in paper-and-pencil format).

Results on *The COPE Inventory*

We have analyzed first the descriptive results for each of the COPE's scales and for the factors, also. The table below presents the minimum, the maximum, the mean and the standard deviation for each (valid N=265).

Table 1. Descriptives results on COPE

	Minimum	Maximum	M	SD
<i>Problem focused</i>	1.58	4	2.90	.51
active coping	1.50	4	3.01	.55
suppression of competing activities	1.25	4	3.16	.63
planning	1	4	2.52	.61
<i>Emotion focused</i>	1.38	3.94	2.75	.48
positive reinterpretation	1.25	4	3.23	.58
restraint	1.25	4	2.51	.53
acceptance	1	4	2.73	.66
religious coping	1	4	2.52	1.03
<i>Social support focused</i>	1.17	4	2.62	.60
venting of emotions	1	4	2.38	.70
instrumental social support	1	4	2.71	.80
emotional social support	1	4	2.77	.68
<i>Avoidant coping</i>	1	3	1.81	.40
denial	1	3	1.59	.50
mental disengagement	1	4	2.25	.60
behavioral disengagement	1	3.5	1.59	.52
<i>Humor</i>	1	4	2.08	.86
<i>Substance use</i>	1	4	1.14	.45

We can see from this table what are the predominant coping strategies (for the entire sample): positive reinterpretation ($M=3.23$), planning ($M=3.16$), active coping ($M=3.01$). Also preferred are: instrumental social support ($M=2.77$), emotional social support ($M=2.71$) and acceptance ($M=2.73$). The strategies less preferred were denial ($M=1.59$), behavioral disengagement ($M=1.59$) and substance use ($M=1.14$). The distributions were approximately normal for almost all scales (allowing afterwards for parametric inferential procedures); an exception was the substance use scale, where scores had a pretty pronounced positive asymmetry.

We have noted that, for most of the subjects, there was not a dominant, unique strategy. More than that, scores on different strategies correlated with each other, indicating a clustering tendency. We have analyzed separately the main coping dimensions (*note*: all correlations mentioned here are significant at .001 or .01 level).

Regarding the scales of the problem-focused dimension, we note:

- as predicted, active coping correlates strongly with planning ($r=.74$) and with suppression of competing activities ($r=.51$). Suppression of competing activities correlates moderately with planning ($r=.53$);
- also, we find correlations with positive reinterpretation (for active coping $r=.62$, for planning $r=.61$, for suppression of other activities $r=.39$);
- suppression of competing activities, planning and active coping correlate with restraint ($r=.40$, $.39$ and $.39$ respectively);
- all three scales correlate with acceptance (for active coping $r=.36$, for suppression of competing activities $r=.33$ and for planning $r=.32$);
- planning and instrumental social support correlate ($r=.37$).

Regarding the scales of the emotion-focused dimension, the analysis reveals:

- positive reinterpretation correlates with restraint ($r=.38$), acceptance ($r=.38$) and religious coping ($r=.24$). The correlation between acceptance and restraint is $r=.42$;
- positive reinterpretation also correlates with many scales, the highest correlation being with active coping ($r=.62$) and planning ($r=.61$);
- religious coping correlates (weak correlation) both with planning ($r=.25$), active coping ($r=.24$) and venting of emotions ($r=.23$).

For the scales of the *social support seeking* dimension, the analysis reveals:

- emotional social support correlates with instrumental social support ($r=.76$) and venting of emotions ($r=.42$). Venting correlates with instrumental social support ($r=.34$);
- instrumental social support correlates with positive reinterpretation ($r=.40$), planning and active coping (both $r=.37$);
- venting of emotions correlates with mental disengagement (highest correlation for this scale, $r=.48$), and also with behavioral disengagement, but this correlation is smaller ($r=.29$).

The scales of the *avoidant coping* dimension (referring to avoiding the problem and / or the associated emotions) also correlate between them and with many other scales:

- denial correlates highest with behavioral disengagement ($r=.33$) and mental disengagement ($r=.32$). Mental disengagement correlates highest with behavioral disengagement, as expected ($r=.36$);
- denial correlates also with humor ($r=.24$), venting of emotions ($r=.20$), and negatively with planning ($r=-.19$) (but the correlations are small);

- as we have said above, both mental disengagement and behavioral disengagement correlate with venting of emotions ($r=.48$ and $r=.29$, respectively).

Humor correlates with acceptance ($r=.28$), mental disengagement ($r=.26$), denial ($r=.24$) and positive reinterpretation ($r=.24$). *Substance use* correlates directly with behavioral disengagement ($r=.18$) and negatively with positive reinterpretation ($r=-.23$), active coping ($r=-.22$), planning ($r=-.22$) and religious coping ($r=-0.16$).

As expected, the factors also correlate significantly with each other. Problem focused coping correlates with emotion focused coping ($r=.60$) and social coping ($r=.28$), but not with avoidant coping ($r=-.084$, $p=.172$). Emotion focused coping correlates with social focused coping ($r=.38$). Avoidant coping correlates with social support seeking coping ($r=.29$) and with emotion focused coping (but this is a very small correlation, $r=.12$, $p=.057$).

Coping preferences depending on the sex of the participants

The differences between men and women regarding their coping preferences were analyzed using the independent samples t-test. The table below presents means for both groups, as well as the values for the test statistics and the significance level.

Table 2. Coping preferences – differences between men and women

	Mean scores		Mean difference	t	p
	men (N=62)	women (N=203)			
<i>Problem focused</i>	2.77	2.94	-.17	-2.27	.024
active coping	2.88	3.05	-.17	-2.18	.030
suppression of competing activities	2.44	2.5	-.11	-1.18	.238
planning	2.99	3.21	-.22	-2.46	.015
<i>Emotion focused</i>	2.60	2.79	-.19	-2.89	.004
positive reinterpretation	3.11	3.27	-.16	-1.92	.056
restraint	2.42	2.54	-.12	-1.55	.123
acceptance	2.63	2.76	-.13	-1.41	.160
religious coping	2.23	2.61	-.38	-2.53	.012
<i>Social support focused</i>	2.32	2.71	-.39	-4.76	.000
venting of emotions	1.96	2.51	-.55	-5.70	.000
instrumental social support	2.59	2.82	-.23	-2.33	.021
emotional social support	2.39	2.81	-.42	-3.67	.000
<i>Avoidant coping</i>	1.76	1.83	-.07	-1.21	.227
denial	1.60	1.59	.01	.18	.855
mental disengagement	2.17	2.28	-.11	-1.31	.192
behavioral disengagement	1.51	1.62	-.11	-1.51	.133
<i>Humor</i>	2.17	2.05	.12	.98	.330
<i>Substance use</i>	1.24	1.11	.13	1.67	.099

We can note some differences between the two groups. Women obtained significantly higher scores ($p<.05$) on the following scales: active coping and planning (and problem-focused coping in general), religious coping (and emotion-focused coping in general), venting of emotions, instrumental social support and emotional social support (and social support coping in general). Differences varied between .2-.3 points, even .5 points (the eta-squared size effect coefficients are, nevertheless, small).

Women, in general, tend to make more use of coping strategies – or, at least, to declare so! (an exception being for the humor and substance use scales).

Coping preferences depending on the age of the participants

The age of our respondents was treated as a continuous variable. To test its association with coping preferences, we have used the Pearson correlation. Results are shown in table 3.

Table 3. Correlations between age and the use of coping strategies

	Correlations with age (N=263)	
	r	p
<i>Problem focused</i>	.27**	.000
active coping	.28**	.000
suppression of competing activities	.12	.055
planning	.30**	.000
<i>Emotion focused</i>	.28**	.000
positive reinterpretation	.11	.073
restraint	.10	.114
acceptance	.08	.197
religious coping	.35**	.000
<i>Social support focused</i>	-.10	.000
venting of emotions	-.08	.187
instrumental social support	-.03	.692
emotional social support	-.12*	.046
<i>Avoidant coping</i>	-.17**	.000
denial	-.04	.480
mental disengagement	-.21**	.001
behavioral disengagement	-.11	.082
<i>Humor</i>	-.05	.385
<i>Substance use</i>	-.19**	.002

We can notice many significant correlations. Age correlates directly with active coping ($r=.28$), planning ($r=.30$) and, in general, with problem focused coping ($r=.27$); as age increases, the tendency to use such strategies also increases. Positive correlations are also observed with religious coping ($r=.35$) and with the emotion focused coping ($r=.28$). Also, age correlates negatively with mental disengagement ($r=-.21$), with avoidant coping ($r=-.17$) and with substance abuse ($\rho=-.18$, $p=.003$; we have used the rank correlation because of the asymmetry of results on substance abuse scale).

ABO blood type and coping preferences

The association between the blood type and coping preferences was tested using univariate ANOVA. Table 4 presents the mean scores for each blood group and the results on the F tests.

Although some differences can be observed, they are generally small and nonsignificant. The only significant difference is for the social support seeking dimension – A type has the lowest score, and B type has the highest score. This difference is observed for all the subscales of the social support seeking factor.

Interesting observations can be made for the AB type, that has the highest scores for all scales belonging to the avoidant coping factor, for almost all scales belonging to the emotion-focused coping factor and also for the humor scale and the substance use scale.

Table 4. ABO blood type and coping preferences

	Mean scores				F	p
	O (N=90)	A (N=113)	B (N=42)	AB (N=20)		
<i>Problem focused</i>	2.85	2.92	2.94	2.91	.42	.742
active coping	2.96	3.03	3.06	3.05	.45	.715
suppression of competing activities	2.50	2.56	2.52	2.43	.38	.769
planning	3.10	3.17	3.23	3.25	.59	.619
<i>Emotion focused</i>	2.77	2.74	2.68	2.85	.60	.618
positive reinterpretation	3.26	3.24	3.15	3.23	.38	.766
restraint	2.50	2.50	2.54	2.61	.32	.808
acceptance	2.82	2.67	2.65	2.83	1.22	.301
religious coping	2.48	2.56	2.38	2.73	.63	.596
<i>Social support focused</i>	2.65	2.51	2.79	2.72	2.74	.044
venting of emotions	2.38	2.32	2.54	2.40	1.04	.376
instrumental social support	2.80	2.65	2.95	2.91	2.49	.061
emotional social support	2.78	2.56	2.89	2.85	2.44	.065
<i>Avoidant coping</i>	1.81	1.79	1.80	1.95	.92	.430
denial	1.57	1.60	1.56	1.66	.25	.859
mental disengagement	2.29	2.21	2.20	2.43	1.00	.395
behavioral disengagement	1.56	1.56	1.65	1.78	1.23	.299
<i>Humor</i>	2.16	1.97	2.06	2.40	1.83	.143
<i>Substance use</i>	1.16	1.14	1.05	1.25	1.07	.365

Rh and coping preferences

Some of our respondents not knowing their Rh, we have used here only the cases with known Rh (N=227). The differences in coping preferences depending on Rh were tested using the two independent samples t test. Results are presented in table 5.

Table 5. Rh and coping preferences

	Mean scores			t-test	
	positive Rh (N=173)	negative Rh (N=54)	Mean Difference	t	p
<i>Problem focused</i>	2.86	3.00	-.14	-1.68	.095
active coping	2.98	3.11	-.13	-1.50	.134
suppressing competing activities	2.49	2.67	-.18	-1.86	.064
planning	3.12	3.21	-.09	-.96	.338
<i>Emotion focused</i>	2.71	2.81	-.10	-1.28	.204
positive reinterpretation	3.20	3.30	-.10	-1.12	.265
restraint	2.48	2.57	-.09	-1.28	.203
acceptance	2.68	2.80	-.12	-1.23	.222
religious coping	2.48	2.55	-.07	-.38	.701
<i>Social support focused</i>	2.58	2.68	-.10	-1.08	.282
venting of emotions	2.37	2.30	.07	.69	.489
instrumental social support	2.71	2.92	-.21	-2.04	.042
emotional social support	2.67	2.82	-.15	-1.26	.208
<i>Avoidant coping</i>	1.79	1.82	-.03	-.46	.647
denial	1.57	1.64	-.07	-.89	.376
mental disengagement	2.22	2.26	-.04	-.44	.663
behavioral disengagement	1.58	1.56	.02	.31	.755
<i>Humor</i>	2.05	2.17	-.12	-.87	.385
<i>Substance use</i>	1.13	1.18	-.05	-.73	.464

We can notice that most of the mean differences are negative (or close to zero), that is, respondents with negative Rh tend to score higher on almost all of the scales (although the mean differences are small and, excepting a single scale – instrumental support seeking, nonsignificant). This is in part explained by the larger proportion of women among those with negative Rh, as we have already found that women tend to use more the coping strategies.

Interactions between factors

We have assumed that there may be a particular combination of biological variables that would create a difference in the preference for a coping strategy or another. To test this, we have used various combinations of factors and employed the bivariate ANOVA. Reported here are results for the big factors, not for the subscales of COPE.

Analyzing the blood type and the sex of the participants simultaneously, although no significant interaction emerged (even if the interaction was close to $p=.05$ for problem focused and emotion focused dimensions) and the effect size coefficients were small, some differences between means can be noticed (see Table 6). Thus, for both problem-based coping and emotion-based coping, men with AB type have the highest score and men with A type have the lowest score. For the social-based coping, women with B type have the highest score and men with A type have the lowest score. For the avoidant coping, women with AB type have the highest score and men with B type have the lowest score.

Table 6. Interactions between ABO type and sex: subgroup means

Blood type	sex	N	Mean			
			Problem focused	Emotion focused	Social support focused	Avoidant coping
O	men	23	2.71	2.62	2.38	1.79
	women	67	2.90	2.82	2.74	1.82
A	men	24	2.66	2.46	2.13	1.73
	women	89	2.99	2.82	2.61	1.81
B	men	10	2.97	2.70	2.55	1.70
	women	32	2.93	2.68	2.87	1.83
AB	men	5	3.17	2.96	2.43	1.87
	women	15	2.82	2.81	2.82	1.98

Two-way ANOVA for blood type and Rh considered simultaneously ($N=227$) also reveals no significant result, although the interaction effect was close to $p=.05$ for problem focused factor. We can, nevertheless, notice some differences between subgroups (see Table 7). We can note that B type with negative Rh has the highest score on the problem-focused dimension - and also on the scale positive reinterpretation. Participants with type B and positive Rh have the lowest score on emotion focused coping. Persons with negative AB have the highest mean score both for social coping and avoidant coping.

Bivariate ANOVA for Rh and sex of the participants considered simultaneously evidenced a significant interaction effect for the problem focused dimension ($F=5.60$, $p=.019$, $\eta^2=.025$). We can note (see Table 8) that women with negative Rh have the highest score for all coping dimensions. Men with negative Rh have the lowest score for problem-focused coping, whereas men with positive Rh have the lowest score for social-focused coping and also for avoidant coping.

Table 7. Interactions between ABO type and Rh: subgroup means

Blood type	RH	N	Mean			
			Problem focused	Emotion focused	Social support focused	Avoidant coping
O	positive	56	2.84	2.77	2.64	1.79
	negative	23	2.86	2.75	2.71	1.87
A	positive	78	2.89	2.70	2.47	1.77
	negative	20	3.02	2.83	2.55	1.75
B	positive	26	2.80	2.55	2.76	1.80
	negative	8	3.39	2.89	2.75	1.72
AB	positive	13	2.95	2.86	2.68	1.94
	negative	3	2.89	2.81	3.08	2.19

Table 8. Interactions between Rh and sex of the participants: subgroup means

sex	RH	N	Mean			
			Problem focused	Emotion focused	Social support focused	Avoidant coping
men	Positive	40	2.77	2.55	2.22	1.73
	Negative	12	2.56	2.56	2.40	1.78
women	Positive	133	2.89	2.76	2.69	1.81
	Negative	42	3.12	2.88	2.76	1.84

Discussion

ANOVA-type procedures revealed mainly main effects of factors, and not necessarily interaction effects – at least, no significant interaction effects, as some subgroup differences were clear (but we must keep in mind the small size of the compared subgroups).

Tree-factors ANOVA did not reveal an interaction sex * ABO * Rh, and the introduction of age as a covariate did not change the results for none of the performed ANOVA.

We will now discuss the main effect of the variables, as well as the (small) interaction effects.

The main effect of sex emerged clearly. Women tend to make more use of coping strategies! Or, at least, to declare so. This applies especially for active coping, planning, religious coping, venting of emotions, instrumental social support and emotional social support. Our results confirm partially the results obtained by I. Topuzova and colleagues (Topuzova, 2024); the Bulgarian authors, using the same COPE questionnaire, have found that women tend to score higher on many of the scales, especially the ones belonging to the social support coping, emotion-based coping and avoidant coping. Contrary to our results, in their sample, men had higher scores for all three scales from the problem-focused dimension.

The age of the respondents also seems to have relevance for the preference for certain coping strategies. In our sample, age (considered as a continuous, numerical variable) shows positive correlations with active coping, planning, religious coping and with the emotion focused coping and negative correlations with mental disengagement and with avoidant coping. We have found two studies conducted by Bulgarian authors, studies that linked age with coping preferences (Topuzova, 2024, and Miteva, 2024). Those studies considered age as a categorical variable and analyzed differences between age groups / generations; the results they have obtained are mixed. Some of their results are in line with ours – for example, the remark that older people use more emotion-focused coping.

The ABO blood group may have some relevance for the type of coping we prefer. We have found that type A has the lowest scores for social support focused coping, while type B has the highest scores here. The AB blood type tends to prefer emotion-based coping and avoidant coping. Some links may be made between our results and other studies about ABO-based personality differences. Such studies assert that the A blood type, because of the increased cortisol production, is more prone to stress and has a higher Neuroticism (a basic personality trait indicating the predisposition to experience negative affects). If this is true, we may wonder why they avoid to seek social support in times of stress (as we have found in our study). Coping styles have roots in our personality structure. It may be that A type's higher Neuroticism leads those people to avoid appealing to others for support. Another finding of our study was that people with negative Rh tend to have higher scores on many coping scales, especially for instrumental social support, but also for problem-focused strategies. This issue is still to be explored by other researchers, as the majority of those studying the serological systems' relation with behavior and personality limited their research to the ABO system.

In line with the Japanese researchers (Kanazawa, 2020) and with a previous study of ours (Bălan, 2024), we were tempted to draw a coping profile for each blood type.

The *O blood type* appears not to have a particular preference for a strategy or another; their sociable and calm nature (as described in the literature) may help them take things easy. An exception may be the category of men with O blood type and negative Rh – they have the lowest score on problem-based coping.

The *A blood type*, in general, shows some reluctance to appeal to social support (either instrumental or emotional) and to express emotions. Their low Extraversion and high Neuroticism (Bălan, 2024) may be an explanation for this. Men with A blood type have the lowest score on emotion-focused coping and social support-based coping (especially if they have positive Rh), and also lower scores on problem-based coping. Women with A type and negative Rh, instead, have high scores on problem-focused coping.

The *B blood type* shows willingness to appeal to social support. If they have positive Rh, they tend to use less emotion focused coping. If they have negative Rh, they have the highest score on problem-focused coping. Women with blood type B (either positive or negative Rh) have the highest mean score on social support. Women with blood type B and negative Rh have high scores on problem-focused coping and the highest score on emotion-focused coping. Men with blood type B score lowest on avoidant coping, especially if their Rh is positive. Men with blood type B and negative Rh, instead, use less than other groups the social support. We can see clearly from this mixed picture that not only the ABO system, but the Rh and sex of the person are relevant for the coping style. In a previous study (Bălan, 2024) we have noted that the basic personality traits (such as sociability and emotivity) differ considerably between the men and the women of the B blood type.

The *AB blood type*, in general, makes more use of emotional coping and of avoidant coping – a finding in line with the classical description of the AB type as being introverted and with low Neuroticism (low Neuroticism favors self-regulation). The AB with negative Rh shows the highest score on avoidant coping (but also on social support coping!). Men with AB have the highest score on problem-based coping. Women with AB have the highest mean score on avoidant coping and on social-support coping (for both factors, especially if they have negative Rh).

4. CONCLUSIONS

Every person has a unique way of adapting (cognitively, emotionally, behaviorally) to the stress of everyday life. This unique manner, which we can call coping style, is the result of the characteristics of the concrete situation, as well as of the individual's life experience, coping successes and failures in the past, personality traits that guide personal preferences and even biological factors related to personality.

In line with the Japanese tradition illustrated by Masahiko Nomi (1978) and also the European tradition in this matter (Eysenck, 1982), we have chosen to analyze, among the biological factors, not only the sex and age of our participants, but also their main blood characteristics. We have considered the ABO type and Rh type of our respondents, as those are the most well-known (and, presumably, the most important) serological systems.

We have found that all the biological factors that we have registered have their impact on the individual coping options. More than that, some interactions between factors could be envisaged, even if the small sample size of many of the subgroups limit the statistical generalization. We have encountered some other difficulties in data gathering: people (especially young people, especially in Romania) not knowing their blood type, hesitant about what to answer to self-report test items, not knowing themselves enough or reluctant to answer sincerely, plus the fact that blood serology is so complex, so polymorphous that we cannot comprise its subtle aspects. We are, nevertheless, encouraged by the results and determined to further research this realm of biology, personality and self-regulation processes.

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