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Leadership style and communication style of airline pilots: Perceived associations with crew members' satisfaction and effort

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Cover Page Footnote

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The relevance of leadership and communication in civil aviation has been recognized both by academic research and by civil aviation entities. Previous studies have provided evidence on the importance of leadership and communication for flight safety and efficiency (e.g., Adjekum, 2017; Chen & Chen, 2014; Kanki, 2010; Liao, 2015; Orasanu et al., 1997; Sexton & Helmreich, 2000). These studies indicate that leadership and communication enhance coordination in the cockpit, cockpit-cabin interaction, and interactions with supporting staff, such as air traffic controllers and mechanics. Leadership and communication are also widely acknowledged as paramount factors in manuals of the International Civil Aviation Organization (ICAO), as well as in the content of Crew Resource Management (CRM) training (Helmreich et al., 1999).

While there seems to be a consensus in the literature that the commander of an aircraft, as the highest authority on board, may significantly impact the course of events through his/her leadership and communication, few empirical studies have analyzed the effects of different styles of leadership and communication on crew members' satisfaction and performance. On the other hand, while some authors suggest that leadership styles and communication styles might be associated (Bliss & Fallon, 2003; Crews et al., 2019; de Vries et al., 2010; Holladay & Coombs, 1993), research on this association for airline pilots is scant.

These gaps in the literature motivated the current study, which analyzed the leadership styles and the communication styles of airline pilots and their perceived effects for team members. This research has two main objectives. First, it identified which leadership styles and which communication styles are perceived by airline pilots as associated with their team's satisfaction and extra effort. Second, it analyzed whether airline pilots perceive that communication styles mediate between leadership styles and team members' effects in terms of satisfaction and extra effort.

With these analyses, we hope to contribute to a better understanding on the relationship between leadership styles and communication styles of airline pilots and how these processes influence the satisfaction and extra effort between cockpit crew members and cockpit-cabin crew interactions.

Theoretical Background

The importance of human factors for civil aviation operations was formally recognized by the International Civil Aviation Organization in 1986 (ICAO, 2002). Human factors involve all aspects of human performance in civil aviation, where the main objectives are safety and efficiency. The SHELL model, first proposed by Edwards (1972) and later developed by Hawkins (1987), is often used as the conceptual basis for identifying different components of human factors. Edwards (1972) stated that the study of human factors seeks to optimize the relationship between people and their activities, with a particular concern for communication between individuals and the behavior of individuals and groups. Previous research provides evidence that

human factors such as poor decision-making, ineffective communication, inadequate leadership and poor management often underlie the occurrence of problems in flight safety and efficiency (ICAO, 2002).

This study focused on leadership and communication, two human processes that have been widely acknowledged as paramount in civil aviation (e.g., Adjekum, 2017; Chen & Chen, 2014; Kanki, 2010; Liao, 2015; Orasanu et al., 1997; Sexton & Helmreich, 2000). ICAO (2002) also considers that both leadership and communication are essential for effective crew teamwork.

To select the effects of leadership styles and communication styles that are relevant for crew members, we followed the double orientation that has long been established for organizational behavior studies: A humanistic orientation, focusing on issues such as satisfaction and well-being, and a performance orientation, focusing on effort and results (Cummings, 1978; Kamoche, 2001). Accordingly, we analyzed whether airline pilots perceive their leadership styles and their communication styles as associated with their crew members' satisfaction and performance. Crew members' satisfaction was assessed through their positive appraisal of the working environment, including the relationship with the leader (Bass, 1985; Khan et al., 2011; Weiss, 2002). Crew members' performance was assessed through their extra effort, that is, the degree to which the team performs a task or solves problems beyond simple contractual expectations (Bass, 1985; Khan et al., 2011; Seltzer & Bass, 1990). Extra effort is a relevant indicator of performance is flight situations, given that crew members are often faced with non-routine events requiring dynamic reactions (Foushee, 1984; Waller, 1999).

In the following sections we present a literature review on the relationships between the variables included in our study.

Leadership Styles

Leadership style concerns the pattern of behavior that characterizes a person responsible for managing groups of people (DuBrin, 2013), including that person's usual method for providing direction and motivating others (Kotter, 2001). In their seminal work, Lewin et al. (1939) categorized three leadership styles, setting a framework for future studies on the topic. The authors distinguish between authoritarian, democratic and *laissez-faire* leadership. This distinction is mainly based on how leaders make decisions. The authoritarian style is characterized by all decisions being made by the leader, who exercises absolute power, assigns tasks and maintains a distant relationship with team members. In the democratic style, the leader assists group members in making the decisions without imposing his/her views and attempting to be a regular group member. In the *laissez-faire* style, the group has complete freedom in decision-making and the leader does not interfere with the course of events. Over the following decades, many other categorizations and taxonomies of leadership styles have been proposed (Yukl, 2012). Given that problem-solving and decision-making are crucial in aviation (Harris & Li, 2017; O'Hare, 1992), we choose to focus on leadership styles that consider how these processes are made.

Vroom and Yetton (1973) and Vroom and Jago (1988) develop the normative model of decision-making, in which the three main leadership styles identified – autocratic, consultative and group. The autocratic style is divided into style A1 - the leader makes own decision with information readily available to him/her - and style A2 - the leader requests information from subordinates prior to making the decision alone. The consultative style is divided into style C1 - The leader involves subordinates individually, seeking their opinions and suggestions prior to making the decision alone - and style C2 - Similar to C1, but subordinates are involved as a group instead of individually. The final style is labelled the group style, since the decision is made by the group and not the leader. The leader presents the decision situation to the group, elicits opinions and suggestions, but does not attempt to force his views.

Bass et al. (1975) also presented five different leadership styles that are related to the degree of involvement of subordinates in the decision process – directive, negotiation, participation, and delegation. Similarly, Heller and Wilpert (1977) proposed five styles along an influence-power continuum: Own decision without detailed explanation, own decision with detailed explanation, prior consultation with subordinate, joint decision-making with subordinate, and delegation of decision to subordinate.

In view of the correlations among styles found in the studies cited above, three main styles have emerged in the literature relating leadership styles with the involvement of subordinates in decision-making: The directive/autocratic style, where the leader retains full control of the decision, the participative/consultative style, where the leader shares the decision with subordinates, and the delegative/group style, where the leader gives freedom to subordinates to make their own decisions (Oshagbemi, 2008; Yukl, 2002). For the purpose of this paper, we will use these three main leadership styles with the labels directive, participative and delegative.

The directive style, also referred in the literature as autocratic and instrumental, is characterized by all decisions being made by the leader without the involvement of team members. This style provides structure to team members by delivering specific guidance, that is, telling them what to do and how to do it (Bass et al., 1975; House, 1996; Oshagbemi, 2008; Yukl, 2002). Research on this style indicates that it tends to be associated with lower satisfaction of team members (Foels et al., 2000) and that it may enhance team efficiency and performance, particularly in the short term and with low-experience team members (Li et al., 2018; Lorinkova et al., 2013; Martin et al., 2013; Yun et al., 2005). It is, however, unlikely to be associated with extra effort, since it has no impact on proactive behaviors (Martin et al., 2013) and appears to decrease team creativity (Li et al., 2018).

The participative style, where there is joint decision making between the leader and team members and the leader encourages team members to influence the process, is also referred in the literature as democratic or supportive (Foels et al., 2000; House, 1996; Koopman & Wierdsma, 1998).

Research on this style indicates that it tends to be associated with higher satisfaction (Foels et al., 2000) and that it increases efficiency and performance, particularly in the long term (Guzzo et al., 1985; Huang et al., 2010; Li et al., 2018). Participative leadership is also positively associated with extra effort, in the form of organizational citizenship behavior, as well as with team creativity and innovation (Li et al., 2018; Somech, 2006). In the particular case of crew members, the results of Bliss and Fallon (2003) show that participative leadership leads to a more appropriate reaction to alarms than directive leadership.

The delegative style, where the leader gives team members freedom to make their own decisions, is also referred in the literature as the empowering style (Yukl, 2002; Zhang & Bartol, 2010). Research on this style indicates that it tends to increase both satisfaction and performance of team members (Amundsen & Martinsen, 2015; Vecchio et al., 2010). However, positive effects on performance appear to occur in the long term and with high-experience teams (Lorinkova et al., 2013; Martin et al., 2013; Yun et al., 2005). Previous research also indicates that this style increases proactive behaviors (Martin et al., 2013) and creativity (Zhang & Bartol, 2010).

Based on these studies, we proposed:

H1 Directive leadership is negatively associated with perceptions of team members' satisfaction and extra effort.

H2 Participative leadership is positively associated with perceptions of team members' satisfaction and extra effort.

H3 Delegative leadership is positively associated with perceptions of team members' satisfaction and extra effort.

Communication Styles

The seminal work of Norton (1978) provided the foundation for the communicator style construct, defined as the way one verbally and paraverbally interacts to signal how literal meaning should be taken, interpreted, filtered, or understood. More recently, de Vries et al. (2009) present a similar definition, proposing that communication styles are the characteristic way a person sends verbal, paraverbal, and nonverbal signals in social interactions.

Over the years, several typologies of communication styles have been proposed (e.g., de Vries et al., 2009; Dillard et al., 1999; Hansford & Hattie, 1987; Ivanov & Werner, 2010; Norton, 1983; Snavely & McNeill, 2008; Waldherr & Muck, 2011). While no model of communication styles has become widely accepted (de Vries et al., 2009; Leung & Bond, 2001; Waldherr & Muck, 2011), the distinction between aggressive, passive, and assertive communication is widely used in both academic articles and training courses from other sectors of economic activities (e.g., Agarwal, 2019; Dasgupta et al., 2013; Paterson, 2000; Pipaş & Jaradat, 2010; Tripathy, 2018; Waters, 1982; Zuker, 1983).

When using a passive communication style, individuals do not express themselves and do not pursue their interests (Dasgupta et al., 2013; Waters,

1982). Refraining from expressing opinions and feelings might allow individuals to avoid conflict but it also limits their possibility of conveying their message in a clear way (Agarwal, 2019; Pipaş & Jaradat, 2010). By contrast, aggressive communication is an expressive and self-enhancing style that does not refrain from the possibility of conflict (Dasgupta et al., 2013; Waters, 1982; Yang et al., 2020). It often involves personal attacks or attempts to diminish the other person through the use of criticism, irony, sarcasm, or provocative expressions (Agarwal, 2019; Pipaş & Jaradat, 2010). While the passive and the aggressive style might be considered as extreme styles, the assertive style balances self-expression and self-enhancement with the need to respect others and to create mutual understandings (Dasgupta et al., 2013; Pipaş & Jaradat, 2010; Waters, 1982; Yang et al., 2020). It involves clear expression of thoughts and opinions, in an objective and honest way, but also openness and tolerance to others' points of view (Agarwal, 2019; Dasgupta et al., 2013).

Previous research indicates that the assertive communication style tends to lead to better results than the other two. For example, there is some evidence that assertiveness is associated with higher satisfaction (Ma & Jaeger, 2010; Pearsall & Ellis, 2006) and higher performance (Pearsall & Ellis, 2006; Smith-Jentsch et al., 1996). By contrast, aggressiveness is associated with lower satisfaction (Infante & Gorden, 1985; Madlock & Kennedy-Lightsey, 2010; Madlock & Dillow, 2012; Wrench & Punyanunt-Carter, 2005).

In a study simultaneously analyzing the three styles of communication, Dasgupta et al. (2013) found that assertive communication was positively related with satisfaction with communication and with perception of support from the leader, but passive communication and aggressive communication were negatively related to these variables. Job performance was positively associated with assertive communication, negatively associated with aggressive communication, and non-significantly associated with passive communication.

Other studies have analyzed the relationship between communication styles and variables that are related to satisfaction and performance. Agarwal (2019) analyzed the effects of passive, aggressive and assertive communication of leaders on employees' psychological capital and cyberloafing activities. While psychological capital refers to a positive psychological state and may be associated with higher satisfaction, cyberloafing refers to workplace deviance behavior (using the internet for non-work-related purposes) and may be related to lower effort. Results from this study show that assertive communication is positively related to psychological capital and cyberloafing activities. For passive and aggressive communication, the effects were reversed, that is, these communication styles were negatively related to psychological capital and positively related to cyberloafing activities. The study of Yang et al. (2020) found that assertiveness and

aggressiveness have, respectively, a positive and negative association with trust, which in turn is positively associated with work engagement.

Based on these studies, we proposed:

H4 Assertive communication is positively associated with perceptions of team members' satisfaction and extra effort.

H5 Aggressive communication is negatively associated with perceptions of team members' satisfaction and extra effort.

H6 Passive communication is negatively associated with perceptions of team members' satisfaction and extra effort.

Several authors have suggested that leadership styles and communication styles might be associated (Bliss & Fallon, 2003; Crews et al., 2019; de Vries et al., 2010; Holladay & Coombs, 1993). For the particular case of aviation, some authors have suggested that the style of communication present in the cockpit is often guided by the leadership style of the pilot-in-command (Bliss & Fallon, 2003; Helmreich et al., 1999). This association, however, remains an under-researched topic.

While we were unable to find studies relating the three leadership styles with the three communication styles, it stands to reason to expect some associations. For example, an aggressive communication style is likely to be positively associated with the directive style, where leaders obtain results through telling or even imposing directions on team members (de Vries et al., 2010; Oshagbemi, 2008; Yukl, 2002). Conversely, aggressive communication is more likely to be negatively associated with leadership styles where the leader wishes to elicit engagement and responsibility of team members, as in the case in participative and delegative leadership. Passive communication appears to be more appropriate for situations not requiring self-enhancement, as is the case of delegative leadership, where the leader opts for not interfering with the teams' decisions (Oshagbemi, 2008; Vecchio et al., 2010; Yukl, 2002). Thus, it is arguable that passive communication will be positively associated with delegative leadership, but negatively associated with directive and participation leadership. Finally, the assertive communication is likely to be positively associated with participative leadership, where the leader shares the decision-making process with team members and therefore needs to simultaneously pursue his views and be open to others' views (Foels et al., 2000; Oshagbemi, 2008; Yukl, 2002).

Based on this reasoning, we proposed:

H7 Directive leadership is positively associated with aggressive communication and assertive communication, and negatively associated with passive communication.

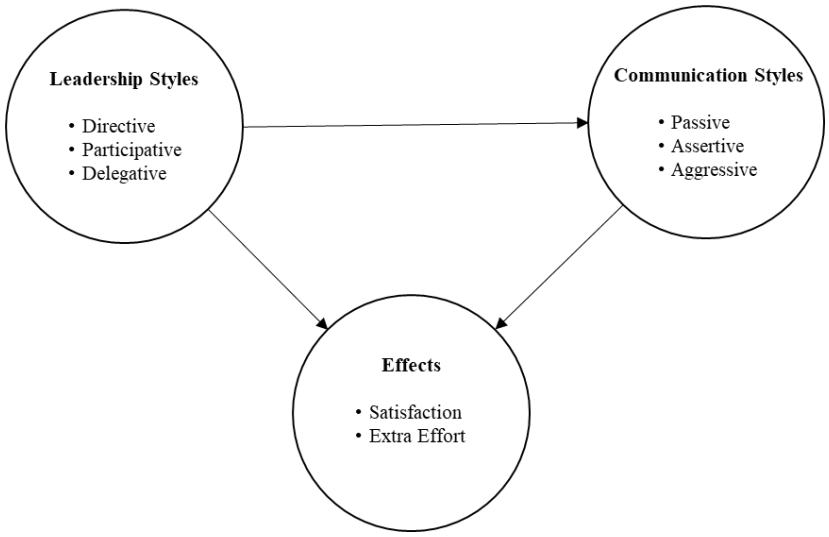
H8 Participative leadership is positively associated with assertive communication and negatively associated with passive communication and aggressive communication.

H9 Delegative leadership is positively associated with passive communication and negatively associated with assertive communication and aggressive communication.

Figure 1 depicts the research model, with the variables and relationships under study.

Figure 1

Research Model



Method

Participants and Procedures

We contacted the Portuguese Airline Pilots´ Association (APPLA), asking for permission to send an online survey to their members via the platform Google Docs. The Association sent the survey link to all pilots via e-mail and the responses were collected directly by the researchers. This process took place in the second half of 2019. Of the total 1257 members of APPLA, 105 valid answers were received. These include 96 (91.4%) men and 9 (8.6% women, with an average age of 45 years. Participants have the following professional categories: 68 (64.8%) are Captains and 37 (35.2%) are First Officers. The majority of participants (75.5%) have a university degree, while 28 (25.5%) participants completed high school (12 years of education). Participants fly the following aircraft typology: Airbus A320 – 38; Airbus A330/A340 – 33; Embraer 190/195 – 15; Boeing 737/747/767/777 – 5; ATR7-600/ DHC8-400 – 5; and other aircraft – 9.

Measures

Given that the study was conducted in Portugal, we attempted to identify measures for which a Portuguese version, validated in Portugal, was available.

Leadership styles were measured with the 10-item instrument of (Rouco, 2012). This instrument includes three scales: Directive leadership style, with four items (e.g., “I make decisions without consulting team members”), participative leadership with 3 items (e.g., “I encourage team members to share their opinions and ideas”), and delegative leadership style with 3 items (e.g., “I let team members make decisions on their own”).

Communication styles were measured with the instrument of Neves et al. (2015). The instrument includes three scales: Assertive communication with 13 items (e.g., "When I do not agree with someone, I present my point of view calmly"), aggressive communication with 11 items (e.g., "I do not hesitate to use sarcasm if I feel it helps me win an argument", and passive communication with 12 items (e.g., "I am not at ease when talking to others").

Satifaction was measured with the instrument of Rouco (2012), adapted from Avolio and Bass (2004), with 4 items (e.g., "Team members manifest their satisfaction for working with me").

Extra Effort was measured with the instrument of Rouco (2012), adapted from Avolio and Bass (2004), with 4 items (e.g., "I enhance team members' performance standards that go beyond what is usual").

All instruments were answered with a 5-point Likert-type frequency scale ranging from 1= rarely to 5= almost always.

Results

To test the hypotheses under study, we use structural equation modelling (SEM), with partial least square analysis (PLS). PLS provides reliable estimates in situations where covariance-based models fail and is particularly recommended for exploratory research with small sample (Henseler et al., 2014). The software used was Smart PLS version 3.0 (Ringle et al., 2015).

In the following sections, we test the measurement models and the structural model. As far as the measurement models are concerned, we test the eight latent variables under study in terms of their reliability and validity. Subsequently, we test the structural model in terms of the relationships established between the latent variables.

Measurement Models

Initial analyses indicated a need to eliminate some items from the model due to poor reliability (standardized loadings below 0.6). Table 1 shows the indicators retained for each latent variable, as well as their means, standard deviations, and standardized loadings.

Table 1

Means, Standard Deviations, and Standardized Loadings of Indicators (total sample)

Latent variables	Indicators	Mean	Std Deviation	Loadings	Bootstrap t-test	p-value
Directive Leadership	DL_1	1.962	0.935	0.870	11.674	0.000
	DL_2	1.790	1.002	0.856	13.312	0.000
Participative Leadership	PL_1	4.352	0.662	0.744	11.287	0.000
	PL_2	4.476	0.806	0.760	15.208	0.000
	PL_3	4.400	0.751	0.705	7.357	0.000
Delegative Leadership	DG_1	3.914	0.885	0.856	7.876	0.000
	DG_2	3.771	0.969	0.726	3.952	0.000
Passive Communication	PC_1	1.400	0.579	0.641	7.132	0.000
	PC_2	1.619	0.877	0.767	11.989	0.000
	PC_3	1.857	0.95	0.827	16.166	0.000
	PC_4	1.429	0.688	0.742	11.719	0.000
Assertive Communication	AC_1	4.200	0.899	0.757	8.116	0.000
	AC_2	4.371	0.721	0.710	9.054	0.000
	AC_3	4.305	0.719	0.664	7.871	0.000
	AC_4	3.876	1.11	0.751	9.458	0.000
Aggressive Communication	AG_1	2.048	0.919	0.739	6.509	0.000
	AG_2	1.295	0.515	0.736	6.645	0.000
	AG_3	1.952	1.018	0.752	6.607	0.000
	AG_4	2.21	1.193	0.739	6.046	0.000
Satisfaction	ST_1	4.352	0.569	0.803	17.617	0.000
	ST_2	4.314	0.574	0.834	24.96	0.000
	ST_3	4.210	0.529	0.751	17.644	0.000
	ST_4	4.457	0.69	0.615	8.412	0.000
Extra Effort	EE_1	4.267	0.651	0.639	6.989	0.000
	EE_2	4.105	0.689	0.721	10.967	0.000
	EE_3	3.962	0.729	0.888	40.292	0.000
	EE_4	4.086	0.664	0.816	23.782	0.000

To test for reliability, we analyzed the composite reliability of the eight latent variables. Table 2 shows that, in all cases, the composite reliability is above the threshold of 0.7, indicating that there are no problems of reliability (Hair et al., 2011).

To test for validity, we assessed convergent validity and discriminant validity. For convergent validity, two assessments were undertaken. First, we analyzed the Average Variance Extracted (AVE), for which the threshold is 0.5 (Hair et al., 2011; Henseler et al., 2009; Sarstedt et al., 2014a). Table 2 shows that AVE is above 0.5 for all latent variables. Second, we calculated bootstrap t-statistics of the indicators' standardized loadings (Anderson & Gerbing, 1988). They were all found to be significant at the 1% significance level ($t>3.29$; $p<0.001$), thus indicating a high convergent validity.

Table 2

Composite Reliability and Average Variance Extracted (Total Sample)

Latent variables	Composite reliability	Average variance extracted (AVE)
Directive Leadership	0.854	0.745
Participative Leadership	0.780	0.542
Delegative Leadership	0.772	0.63
Passive Communication	0.834	0.558
Assertive Communication	0.813	0.521
Aggressive Communication	0.830	0.55
Satisfaction	0.840	0.571
Extra Effort	0.853	0.596

As far as discriminant validity is concerned, we followed Fornell and Larcker, (1981) criterion and compared the square root of the AVE with the correlation for each pair of latent variables. Table 3 shows that, for all pairs, the square root of the AVE is higher than the correlation. This indicates that each latent variable shares more variance with its own measurement than with other constructs, and thus provides evidence of discriminant validity.

Table 3

Correlations between latent variables and square root of average variance extracted (total sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Directive Leadership (1)	**0.863**							
Participative Leadership (2)	-0.352	**0.736**						
Delegative Leadership (3)	-0.191	0.469	**0.794**					
Passive Communication (4)	0.251	-0.266	-0.132	**0.747**				
Assertive Communication (5)	-0.264	0.333	0.250	-0.581	**0.722**			
Aggressive Communication (6)	0.313	-0.296	-0.142	0.389	-0.237	**0.741**		
Satisfaction (7)	-0.157	0.355	0.255	-0.345	0.482	-0.161	**0.755**	
Extra Effort (8)	-0.255	0.456	0.275	-0.398	0.426	-0.141	0.686	**0.772**

Note. Numbers in bold refer to the square root of the AVE.

Structural Model

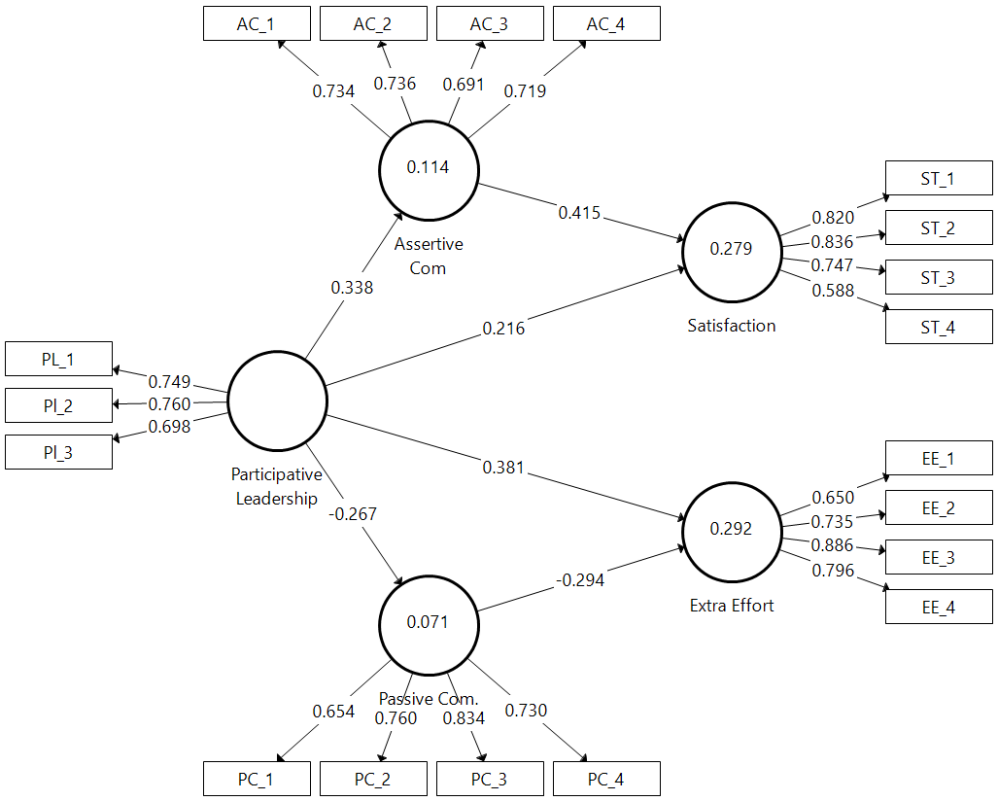
Since there was evidence of reliability and validity in the measurement models, we proceeded to the analysis of the structural model, in order to assess the relationships under study (Henseler et al., 2009). Given that the sample

included Captains and First Officers, it would be relevant to analyze whether the model functions differently in these two subsamples. However, the subsample of First Officers had only 37 participants, whereas the minimum required would be 58 (Hair et al., 2017). Consequently, we only analyzed the model in the total sample and in the subsample of Captains.

In the total sample, using bootstrapping to analyse the significance of the path coefficients, we found that, of the 21 direct relationships under study, only seven presented a t value above 1.96 ($p < 0.05$) and were therefore significant. Four of these significant relationships relate to the effects of Participative Leadership, which has a positive effect on Assertive Communication ($\beta=0.338$, $p<0.01$), Satisfaction ($\beta=0.216$, $p=0.005$) and Extra Effort ($\beta=0.381$, $p<0.01$), and a negative effect on Passive Communication ($\beta=-0.267$, $p<0.01$). Therefore, H2 is fully validated and H8 is only partially validated. The remaining significant relationships include a positive effect of Assertive Communication on Satisfaction ($\beta=0.415$, $p<0.01$), a negative effect of Passive Communication on Extra Effort ($\beta=-0.294$, $p=0.001$), and a positive effect of Directive Leadership on Aggressive Communication ($\beta=0.237$, $p=.033$). These results indicate, respectively, that H4. H6, and H7 are only partially validated.

Directive Leadership, Delegative Leadership, and Aggressive Communication do not have any significant relationship with the dependent variables Satisfaction and Extra Effort, and therefore H1, H3, and H5 were not validated. Given the absence of significant relationships, these three variables were deleted from the model. Figure 2 presents the final structural model for the total sample.

Figure 2
Final Structural Model (Total Sample)



When analyzing the subsample of Captains, the results are very similar for direct and indirect relationships (Table 4 and Table 5). However, it is noteworthy that the negative relationship between Passive Communication and Extra Effort is stronger when only the Captains are considered (β=-0.437 for Captains*;* β=-0.294 in the total sample***).***

Table 4 presents the significant direct effects of this model, with the bootstrapping t-test of the path coefficients and their effect sizes (f^2). In the total sample, the effect sizes of the path coefficients are all weak, except for the relationships between Participative Leadership and Extra Effort, and between Assertive Communication and Satisfaction, where the effect size is medium (Cohen, 1988). In the Captains subsample, the results are similar but the effect size of the relationship between Passive Communication and Extra Effort is medium and close to strong.

Table 4
Significant Direct Effects

Relationship	β	*t*	*p*	f^2
Total sample				
Participative Leadership-> Assertive Communication	0.338	4.243	0.000	0.129
Participative Leadership -> Passive Communication	-0.267	3.586	0.000	0.077
Participative Leadership -> Satisfaction	0.216	2.791	0.005	0.057
Participative Leadership -> Extra Effort	0.381	4.754	0.000	**0.191**
Assertive Communication -> Satisfaction	0.415	5.451	0.000	**0.211**
Passive communication -> Extra Effort	-0.294	3.367	0.001	0.114
Captains subsample				
Participative Leadership-> Assertive Communication	0.297	2.808	0.005	0.097
Participative Leadership -> Passive Communication	-0.257	2.592	0.010	0.071
Participative Leadership -> Satisfaction	0.242	2.395	0.017	0.073
Participative Leadership -> Extra Effort	0.360	3.330	0.001	**0.202**
Assertive Communication -> Satisfaction	0.386	3.456	0.001	**0.184**
Passive communication -> Extra Effort	-0.437	4.755	0.000	**0.298**

Table 5 presents the significant indirect effects of the model. In the total sample, the results indicate that Assertive Communication mediates between Participative Leadership and Satisfaction (β=0.140, p=0.001), while Passive Communication mediates between Participative Leadership and Extra Effort (β=0.078, p=0.001). The results are similar in the Captains subsample, where Assertive Communication also mediates between Participative Leadership and Satisfaction (β=0.115, p=0.030), and Passive Communication mediates between Participative Leadership and Extra Effort (β=0.112, p=0.039).

Table 5
Significant Indirect Effects

Relationship	β	*t*	*p*
Total sample			
Participative Leadership -> Assertive Communication-> Satisfaction	0.140	3.381	0.001
Participative Leadership -> Passive Communication-> Extra Effort	0.078	2.255	0.001
Captains subsample			
Participative Leadership -> Assertive Communication-> Satisfaction	0.115	2.168	0.030
Participative Leadership -> Passive Communication-> Extra Effort	0.112	2.068	0.039

To analyze predictive relevance, we used blindfolding to calculate Stone-Geiser's Q^2. Since in the values of Q^2 are above zero for both Extra Effort and Satisfaction, the model is considered to have predictive relevance (Hair et al., 2011). We analyzed the coefficient of determination (R^2) in order to evaluate the explanatory power of the model (Sarstedt et al., 2014b). In the total sample, the model explains 29.2% of variance for Extra Effort and 27.9% of Satisfaction. In the Captains subsample the model explains 40.1% of

variance for Extra Effort and 26.3% of Satisfaction, again showing a stronger impact of Passive Communication on Extra Effort.

Discussion

As far as the outcomes of leadership styles are concerned, the results indicate that Directive Leadership and Delegative Leadership are not perceived by airline pilots as associated with their teams' Satisfaction and the Extra Effort. By contrast, Participative Leadership is significantly and positively associated with both Satisfaction and Extra Effort. This result is in line with previous research in other contexts which has provided evidence of the positive outcomes of Participative Leadership for satisfaction and performance (Foels et al., 2000; Guzzo et al., 1985; Huang et al., 2010; Li et al., 2018; Lorinkova et al., 2013; Martin et al., 2013). In particular, results are in accordance with the work of Martin et al. (2013), who showed that although both Directive Leadership and Participative Leadership may increase performance, only Participative leadership increased proactive behaviors, an issue much connected with Extra Effort. The study of Huang et al. (2010) also indicates that participative leadership is associated with extra effort, in the form of organizational citizenship behavior.

The fact that airline pilots appear to consider that the participative style as more associated with team effects than the directive or delegative style is particularly relevant in the aviation context. Nearly four decades ago, Foushee (1984) argued that a strong group norm of shared responsibility is necessary for flight crews. Participative leadership, drawing on the inputs of all group members, is particularly important when safety is a major concern (O'Dea & Flin, 2001). In aviation, participative leadership may enhance proactive behaviors to restore communication before human error occurs, especially during periods of disruption or high workload (Bliss & Fallon, 2003).

The results on the relationships between leadership styles and communication styles further highlight the importance of Participative Leadership in aviation. Participative leadership is positively associated with Assertive Communication and negatively related with Passive Communication. Previous studies put forward the importance of assertive communication, showing that the extent to which crew members exchange information, opinions, and even arguments, is crucial for avoiding incidents and accidents (Bourgeon et al., 2013; Bowers et al., 1998; Kanki, 2010). On the contrary, a passive communication, where crew members do not speak up when necessary, has been found to be associated with accidents (Ginnett, 2010). While the results of the study also indicate that Directive Leadership is perceived as positively associated with Aggressive Communication, Crew Resource Management activities often stress the fact that aviation problems often steam from the airline pilots exerting an excessive authoritarian control and an aggressive communication style (Kanki, 2010).

Finally, results indicate that airline pilots perceive that Participative leadership increases Satisfaction by enhancing Assertive communication and

increases Extra Effort by reducing Passive Communication. While the results that Assertive Communication is positively associated with Satisfaction in in line with previous studies (Dasgupta et al., 2013; Ma & Jaeger, 2010; Pearsall & Ellis, 2006), it is unclear why there is no significant relationship between Assertive Communication and Extra Effort. Previous studies suggested a positive relationship between Assertive Communication and performance (Pearsall & Ellis, 2006; Smith-Jentsch et al., 1996), but this relationship may not apply similarly for the particular case of Extra Effort. Similarly, while the results that Passive Communication is negatively associated with Extra Effort in in line with what was hypothesized, it is unclear why there is no significant relationship between Passive Communication and Satisfaction, for which previous studies also suggested a negative relationship (Agarwal, 2019; Dasgupta et al., 2013). The relationship between Passive Communication and Extra Effort appears to be stronger in the Captains subsample, which may indicate that as airline pilots acquire more experience and progress in their careers, they become more aware of the negative impacts of Passive Communication.

Conclusion

Some theoretical contributions may be derived from this study. First, previous studies on the outcomes of leadership styles have provided ambiguous results, indicating that they differ from situation to situation (Lorinkova et al., 2013; Somech, 2006; Yun et al., 2005). By studying the particular case of airline pilots, this study analyses the effects of leadership styles where safety is a major concern and where non-routine situations may require dynamic decision-making processes. Secondly, while the relations of leadership styles with communication styles and their outcomes remain under-researched (de Vries et al., 2010), this study provides a contribution to this gap in the literature. The results indicate that participative leadership enhances satisfaction and extra effort both directly and indirectly, where the indirect effects are achieved through communication styles. Participative leadership indirectly enhances satisfaction by enhancing assertive communication. On the other hand, participative leadership reduces passive communication, which in turn decreases extra effort.

Findings from this study may also have some practical applications, namely in what concerns the selection and training of pilots. As far as the selection is concerned, results indicate that assertive communication and participative leadership style may be relevant selection criteria. Similarly, the content on training courses may include assertive communication and participative leadership as essential features for pilots, in parallel with their technical skills.

The sample size did not allow us to conduct multi-group analysis. This analysis would be relevant to analyze the effect of demographic variables, such as years of experience and education level of pilots, on the relationships

under study. In particular, a comparison between Captains and First Officers appears to be an interesting avenue for future research.

Another limitation of the study is that variables are analyzed through the perceptions of airline pilots. The analysis of perceptions is relevant for it has long been established in social sciences that perceptions, more than reality, shape behavior (Thomas & Thomas, 1928). Thus, if airline pilots perceive that a participative leadership style and an assertive communication style are associated with more positive results, they are more likely to continue to engage in those styles. However, in future studies it would be relevant to compare the assessment of team satisfaction and performance provided by airline pilots with the same assessment provided by team members.

Since this study was undertaken in Portugal, it is possible that characteristics of the Portuguese culture underlie the results found. Therefore, we suggest that future studies compare samples of airline pilots from different countries, so that the generalizability of results can be ensured.

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