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Relationship between Decision-Making Styles and Leadership Styles of Portuguese Fire Officers

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Abstract: Numerous studies in management and leadership indicate that one's decision-making style is reflective of one's leadership style. In the context of civil protection and the fire service, the ability of the fire officers to adopt the best style of decision-making and leadership in each situation represents a critical factor of success. Therefore, the present study was designed to examine the relationship between decision-making and the leadership style of fire officers. For this study, a quantitative method was used, with the application of questionnaires with closed questions. A sample of 346 officers of Portuguese fire stations answered the questionnaire. Correlations between styles are consistent with findings from other studies. Decision-making styles directly influence the leadership styles adopted. Fire officers prioritize people and social concerns, involving teams in decision-making. Research shows positive correlations between participants' roles, conceptual decision-making, and relation-focused leadership. Higher academic degrees are associated with relationship-focused leadership. Behavioral decision-making mediates the impact of education on leadership styles.

Keywords: decision-making styles; leadership styles; fire officers; firefighter

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1. Introduction

The mission of firefighters is to protect people and property in an operational environment in high-stress and complex situations where leadership and decision-making are two critical factors for achieving success. This is even more important during critical events, such as the South Canyon Fire in California [1], and the deadly fires of Pedrogão Grande in Portugal [2], where poor decision-making and leadership capacity contributed to the escalation of the disasters [3,4].

The events just mentioned, as well as the worsening fire conditions that are increasing as a result of climate change and more extreme weather events [5], create an urgent need to study the relationship between leadership styles and decision-making styles, to integrate research findings, and to transfer them into training programs for fire officers [2]. Surprisingly, firefighting leadership has little empirical evidence that supports or clarifies the link between fire officers' decision-making styles and leadership styles. In this study, we sought to analyze a sample of Portuguese firefighters who were involved in the command-and-control operations of some of the most devastating rural fires of the decade, in Europe.

The results of leadership are partially dependent on the attitudes and behaviors of the leader, the characteristics of the team members, and the workplace, among other variables [6–8]. In turn, the different leadership styles practiced by leaders affect the performance of team members [9–11], the organizational climate [12–15], the satisfaction of team members [16], and job engagement, to name a few [17]. Finally, it is also important that leaders have an effective leadership style to reduce the attrition rate with team members and focus on performance and satisfaction [18]. Following Rouco [19], leadership styles are

related to problem solving and decision-making in the workplace. For Yukl [20], leaders can make decisions in a variety of ways, including the involvement of team members in problem solving. Nevertheless, there is a gap in the literature regarding the link between leadership styles and decision-making styles in firefighters [21]. During the literature search in Scopus and Web of Science, using 'Leadership Style', 'Leadership', 'Decision Making Style', Decision Making', and "Firefighters" as search terms, without any other restrictions, resulted in zero empirical research articles, which demonstrates the scarcity of research on this topic.

Thus, studying the relationship between decision-making and leadership styles and developing in fire officers the attitudes and behaviors most appropriate for the fulfillment of the mission represents a critical factor of organizational success. Furthermore, the identification of attitudes and behaviors that are associated with decision-making and leadership styles in contexts of high stress will allow for the development of educational and vocational training programs to develop potential commanders [1]. This is the case in research by Hagemann et al. [22], who found that the implementation of debriefing routines improved decision-making quality under conflicting goals and increased safety behaviors in firefighters.

The main objective of this study is to identify the relationship between decision-making styles and leadership styles so that fire officers can successfully carry out their mission. To guide this study, the following research question was formulated: What is the relationship between decision-making styles and leadership styles practiced by fire officers to successfully accomplish the mission?

1.1. Decision-Making Styles

Decision-making is a systematic process of selecting the option that offers the best chance of improving the efficiency and effectiveness of the organization to create value in all interest groups [23,24]. The word decision has been defined as an "answer to some problem or a choice between two or more alternatives" [25] (p. 3), and it is the ability to decide between choices within a pool of alternatives [26]. Moreover, a decision can also be a judgment or conclusion reached or given, where one of the factors with the greatest impact on the selection of one of the alternatives is the ethical criteria (values) of the decision-making. Finally, researchers agree that decision-making depends on the characteristics (beliefs, needs, expertise) of the decision maker [27–29], as well as task factors [27,28] and the organizational environment [29]. More particularly, individuals' responses depend on how they organize and experience information, as well as its quantity and quality [30].

Rowe and Mason [31] referred to the decision-making process as a cognitive process comprised of five elements: (1) the stimulus, which arouses the decision maker; (2) the manner in which the individual responds to the stimulus; (3) the divergent thinking about the problem; (4) implementing and executing the decision; and (5) determining the effectiveness of the decision whether or not it helps achieving the desired goals. The third element referred to in the cognitive process, i.e., the divergent thinking, involves the ability to find many different and new responses or solutions to open-ended problems [32]. Different decision-making styles may have different bearings on different personality types and cognitive styles [33]. While decision styles focus more narrowly on capturing decision-making processes, cognitive styles capture general information processing and problem solving more broadly [34]. Some authors treat cognitive and decision styles interchangeably [35], and others consider cognitive styles a subset of decision styles [36]. The more recent perspective is to view decision styles as a subset of cognitive styles [37]. Also, decision styles can be seen as likelihoods of behavior [38] that allow for some change or development in response to factors, such as environmental load and pressure [39], decision time, and task familiarity [40]. However, individuals are considered to have a dominant style even if they use multiple styles [41].

Rowe et al. [25] proposed the term decision style, which reflects the way in which a person uses information to reach a decision. Decision style focuses attention on the way

one uses information and derives meaning from it. People may be classified into two opposing ends of a continuum. One end represents those who use the least amount of data and, thus, save time. The other end represents those who use the greatest amount of data and try to achieve the best possible solution without any concern for time. According to Rowe and Boulgarides [42], identifying one's decision style may predict behavior, such as reactions to stress, motivation, problem solving abilities, and general manner of thinking. The decision profile of any given individual reflects a combination of all four styles. It may be characterized as either one dominant style or as a balanced profile with all four at a similar strength.

Decision style has been conceptualized as a value orientation/personal value that forms four basic styles depicting four combinations of styles. These four styles are the Cognitive Complexity Model developed by Rowe and Mason [31] (Figure 1). The Cognitive Complexity Model represents an attempt to characterize the way people arrive at decisions. It uses knowledge gleaned from social psychology, cognitive psychology, structural engineering, organizational behavior, and information systems. Four distinct leadership styles are identified: directive, analytical, conceptual, and behavioral.

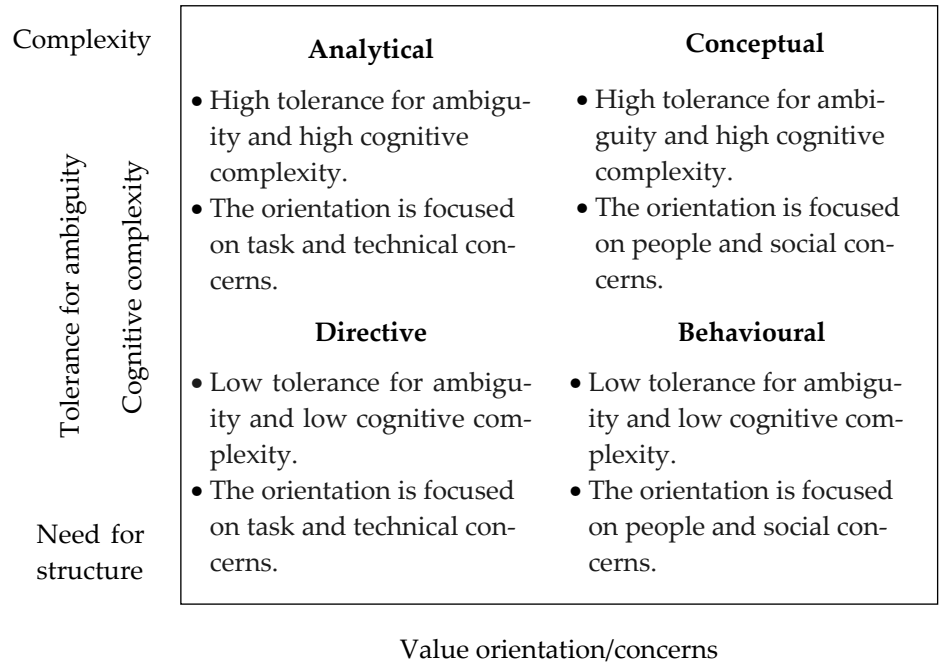

Figure 1. Complete Decision Style Model by Rowe and Mason [31].

When we analyze the description of the analytical decision-making style and the rational decision-making style by different authors and models, we find that they are similar and are described as rational or analytical processes, which are slower, serial, and laborious, and depend on planning the sequence in which information is processed [32]. In the context of firefighting, fire commanders use various decision-making processes, ranging from rapid decision-making (inductive) based on their experience to the use of organizational decision-making (deductive) [19]. Rapid decision-making methods are used when time is limited, while slower, more formal and time-consuming strategies are employed when more time is available. Tacit knowledge on the part of fire commanders is crucial, as it allows them to switch to defensive tactics.

In the context of the firefighting activity, the number of empirical studies that formally address decision-making styles or how fire commanders make decisions is scant. One exception is the work of Useem et al. [1], who have studied leadership and decision-making in the context of the South Canyon Fire in California at the turn of the millennium. By qualitatively analyzing mission communications and reports, Useem and colleagues

were able to highlight how ambiguous authority, under-preparation, and acute stress hindered fire chiefs' ability to perform deliberate, thoughtful decisions associated with people allocation and firefighting strategy. Although the work of Useem et al. [1] laid the foundations to understand the intricate relationship between leadership and decision-making in the context of firefighting, it did not present a clear link between fire commanders decision-making styles and related leadership styles. In the current research, we sought to do this.

1.2. Leadership Styles

In organizations, leaders interact with team members through attitudes and behaviors to influence them in achieving organizational objectives [43]. Many authors define the leadership style as a set of standard and consistent attitudes and behaviors that characterizes a leader in the workplace [7,20,44]. According to Vieira [43], leadership style is how a particular individual exerts influence over team members.

According to Rouco [19], leadership styles are related to the degree of involvement of team members in decision-making when solving workplace problems. Several leadership models characterize the relationship between the leader and team members during workplace decision-making, such as Lewin, Lippit, and White's Leadership Styles, House's Path–Goal Model, and the Vroom–Jago Leadership Model. According to Yukl [13], leaders can make decisions with or without the participation of team members.

After reviewing the literature on leadership theories and models that are directly and explicitly related to decision-making, several leadership styles have been proposed according to different approaches and authors, of which those illustrated in Table 1 are highlighted.

In this study, the three leadership styles of Lewin, Lippit, and White's Leadership Styles model are taken into consideration. In the operational context of firefighters, the three leadership styles proposed in the model are appropriate and sufficient to characterize the attitudes and behaviors of fire officers in the involvement of their team members in decision-making [43]. As a matter of operational terminology in the context of firefighters, the designations of the three leadership styles are as follows: the autocratic became the directive, the democratic became participative, and the Laissez-faire became delegation.

Regarding the directive versus participative versus delegation styles, the directive leadership style is defined as providing team members with a grid of decisions that align their actions in materializing the leader's vision [44], and which is associated with sometimes faulty and underperforming decision-making by team members [45]. According to Bass, Valenzi, Farrow, and Solomon [46], the directive leadership style aims to guide the participation of team members by providing strict instructions on how to solve a problem or perform a task. Lewin, Lippit, and White [47] stated that the directive leadership style involves the leader in decision-making, exercising absolute power, assigning tasks, and maintaining a distant relationship with team members. Interestingly, research by Leone et al. [2] with Portuguese firefighters suggests that during firefighting operations, directive leadership styles promote firefighters' wellbeing, possibly because they result in a sense of confidence in the team leader that is reassuring. On the other hand, empowering leadership (which is similar to the participative leadership style) does not contribute to increased firefighter performance and wellbeing in the operational context.

The participative leadership style is defined as joint decision-making between the leader and the team members and seeks to increase the participation of team members in the sharing of power and advice before making a decision [48,49]. It offers a variety of benefits, such as improving the quality of decisions [50] and the satisfaction of team members [51]. Abudayyel, Fredericks, Butt, and Shaar [52] reported that leaders involving team members in decision-making increase their motivation and performance. Anderson and King [53] reported that participative leadership and a clear vision and mission stimulate proactivity and innovation. According to Arnold et al. [53] and Lewin, Lippit, and White [47], the participative leadership style involves the use of a consultative approach, encourages

team members participation in decision-making, and maintains a very close relationship with team members. Oshagbemi [54] stated that older or more experienced leaders tend to practice the participative leadership style. Yukl [20] stated that when team members are involved in the decision-making process, they are more likely to improve its quality, more easily accept the results, and have a higher level of satisfaction. As a result, team members trust each other more with their opinions and feel more committed to the team's goals [55,56].

Table 1. Leadership styles with a relation to decision-making.

Authors	Leadership Style	Summary Description
Lewin, Lippit, and White's Leadership Styles	Autocratic	The leader has complete power over their team members. The leader makes all the decisions, and the team members are expected to follow orders and to execute them without question.
	Democratic	The leader involves team members in the decision-making process. Often the leader may still make the final decision, but input from team members is encouraged to reach a decision.
	Laissez-faire	The leader delegates decision-making authority to their team members and allows them to work largely on their own.
House's Path–Goal Model	Directive	The leader provides guidelines, lets team members know what is expected of them, sets performance standards for them, and controls behavior when performance standards are not met. He makes judicious use of rewards and disciplinary action.
	Supportive	The leader is friendly towards team members and displays personal concern for their needs, welfare, and well-being.
	Participative	The leader believes in group decision-making and shares information with team members. He consults his team members on important decisions related to work, task goals, and paths to resolve goals.
	Achievement-oriented	The leader sets challenging goals and encourages team members to reach their peak performance. The leader believes that team members are responsible enough to accomplish challenging goals.
Vroom–Yetton–Jago Decision-making Model of Leadership	Autocratic (AI)	The leader makes the decision by himself using existing information without any communication with the team members.
	Autocratic (AII)	The leader consults with team members to obtain information but makes the decision by himself or herself without informing the group.
	Consultive (CI)	The leader consults the team members to obtain their opinions about the situation, but he or she makes the decision for themselves.
	Consultive (CII)	The leader consults the team members, seeking opinions and suggestions, but he or she makes the decision for himself or herself. In this type of leadership style, the leader is open to suggestions and ideas.
	Collaborative	The leader shares the decision-making process with the team members. He or she supports the team in making the decision and finding an answer that everyone agrees on.

In the current study, we use the following definitions of leadership styles [19] as a framework for this study: the directive leadership style (the leader makes decisions alone in order to accomplish the tasks), the participative leadership style (the leader invites and listens to the contributions of others in the team before agreeing on changes that affect the team), and the delegation style (the leader entrusts responsibilities and decisions to others in order to accomplish the team's tasks).

Many authors and studies have concluded that the participative leadership style is more effective for team members and the organization than the directive leadership

style [57]. The authors also claim that the use of both leadership styles by leaders can increase the productivity of team members in different situations [58]. Kahai, Sosik, and Avolio [59] concluded that neither the participative nor the directive leadership style was directly related to group performance. However, the same authors stated that the participative leadership style had a negative relationship with the team's performance in driving the resolution of a structured problem and a positive relationship when the problem was semi-structured. As for the style of leadership by delegation, according to Xirasagar [60] the delegation leadership style involves the policy of non-interference and allows complete freedom for team members to decide how to achieve goals or objectives.

In addition to the leadership styles described in the previous paragraphs that are not explicitly related to decision-making, the literature review identified other models of interest for this research, of which the following stand out: transformational versus transactional leadership [48,61]; people-oriented leadership style versus task-oriented leadership style (Fiedler's contingency theory or Fiedler's contingency model or Fiedler's theory of leadership) [62]; concern for people versus concern for production (Blake and Mouton's managerial grid) [63]. For the purposes of this study, we will only go into greater detail about the people-oriented leadership style versus the task-oriented leadership style.

About the task-oriented versus people-oriented leadership style, the effectiveness and success of leadership depends largely on the behavioral patterns of the leader. Based on the theory of human relations and the behavioral of leadership, several studies were conducted at Ohio University around 1945 and at the University of Michigan around 1947. The Ohio University studies have identified two types of behaviors that explain what leaders do: leaders provide structure and support to team members [64]. Studies at the University of Michigan identified that leaders have people-oriented behaviors (human relations) and production-oriented behaviors (task) [65,66]. In the following decades and to date, several studies have been conducted, and according to several researchers, it has been concluded that there are two types of behaviors of leaders, such as "initiation" or "consideration", "orientation to people" or "orientation to the task", and "people-centered" or "work-centered" [67]. Subsequently, these behaviors were classified as behaviors oriented towards relationships or human relationships and oriented to the tasks [68], in which leaders must use their practical intelligence to opt for one of the leadership styles according to situational variations.

O´Dea and Flin [69] mentioned that to build high levels of interpersonal relationships between team members it is necessary for leaders to listen to and accept the suggestions of team members, in which communication plays an important role. The leadership style oriented towards human relations implies establishing interpersonal relationships with team members, and as already mentioned it is associated with the theory of human relations; consequently, interpersonal communication plays a fundamental role. According to Penley and Hawkins [70], the style of leadership oriented towards people or human relationships is primarily communicative, while the task-oriented leadership style is less so. The task-oriented leadership style is more about providing information than the communicative style. Also, De Vries, Bakker-Pieper, and Oostenveld [71] concluded that there is a strong relationship between the human relations-oriented leadership style and the assertive communication style. Nevertheless, De Vries, Bakker-Pieper, and Oostenveld [71] stated that the orientation to the task is characteristic of the presence of some verbal aggressiveness, where this explanation has to do with the fact that these leadership behaviors are associated with the rules, planning, and definition of objectives.

1.3. Previous Research on the Relationship between Decision-Making Styles, Leadership Styles, and Hypotheses

For Scott and Bruce [72] and Thunholm [36], people have a dominant style that can change across different situations based on individual characteristics. Many studies from different professions have shown that there are several important factors that influence decision-making and leadership styles in organizations. These factors include

experience [21,73], cognitive biases [74], age and individual differences in beliefs [21], an escalation of commitment, and education [21]. Similarly, some recent research has shown that some leaders still lack the education, knowledge, quality, and leadership styles associated with sound decision-making in their organizations [21]. In addition, cognitive styles are trait-based individual differences that represent how someone perceives and processes information across a broad range of contexts [75], including rational ability and rational engagement, which reflect an individual's ability and preference to think in a logical way [76], and which have also been discussed in terms of experiential ability and experiential engagement, which represent the ability and preference to rely on impressions and feelings [76]. Uzanwanne's [77] study revealed that the education and age of executives significantly influence leadership styles and decision-making models.

Hariri et al. [78], Kao and Kao [79], and Tatum et al. [80] found in their respective studies that there is a relationship between leadership styles and decision-making styles. Tatum et al. [81] reinforce this by stating that each leadership style corresponds to a decision-making style. In their study, Hariri et al. [78] found that people-oriented leaders have a rational decision-making style and a leadership style that employs delegation with avoidant decision-making. Tatum et al. [80] argued that the delegation leadership style is associated with a less comprehensive decision-making style. The study by Remenova, Jankelova, and Prochazkova [81] found a negative correlation between supportive leadership and thinking decision-making. It also revealed that directive leadership is influenced by team size, age, and personal parameters.

Azeska et al. [82] identified in their studies that leaders with a directive decision-making style are associated with the directive leadership style. The leader makes decisions based on a relatively small amount of information and lacks tolerance for vague information; leaders with an analytical decision-making style make decisions by researching extensive data and have an increased tolerance for vague information; leaders with a conceptual decision-making style make decisions based on extensive elaboration of data and tend to be creative and inventive; leaders with a behavioral decision-making style are characterized by an exaggerated need for acceptance (affiliation) and a participative leadership style with team members.

After reviewing the literature on decision-making styles and leadership styles and supported by Figures 1 and 2, which list the variables under study, the following hypotheses were formulated:

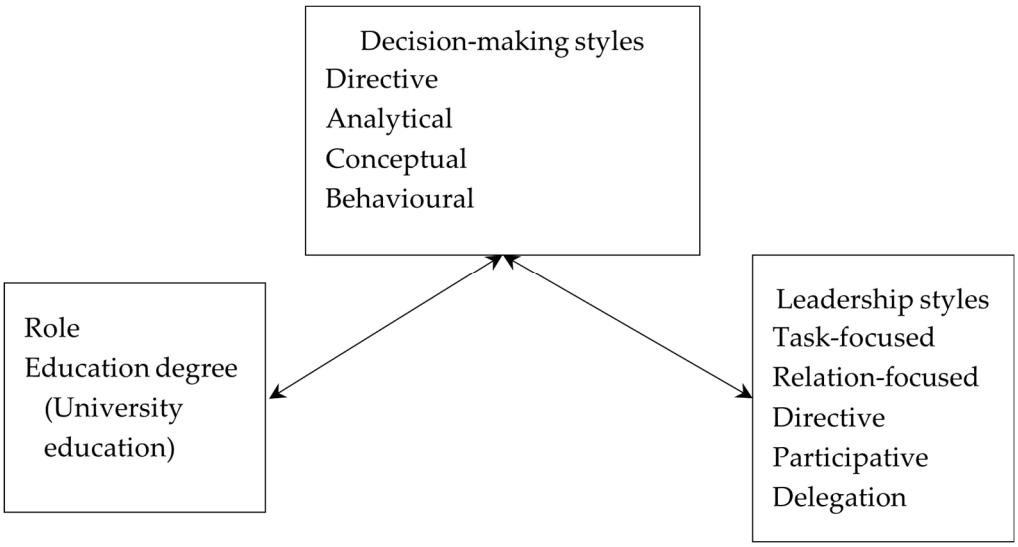

Figure 2. Conceptual model.

Hypothesis 1. There is a positive relation between the participants' role and conceptual decision-making.

Hypothesis 2. There is a positive relation between the participants' role and directive leadership style.

Hypothesis 3. There is a positive relation between participants' education and relation-focused leadership.

Hypothesis 4. There is a positive relation between participants' education and directive decision-making.

Hypothesis 5. There is a positive relation between participants' education and behavioral decision-making.

Hypothesis 6. There is a positive relation between behavioral decision-making and relation-focused leadership.

Hypothesis 7. There is a positive relation between behavioral decision-making and the participative leadership style.

Hypothesis 8. There is a negative relation between behavioral decision-making and the directive leadership style.

Hypothesis 9. There is a positive relation between directive decision-making and the delegation leadership style.

As an additional analysis of the data obtained from the respondents' answers, the following hypotheses were formulated:

Hypothesis 10. Behavioral decision-making style is a mediator between participants' education and directive leadership.

Hypothesis 11. Behavioral decision-making style is a mediator between participants' education and participative leadership.

Hypothesis 12. Behavioral decision-making style is a mediator between participants' education and relationship-focused leadership.

2. Materials and Methods

In the literature review step, we searched the literature on leadership styles and decision-making styles in four databases, namely Scopus, Web of Science, b-on, and EBSCO. We searched the titles, keywords, and abstracts for references to leadership and decision-making styles.

The quantitative method was used for data collection, with the use of closed-ended questionnaires. The questionnaires were inserted in Google Forms. The Portuguese National Fire Service School (ENB) sent the questionnaires to all fire stations through its internal communication platform. The questionnaires were responded to between 12 January and 25 February 2023.

2.1. Measures

The general questionnaire consists of the following three parts: First part—socio-demographic data (category: role, years of experience in category, age, gender, and education degree); second part—decision-making style inventory; third part—leadership style

inventory. The characteristics of the questionnaires used in the second and third parts are as follows:

Decision-Making Style Inventory (DSI): The decision-making style inventory was developed by Rowe and Mason [31]. It measures an individual's preferences when approaching various decision situations. It measures four styles of decision-making: (1) the directive style, (2) the analytical style, (3) the conceptual style, and (4) the behavioral style. The inventory consisted of 20 questions related to typical situations that the individual faces at a managerial level. The DMSI asks the individual to answer twenty questions concerning his or her decision-making preferences. Each question contains four options, corresponding to the four decision-making styles. The respondent characterizes each option as "most like me", "moderately like me", "a little like me", and "least like me". Scores for each decision-making style derive from summing the scores for the options corresponding to that style. The Cronbach's alpha values of the constructs are between 0.70 and 0.88.

Leadership Style Inventory: Leadership styles were measured using the leadership style inventory (LSI) [19]. The leadership style inventory was developed by Rouco [19] in a military context and measures the level of participation at which the leader invites team members to participate in decision-making. It measures three styles of leadership related to decision-making: (1) directive leadership style, (2) participative leadership style, and (3) delegation leadership style. The inventory consisted of 10 questions related to the degree of participation of team members in decision-making, as follows: directive leadership style, with four items; participative leadership style, with three items; and delegation leadership style. Both styles are on a Likert scale from 1—I totally disagree to 5—I totally agree. The Cronbach's alpha values of the constructs range from 0.76 to 0.82.

2.2. Samples

The population for the study consists of the fire officers (commanders, 2nd commanders, and assistant commanders) of Portuguese fire stations. According to information provided by the Portuguese National Emergency and Civil Protection Authority, the sample population is 1069 on 4 October 2023. The population is divided into the following categories: commanders—375 members; 2nd commanders—274 members; assistant commanders—420 members. In total, 346 fire officers answered the questionnaire, of which 148 were commanders, 77 were 2nd commanders, and 121 were assistant commanders. The sample is representative, with a 95% degree of confidence and a margin of error of 5% for a z = 1.96. Representativeness is also guaranteed in each category.

3. Results

To test the research hypotheses, we used PROCESS [83] for SPSS. PROCESS is a computational tool to analyze "mediation process models" that are path analysis-based. PROCESS estimates the coefficients of a model using OLS regression (for continuous outcomes) and allows the estimation of the mediation effects using bootstrap analysis.

The results of descriptive statistics and correlations between research variables are shown in Table 2. Table 2 reports means and standard deviation is used to describe the characteristic of the variable and correlations. These variables are the following: role (1); education degree (2); directive decision-making (3); analytical decision-making (4); conceptual decision-making (5); behavioral decision-making (6); task-focused leadership (7); relation-focused leadership (8); directive leadership style (9); participative leadership style (10); and delegation leadership style (11).

The mean of the analytical decision-making style was the highest (M = 91.15, SD = 19.97), followed by the mean of the behavioral decision-making style (M = 84.34, SD = 22.40), the directive decision-making style (M = 81.87, SD = 19.97), and the conceptual decision-making style (M = 75.63, SD = 21.68). The scores ranged from 0 to 160 (Rowe and Mason (1987)). The mean of the relationship-focused leadership style was the highest (MD = 4.41, SD = 0.52), followed by the mean of the task-focused leadership (MD = 4.34, SD = 0.51), participative leadership style (MD = 4.21, SD = 0.58), delegation leadership style (MD = 3.23, SD = 0.93),

and directive leadership style (MD = 2.05, SD = 0.73). The scores in the rating ranged from 1 to 5 [19].

Table 2. Descriptive statistics and correlations.

Variables	*M*	*SD*	1 Role	2 Education	3	4	5	6	7	8	9	10
1. Role	1.92	0.88	1	-	-	-	-	-	-	-	-	-
2. Education degree		1.37	0.48	0.17 **	1	-	-	-	-	-	-	-
3. Directive decision-making	81.87	19.97	0.04	−0.12 *	1	-	-	-	-	-	-	-
4. Analytical decision-making	91.15	19.43	0.07	0.01	0.70 **	1	-	-	-	-	-	-
5. Conceptual decision-making	75.63	21.68	0.11 *	−0.08	0.64 **	0.70 **	1	-	-	-	-	-
6. Behavioral decision-making	84.34	22.46	0.10	−0.19 **	0.51 **	0.49 **	0.66 **	1	-	-	-	-
7. Task-focused leadership	4.34	0.51	0.03	0.05	0.08	0.12 *	0.06	0.09	1	-	-	-
8. Relation-focused leadership	4.41	0.52	−0.02	0.11 *	0.05	0.06	0.04	0.13 *	0.57 **	1	-	-
9. Directive leadership style	2.05	0.73	−0.15 **	−0.08	0.9	0.07	0.3	−0.12 *	−0.13 *	−0.19 **	1	-
10. Participative leadership style	4.21	0.58	0.09	0.08	−0.02	0.04	0.11 *	0.21 **	0.47 **	0.46 **	−0.35 **	1
11. Delegation leadership style	3.23	0.93	0.09	0.09	−0.11*	−0.02	0.01	0.03	0.21 **	0.21 **	−0.04	0.24 **

Note: ** $p < 0.01$, * $p < 0.05$.

Regarding the participants' role variable, the correlation results reported in Table 2 show a positive correlation between participants' roles and participants' education ($r = 0.17$, $p < 0.001$). The positive correlation between the participants' roles and conceptual decision-making ($r = 0.11$, $p < 0.001$) in these results supports Hypothesis 1. A negative correlation between the participants' roles and directive leadership style ($r = -0.15$, $p < 0.001$) means that these results reject Hypothesis 2.

Concerning education, the correlation results show a positive correlation between participants' education and relation-focused leadership ($r = 0.11$, $p < 0.05$), and a negative correlation between participants' education and directive decision-making ($r = -0.12$, $p < 0.05$) and behavioral decision-making ($r = -0.19$, $p < 0.001$). These results support Hypothesis 3 and reject Hypotheses 4 and 5.

Additionally, the results in Table 2 also show a positive correlation between behavioral decision-making and relation-focused leadership ($r = 0.13$, $p < 0.01$) and participative leadership style ($r = 0.21$, $p < 0.001$), as well as a negative correlation between behavioral decision-making and directive leadership style ($r = -0.12$, $p < 0.01$). These results support Hypotheses 6 and 7 and reject Hypothesis 8.

Regarding the role of directive decision-making style, our findings suggest that there is a negative relationship between participants' education and the adoption of a directive decision-making style, B = −5.30, $SE = 2.21$, $t = -2.39$, $p = 0.02$, 95% CI [−9.651, −0.955], while directive decision-making style is negatively related with participants' delegation leadership, B = −0.01, $SE = 0.01$, $t = -2.08$, $p = 0.04$, 95% CI [−0.010, −0.003]. Still, there was no support for the mediation hypothesis, since B = 0.03, $SE = 0.02$, 95% CI [−0.028, 0.0704]. These results reject Hypothesis 9.

Regarding the role of behavioral decision-making style as a potential mediator between participants' education and preferential leadership style, our findings suggest that holding a degree is negatively related to behavioral decision-making style, B = −9.77, $SE = 2.44$, $t = -4.00$, $p < 0.001$, 95% CI [−14.573, −4.969], and that there is no indirect effect between holding a degree and participants' directive leadership through participants' behavioral decision-making style, B = 0.04, $SE = 0.02$, 95% CI [−0.012, 0.093]. These results reject Hypothesis 10.

The results also suggest that participants' education is positively related with participative leadership, B = 0.14, $SE = 0.06$, $t = 2.13$, $p < 0.05$, 95% CI [0.010, 0.264], and that there is a partial indirect effect between participants' education and participants' participative leadership, B = −0.10, $SE = 0.03$, 95% CI [−0.174, −0.039]. Finally, our findings also suggest that participants' education is positively related with participants' relationship-focused leadership, and that this relationship is partially mediated by participants' behavioral decision-making style, B = −0.04, $SE = 0.02$, 95% CI [−0.071, −0.086]. These results support Hypotheses 11 and 12.

4. Discussion

The aim of this study was to analyze the possible relationships between decision-making styles and different leadership styles. It is based on the premise that the decision-making process has a direct influence on the styles adopted in leadership [21,78–80]. Thus, the paper discusses the relationship between decision-making styles and leadership styles, emphasizing that decision-making is a crucial managerial activity, and leadership is a projection of the commander's attitudes and behaviors [19].

Before discussing the results, which are oriented towards the main objective of this study and the respective hypotheses, an interpretation of the results of the different variables will be made according to the perspectives of previous studies. In general, and from the descriptive analysis, the fire officers are perceived as having an analytical decision-making style; in this way, they have a high tolerance for ambiguity and high cognitive complexity, and the orientation is focused on task and technical concerns [31]. They make decisions by researching extensive data, and have an increased tolerance for vague information [82]. According to Rowe and Mason [78], in the analytical decision-making style, the position (role) of individuals is important to have control over and is characterized by the ability to deal with new situations.

As for leadership styles, the fire officers are focused on people and social concerns [78] and invite and listen to contributions from others to solve problems or perform tasks [19]. These results contradict the premises of the analytical decision-making style, however, it is considered that in a context of emergency and civil protection, and in a general staff operational environment, the commander lets his team participate in the decision-making [20] and, at the end, declares his "intention" for the fulfillment of the mission. Despite the contradictory results, in the operational context of emergency and civil protection, it reinforces the way a commander acts through the phrase "mission first, people always".

The results show a positive correlation between participants' roles and conceptual decision-making, providing a glimpse into the relationship between these variables and supporting the findings with statistical significance [21,77], which confirms Hypothesis 1. The fire officers have high tolerance for ambiguity and high cognitive complexity [31]. In addition, firefighter leaders have a people and social orientation [31]. The results show a positive correlation between participants' roles and participants' education [30] and a positive correlation between participants' education and relation-focused leadership (Hypothesis 3) and behavioral decision-making (Hypothesis 5). In other words, as the fire officers have higher academic degrees, they tend to employ relation-focused leadership. These results are reinforced by the rejection of Hypothesis 2, which confirms that as firefighters occupy top positions, they become less directive in their leadership style [33]. The rejection of Hypothesis 4 also reinforces or complements the confirmation of Hypotheses 3 and 5. In the operational context of emergency and civil protection, this result confirms that fire officers give decision-making freedom to team members to be able to exploit success in a timely manner [48,49]. We also found a negative correlation between directive decision-making and the delegation leadership style (Hypothesis 9).

The study confirms the assumptions underlying the formulation of Hypotheses 6, 7, and 8, i.e., that the behavioral decision-making style is associated with low tolerance for ambiguity and low cognitive complexity and that the orientation is focused on people and social concerns [31], and this confirms the distance of directive behaviors from the fire officers.

In Hypotheses 10, 11, and 12, the behavioral decision-making style plays a key role as a mediator in the positive relationship between the academic degree and the relation-focused (Hypothesis 12) and participative (Hypothesis 11) leadership styles of the fire officers [78–80], and a negative relationship with the directive (Hypothesis 10) leadership style [36,72]. It is proposed that the way individuals make decisions (their behavioral decision-making style) acts as a mediator. In this context, a mediator is a variable or factor that lies between an independent variable (education) and a dependent variable (relation-focused, participative, and directive leadership styles) [21]. It suggests that the influence of participants' education on relation-focused and participative leadership styles

is not direct but is influenced by their behavioral decision-making style [77]. This emphasizes the idea that it is not academic background alone that directly influences leadership styles [21,73]. Instead, the individuals´ decision-making styles act as an intermediary, influencing the connection between their educational qualifications and the specific leadership styles they tend to adopt. The phrase highlights the intricate interplay between cognitive processes, educational experiences, and leadership choices, and contributes to a more nuanced understanding of the dynamics at play within the fire officers [75,76].

As such, the study of these relationships, in this paper, will make an important contribution to the vocational training programs to develop the right competencies and to the literature. In practical implications, this study implies that training and development programs for fire officers should consider both academic qualifications and decision-making styles. Emphasizing behavioral decision-making and understanding the contextual nuances of emergency response situations can enhance leadership effectiveness. Acknowledging the interplay between education, decision-making styles, and leadership preferences can guide the development of tailored leadership development initiatives for fire service commanders. Ultimately, this will contribute to more adaptive and effective leadership in emergency and civil protection scenarios.

The theoretical implications of this study extend beyond the specific context of fire officers, providing valuable insights into the broader understanding of decision-making styles and their impact on leadership. The nuanced exploration of contextual factors, the role of training, and the identification of mediating variables contribute to the ongoing development of leadership theories and decision science. The study enriches theoretical discussions by emphasizing the need for a context-sensitive and individualized approach to leadership in dynamic operational environments.

This study on decision-making and leadership styles among fire service command staff has limitations that may affect its generalizability. Self-reported data from participants may introduce social desirability bias, affecting the accuracy of reported styles. The study´s limited demographic diversity may affect its generalizability, as the sample consists primarily of individuals with similar demographic characteristics or career backgrounds, and the study does not account for potential cultural differences in decision-making and leadership styles.

Future research could use longitudinal designs to track the evolution of decision-making styles and leadership styles within fire officers over an extended period. This would provide a more comprehensive understanding of how these dynamics change and adapt in response to evolving organizational contexts and leadership challenges. Investigating decision-making styles and leadership styles within fire officers from diverse cultural and international perspectives would add depth to the research. Given the critical nature of decision-making in emergency and civil protection contexts, future studies could focus specifically on decision-making processes during crisis situations. Evaluating the impact of leadership training programs on decision-making styles and leadership styles within fire officers could provide practical insights.

5. Conclusions

The study aims to analyze the relationships between decision-making styles and leadership styles among Portuguese fire officers. It emphasizes that the decision-making process directly influences the leadership styles adopted.

Fire officers, despite having analytical decision-making styles, exhibit leadership styles that focus on people and social concerns. In emergency situations, fire service commanders engage their teams in decision-making while maintaining a "mission first, people always" approach.

Research shows positive correlations between participants' roles, conceptual decision-making, and relation-focused leadership, and top positions in the fire service are linked to a decrease in directive leadership styles. Higher academic degrees among fire officers are associated with relationship-focused leadership.

Behavioral decision-making style acts as a mediator in the relationship between academic degree and relation-focused, participative, and directive leadership styles (inverse). Individual decision-making styles mediate the impact of education on leadership styles.

Understanding the correlation between decision-making styles and leadership styles can help the Portuguese National Fire Service School (ENB) to design more effective leadership training programs. Fire officers can be trained to recognize their decision-making style and understand how it influences their leadership style. This can lead to more effective leadership, better team dynamics, and improved performance in emergency situations.

The results of the study can also be used in the recruitment and promotion process. For example, if a role requires strong relationship-oriented leadership, individuals with higher academic degrees might be considered more appropriate.

These findings can help shape the organizational culture of the fire service. If the fire service values certain leadership styles, promoting corresponding decision-making styles could help to reinforce those styles.

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