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REVIEW ARTICLE

Influence of executive functioning and emotional regulation on effective career choice

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ABSTRACT

Although emotional management and executive functioning have been widely associated with effective decision making, not much attention has been paid to their role in vocational decision making. This study analyzed the relationship between insecurity in career choice, executive functioning, and emotion regulation in university students. Results show how executive dysfunction significantly predicted insecurity in vocational choice. Its mediating role between emotional management and the academic-vocational decision-making process was also confirmed. Our findings contribute to the understanding of vocational choice in youth and suggest the need to consider both variables in guidance programs, to prevent subsequent dissatisfaction with the vocational decision.

Keywords: decision making; vocational guidance; career; choice executive functions; emotional regulation

1. Introduction

Decision-making (DM) is a very relevant executive process throughout anyone's life. In young people its importance is accentuated, especially from the end of the compulsory secondary education stage[1,2]. This is when students begin to decide on vital aspects related to their academic and professional life[3], being career choice one of the most important decisions of their lives[4]. An effective career choice can be understood as a process in which alternatives are identified, the most suitable ones for the student are confirmed and, after analyzing them, the best one is identified[5], with the objective that the person makes choices with the greatest possible security and information and thus avoids situations such as abandonment of the chosen career, a problem that is very present in society[6]. On many occasions, students do not have the necessary maturity to do so, in part because the regions of the prefrontal cortex, in which some relevant components related to these functions are located, are not fully developed[7,8]. Studying the role of these components in relation to effective career choice is necessary since it provides more information for planning appropriate actions when preparing students to make decisions about what they want to do once they have completed their secondary and/or post-secondary education.

As we have been saying, DM has a high executive component. When we speak of executive functions (EF) we refer to a set of skills that regulate a person's actions and behaviors to solve problems and achieve

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short, medium and long-term goals. These include planning, cognitive flexibility, working memory and inhibition[9]. Literature proposes executive maturation as a predictor of success and effective adaptive functioning in daily life[10,11]. Therefore, it would be logical to think that effectiveness in academic-vocational DM is also related to executive maturity. DM involves being cognitively flexible, planning the process, being able to inhibit choices, etc., all of which are executive processes. In this sense, the work of Welsh and Schmitt-Wilson[12], which warns of the absence of research in this field, suggests that certainty in vocational DM is associated with good executive performance. They propose this variable as possibly the most important cognitive factor in effective DM.

In relation to executive elements most commonly linked to DM, working memory has been one of the most studied executive constructs[12–15]. The results of these investigations show a significant association between both constructs, showing a more competent DM in those subjects with a higher working memory performance.

Inhibition and planning have also been the focus of some research. For inhibition, it has been shown to be related to decisions that involve risk[16–18]. Regarding planning, several studies have reported a positive association between this variable and DM[12,16]. Results showed that favorable executive performance had a significant effect on vocational DM and predicted higher levels of certainty in career choice.

The PIC model, one of the most widespread models in the career DM process, distributes this decision in three stages: Prescreening, In-depth exploration, and Choice[4,19]. All these stages are influenced by a high executive component, requiring good planning skills, inhibition, working memory, and organization to successfully overcome them. Thus, the influence of executive functions on effective academic DM is once again evident.

Along with good executive functioning, there is a great deal of research showing the relationship and influence that emotions have on the academic world, particularly on academic achievement[20–22]. Emotional regulation (ER) is defined as a process by which people try to understand what emotions we experience, when we experience them and how we express them, in order to manage situations and adapt our emotional responses to the context[23]. Studies such as Burić et al.[20] highlight the importance of ER strategies to cope with academic situations in the most appropriate way. For example, Jamieson et al.[24] found that the reappraisal of stress arousal, an ER strategy to cope with negative emotions, improved academic performance. Students who have difficulties in handling anxiety or anger, or who are more likely to present these states, make worse decisions than those who do not, since these emotions lower their motivation towards learning and commitment to educational activities[22].

In line with these studies, Singh and Singh[25] state that difficulties in ER are negatively associated with motivation. These authors advocate working on DM in relation to (intrinsic) motivation as an effective mean for correct career choice, reducing the probability of making wrong choices. According to their ideas, the maladaptive management of negatively valanced emotions in situations of academic achievement can lead to demotivation with the career, so these variables are affecting satisfaction with vocational DM.

Sitting in this context of career choice, we must bear in mind that this type of DM brings with it feelings related to stress or anxiety, which must be properly managed[26]. In this sense, it is feasible to think that without good executive functioning and, therefore, without a good ER, decisions will be made in worse conditions, both in terms of certainty, conformity and motivation, than if there is previous training or attention to these variables[27]. The literature has already linked the two cognitive variables described above: executive functioning and emotional regulation. The results of several studies indicate that young people with emotional management problems, as well as deficits in EF, tend to make wrong decisions[28–30].

So far, career choice has been linked to other variables such as interests, attitudes, aptitudes, etc., leaving aside cognitive variables such as those selected in this study. Research has not paid special attention to the role of emotional and cognitive development as important variables in the process of vocational identity formation and thus in the process of vocational DM. Nor has it given a leading role to executive functioning, being selected by studies such as Welsh and Schmitt-Wilson[12] as a key variable. Therefore, we are facing a current educational challenge, to be able to help students to choose their career in a satisfactory and effective way with an adaptive management of the emotions derived from the process.

For this reason, the aim of our research is to understand the relationship between executive functioning, ER and insecurity in career choice. As a specific objective we want to know if the role of executive functioning is really key and even more important than that of emotional regulation in the vocational DM process.

Similarly, the research question around which this study revolves is to find out whether there is a relationship between these three variables, as suggested by the literature reviewed, and to learn more about how they are related. In this way, the results can be taken into account for the development of theoretical models of vocational DM that include cognitive variables that have not been taken into account so far. Likewise, these results will support the design of vocational guidance programs and the work on the variables involved to facilitate the process.

Along these lines, we propose the following hypotheses:

1) It is expected that higher levels of executive dysfunction and emotional dysregulation are associated with greater insecurity in the academic-vocational decision.

2) It is expected that deficits in executive functioning have a greater predictive weight in the face of ER difficulties in career choice insecurity.

3) The association between ER difficulties and choice insecurity is expected to be mediated by deficits in executive functioning.

2. Materials and methods

2.1. Participants

One hundred and fifty university students (128 women, 21 men, 1 non-binary gender) from different Spanish university institutions participated in this research **Table 1**. The ages of the participants were between 18 and 27 years (M = 20.919; WD = 2.552). The area of Social and Legal Sciences was the most represented in our sample (n = 86). 79.3% stated that the degree or master's degree they were studying was their first choice. The inclusion criteria were to be of legal age (>18), and to be enrolled in Degree, Double Degree or Master's studies in a faculty of any Spanish university institution.

Table 1. Demographic variables of the sample.

Variables		**Sample (N = 150)**		
		M	*DT*	*N*
Age		20.919	2.552	-
Gender		-	-	-
	Female	-		128
	Male	-		21
	Non binary	-		1

Table 1. (*Continued*).

Variables		Sample (N = 150)	
Type of studies		-	-
	Degree	-	131
	Double degree	-	12
	Master's degree	-	7
Study area		-	19
	Social/legal sciences	-	86
	Health sciences	-	34
	Engineering/architecture	-	8
	Humanities/arts	-	11
	Sciences	-	11
Studying first choice		-	-
	Yes	-	119
	No	-	31

2.2. Measures

Different measures were used to evaluate the study variables.

Career Decision Scale (CDS[31]): It is an instrument formed by 18 items (2 on certainty and 16 on indecision) valued through a Likert-type scale ranging from 1 (little similarity with the item) to 4 (high similarity with the item) points. According to the work of Osipow[31], it is a valid instrument to measure satisfaction with career decision making. The reliability estimates obtained from university students are between 0.82 and 0.90[32]). In our study the internal consistency of the insecurity scale, the one used in the study, was good ($\alpha = 0.83$).

Dysexecutive Questionnaire (DEX[33]): DEX is an assessment tool for executive dysfunctions in daily life that is part of a larger battery of Behavioral Assessment of the Dysexecutive Syndrome (BADS[34]). This questionnaire consists of 20 5-point Likert-type items, scored between 0 (never) and 4 (very often). We have used the Spanish version of the scale[35], which has an ideal internal consistency for its use (0.91), being in our case ($\alpha = 0.87$).

Adult executive functioning inventory (ADEXI[36]): The instrument for evaluating executive functioning in adults is composed of 14 items evaluated through a Likert-type scale whose score ranges from 1 (definitely not true) to 5 (definitely true). This instrument assesses working memory (9 items) and inhibition (5 items). Previous research has shown very good internal consistency (a = 0.90) for the working memory subscale, but somewhat less (0.70) for the inhibition subscale[36]. In this research the reliability was very good for working memory ($\alpha = 0.84$) and good for inhibition ($\alpha = 0.68$).

Emotion Regulation Assessment[37]: It is a questionnaire made up of sixteen blocks with questions about strategies used to regulate an emotional situation. Each block is made up of 14 questions that refer to different emotional regulation strategies: three adaptive (acceptance, problem solving and re-evaluation) and 11 non-adaptive (related to self-criticism, concealment of emotional expression, suppression of emotional experience, and worry/rumor); and refers to an emotional situation (anxiety, anger, sadness/depression, happiness); an intensity of the emotion experienced (moderate, high) and a situation (social, achievement). In our study the blocks referring to negative emotions (anxiety, anger, sadness), experienced with a high intensity, in achievement situations focused on the academic field have been used. A total score was used for each of the emotion blocks.

Before each block of questions, a brief description of the identified emotion was presented to avoid confusion between them. The reliability of the scale for the emotion of anxiety was good (α = 0.74), for the emotion of anger it was very good (α = 0.84) and adequate for the emotion of sadness (α = 0.73).

2.3. Procedure

A non-probabilistic purposive sample was raised. Participants in the study were recruited through internal mail, social networks and posters on notice boards in various faculties of Madrid. The students received information about the objectives of the study, data protection, anonymity and consent to voluntary participation. After this, they voluntarily completed an online questionnaire that included questions about demographic variables and research evaluation instruments. The questionnaire was provided through a link (for dissemination by mail and social networks) or a QR code (for dissemination through bulletin board postings). The survey was available during the first quarter of the year 2023.

2.4. Data analyses

Data were analyzed with the 27th version of the statistical program SPSS. First, the normality of the variables included in the study was assured through the Kolmogorov-Smirnov test. After this, descriptive studies of the main study variables were carried out. A Pearson R correlation analysis was performed to investigate the relationship between variables included in the study. For the predictive study, hierarchical linear regression analyses were performed following the stepwise introduction method, introducing those variables of interest to our study that had correlated with the dependent variable. Previous analyses ensured the assumptions of normality, linearity and homoscedasticity. Finally, a mediational analysis was performed using the Process macro for SPSS (version 3.2). These were reproduced in 10,000 bootstrapping samples which, according to Hayes[38], are sufficient for the mediation analyses.

3. Results

3.1. Variables associated with insecurity in career choice

Table 2 shows the results of Pearson correlation analysis between the different variables studied.

Table 2. Associations between study variables.

	1	2	3	4	5	6	7	M	DT
CDS[1]	-	0.524**	0.374**	0.416**	0.423**	0.321**	0.354**	30.965	8.426
DEX[2]	-	-	0.627**	0.598**	0.410**	0.448**	0.284**	25.333	11.141
INH[3]	-	-	-	0.677**	0.208	0.174	0.204*	13.046	3.710
WM[4]	-	-	-	-	0.254*	0.315**	0.240*	20.459	5.695
REANS[5]	-	-	-	-	-	0.755**	0.644**	21.206	6.153
REDEP[6]	-	-	-	-	-	-	0.543**	20.425	6.050
REANGR[7]	-	-	-	-	-	-	-	19.023	7.327

**$p < 0.01$; *$p < 0.05$.
CDS[1] = Career Decision Scale[31]; DEX[2] = Dysexecutive Questionnaire[33]; INH[3] = ADEXI inhibition scale[36]; WM[4] = ADEXI Working Memory scale[36], REANS[5] = Emotion-anxiety regulation scale of Emotion Regulation Assessment[37]; REDEP[6] = Emotion-depressive regulation scale of Emotion Regulation Assessment[37]; REANGR[7] = Emotion-angry regulation scale of Emotion Regulation Assessment[37].

As it can be observed in the table, and according to hypothesis 1, scores referred to executive dysfunction (DEX, r = 0.524; $p < 0.01$; INH, r = 0.374; $p < 0.01$; WM, r = 0.416; $p < 0.01$) and to emotional dysregulation

(RANS, $r = 0.423$; $p < 0.01$; RDEP, $r = 0.321$; $p < 0.01$; RANGR, $r = 0.354$; $p < 0.01$) were positively and significantly associated with insecurity of choice.

3.2. Predictors of insecurity in academic-vocational choice

A hierarchical linear regression analysis was performed to find the predictors of insecurity in academic-vocational choice. The variables introduced in the model were grouped in two blocks: a) executive variables: total executive dysfunction (DEX), inhibition (INH) and working memory (WM) of ADEXI; and b) variables related to ER: emotional regulation of anxiety (RANS), emotional regulation of depression (RDEP), emotional regulation of anger (RANGR).

Variables related to executive functioning were introduced in the first step of the regression to control their influence on the total insecurity score. The regression data are shown in **Tables 3** and **4**.

Table 3. Predictors of insecurity in career choice (model 1).

Predictors	***R***	***R²***	**ΔR^2**	***β***	***t***	***F***
STEP 1						
INH	0.291	0.265	0.291^{***}	−0.007	−0.048	11.359^{***}
WM				0.164	1.247	
DEX				0.430^{**}	3.463	
Predictors	***R***	***R²***	**ΔR^2**	***β***	***t***	***F***
STEP 2						
INH	0.361	0.313	0.050^{*}	0.308	−0.149	7.535^{**}
WM				0.165	1.274	
DEX				0.363^{**}	2.762	
READ				0.289	1.898	
REDEP				−0.176	−1.213	
REANGR				0.125	1.053	

***$p = 0.000$; **$p < 0.01$; *p < 0.05.
CDS[1] = Career Decision Scale[31]; DEX[2] = Dysexecutive Questionnaire[33]; INH[3] = ADEXI inhibition scale[36]; WM[4] = ADEXI Working Memory scale[36], REANS[5] = Emotion-anxiety regulation scale of Emotion Regulation Assessment[37]; REDEP[6] = Emotion-depressive regulation scale of Emotion Regulation Assessment[37]; REANGR[7] = Emotion-angry regulation scale of Emotion Regulation Assessment[37].

The hierarchical regression showed how the variables introduced in the first step of model 1 represented 26.5% of the variance. After the entry of variables related to ER the total explained variance was 31.3%.

In model 2 (see **Table 4**), the variables related to emotional regulation were introduced in the first place. These explained 16.1% of the variance. In step 2, the explanatory power of the executive variables was increased to 31.3%. Total executive dysfunction as measured by DEX emerged as a significant predictor ($\beta = 0.363$; $t = 2.762$; $p = 0.012$).

Table 4. Predictors of insecurity in career choice (model 2).

Predictors	***R***	***R²***	**$\triangle R^2$**	***β***	***t***	***F***
STEP 1						
REANS	0.190	0.161	0.190^{**}	0.344	2.067	6.505^{**}
REDEP				−0.015	−0.096	
REANGR				0.140	1.079	

Table 4. (*Continued*).

Predictors	***R***	***R²***	**△*R²***	***β***	***t***	***F***
STEP 2						
READ	0.361	0.313	0.171***	0.289	1.898	7.535***
REDEP				−0.176	−1.213	
REANG				0.125	1.053	
INH				−0.020	−0.149	
WM				0.165	1.274	
DEX				0.363**	2.762	

***p = 0.000; **p < 0.01; *p < 0.05.
CDS[1] = Career Decision Scale[31]; DEX[2] = Dysexecutive Questionnaire[33]; INH[3] = ADEXI inhibition scale[36]; WM[4] = ADEXI Working Memory scale[36], REANS[5] = Emotion-anxiety regulation scale of Emotion Regulation Assessment[37]; REDEP[6] = Emotion-depressive regulation scale of Emotion Regulation Assessment[37]; REANGR[7] = Emotion-angry regulation scale of Emotion Regulation Assessment[37].

3.3. Mediators of insecurity in academic-vocational choice

Model 4 of the PROCESS macro was used to determine whether the indirect effect of the executive dysfunction variable on the emotional regulation of anxiety and insecurity of choice was significant (**Table 5**). The variable DEX was selected to be introduced in this model because of its predictive power of the dependent variable. According to the table, the association between ER of anxiety and insecurity through the mediator was significant. The total model explains 30.15%.

Executive dysfunction mediated between the relationship of ER of anxiety and insecurity (F [2.73] = 13,885, p = 0.000). The confidence interval of the executive dysfunction variable was different from 0 (0.073, 0.401), which supports its mediating role.

As it can be seen in **Table 5**, the total effect (c = 0.375, ET = 0.138, p = 0.008) was significant. The direct effect, however, was not (c' = 0.151, ET = 0.134, p = 0.262). These data confirmed hypothesis 3 describing the mediating role of executive dysfunction between emotional regulation of feelings of anxiety and insecurity.

Table 5. Multiple mediation model of executive functions for emotion-anxiety regulation and insecurity.

Constant									
		M_1 (Executive functions)					**Y (Insecurity)**		
Antece		**Coef.**	**ET**	***p***			**Coef.**	**ET**	***p***
X	a_1	0.626***	0.174	0.000	a_2	c'	0.151	0.134	<0.05
M_1	-	-	-	-	-	b_1	0.351***	0.105	<0.01
Consta	i_{M1}	13.236***	3.622	0.000	i_{M2}	i_{vy}	18.813***	2.802	0.000
		R^2 = 0.385			-	-	R^2 = 0.525	-	
		F [1.74] = 12.919			-	-	F [2.73] = 13.885	-	

Note: i_{M1}, i_{M2} and i_Y are regression interceptions.

A new mediation analysis was performed to study the indirect effect of the executive dysfunction variable on the relationship emotional regulation of depression-insecurity in career choice (**Table 6**).

As on the previous occasion, the variable DEX was selected to be introduced into this model because of its predictive power. **Table 6** shows how the association between the variables introduced was significant. The total model explained 27.07%.

Again, executive dysfunction was mediating between the ER of depression and insecurity (F [2.73] = 13,752, p = 0.000), its confidence interval did not contain 0 (0.063–0.360). The total effect (c = 0.327, ET = 0.135, p = 0.018) was also significant. However, the direct effect was not significant (c' = 0.086, SE = 0.005, p = 0.297).

Table 6. Multiple mediation model of executive functions for emotion-depressive regulation and insecurity.

Constant									
		M_1 (Executive functions)					**Y (Insecurity)**		
Antecedent		**Coef.**	**ET**	***p***			**Coef.**	**ET**	***p***
X (Emotion-depressive regulation)	a_1	0.532**	0.172	<0.01	a_2	c'	0.133	0.128	>0.05
M_1 (Executive functions)	-	-	-	-	-	b_1	0.364***	0.081	0.000
Constant	i_{M1}	16.185**	3.261	0.000	i_{M2}	i_Y	19.267*	2.632	0.000
	-	R^2 = 0.337			-	-	R^2 = 0.523		
	-	F [1.74] = 9.531			-	-	F [2.73] = 13.752		

Note: i_{M1}, i_{M2} and i_Y are regression interceptions.

Finally, a simple mediation analysis was performed to assess the mediating role of the executive dysfunction variable in the relationship of emotional regulation of anger-insecurity choice (**Table 7**). The model was also significant (F [2.73] = 17,834, p = 0.000), the confidence interval of the mediating variable did not contain zero (0.022, 0.260). The direct effect was significant (c' = 0.264, ET = 0.009, p = 0.009). The total effect of the model (c = 0.397, SE = 0.104, p = 0.000), which explained 40.54%, was also significant.

Table 7. Multiple mediation model of executive functions for emotion-angry regulation and insecurity.

Constant									
		M_1 (Executive functions)					**Y (Insecurity)**		
Antecedent		**Coef.**	**ET**	***p***			**Coef.**	**ET**	***p***
X (Emotion-angry regulation)	a_1	0.407**	0.141	<0.01	a_2	c'	0.264**	0.099	<0.01
M_1 (Executive functions)	-	-	-	-	-	b_1	0.327***	0.077	0.000
Constant	i_{M1}	18.865**	2.610	0.000	i_{M2}	i_y	−18.210*	2.275	0.000
	-	R^2 = 0.348			-	-	R^2 = 0.572		
	-	F [1.74] = 8.334			-	-	F [2.73] = 17.834		

Note: i_{M1}, i_{M2} and i_Y are regression interceptions.

4. Discussion

The main objective of this study was to understand the relationship between insecurity in career choice, executive functioning and the ER. Cognitive and emotional maturity, and consequently identity, are theoretically typical milestones of emerging adulthood. Among the factors associated with the formation of a person's identity is the choice of a profession. Although the literature has explored the relationship between identity development and vocational DM, research has not paid particular attention to the role of emotional and cognitive development of individuals in the process of vocational identity formation and, therefore, in the vocational DM process[12]. In this sense our results describe a positive and significant association between unsure career choice, lower executive performance in everyday activities and problems with ER.

As it has been said, generally little attention has been paid to the cognitive foundations of vocational development. Welsh and Schmitt-Wilson[12] work investigated the relationship between hot and cold executive

functioning, identity and security in vocational DM. In the same line of our results, this study reported the existence of a relationship between these variables and also warned of the need to carry out further research that would favor a better understanding of the process of vocational DM.

Welsh and Schmitt-Wilson[12] described higher levels of working memory, planning/organization, and organization of materials in those subjects with a more formed identity. In our study, working memory and inhibition stand out as variables related to accuracy in academic-vocational DM, in line with other previous studies [14,16,17]. Also, Marshall's research[39] showed how courage, optimism, positive affection, and life satisfaction were associated with better inhibition and working memory scores in college students. It is logical to think that the levels of certainty around future plans are stronger in those people who are better able to manage information online and inhibit options that are not significant for their decision.

In the current research, executive dysfunction also had a significant predictive role, its explanatory power being superior to that of emotional variables. There are several investigations that link executive functioning with the process of emotional regulation, so it was interesting to know which of these variables had greater weight in vocational DM. As mentioned above, Welsh and Schmitt-Wilson's study[12] proposed executive functioning as the most important variable in MD. The results of their study supported this finding and, like our research, also identified executive functioning as a predictor of confidence in vocational decisions. While Welsh and Schmitt-Wilson[12] work used laboratory instruments, ours used an ecological measure. Despite using different measurement tools, similar results have been reported.

Along these lines, academic DM models include different stages that require good executive functioning to successfully overcome them[4,19,40,41]. Therefore, the greater weight of executive functions versus emotional skills makes sense insofar as the academic and vocational DM process has a high executive component.

As described above, EF and ER are two strongly related constructs in the literature. Understanding this relationship is relevant to our research objectives. For this reason, a mediation analysis was carried out to prove if problems on ER could be linked to greater insecurity in choice and, in turn, if this association could be explained by executive functioning.

Numerous studies have shown that people with poorer executive functioning and regulation of difficult emotional situations are more likely to develop symptoms related to anxiety and depression, or to offer disproportionate responses, such as anger or rage, and therefore have a tendency to have poor DM [22,42,43]. In reference to anxiety, results of several investigations point out that young people who present anxiety symptoms and difficulties in its regulation, as well as deficits in EF, tend to make wrong decisions [28,29]. Similar results have been reported for depression, in which those with depressive symptoms and deficits in EF make worse decisions[28,30]. Other studies have reported that students who have difficulties in managing anger, or who tend to present these states more frequently, reflect worse performances in the academic environment than those people who do not have these responses[22]. Furthermore, it has been shown that anger behaviors in adolescents are positively related to risky decision making, characterized by impulsiveness and lack of inhibition[44], which are incompatible with a meditated and thoughtful decision, as is the case with academic-vocational DM.

According to our results, the mediating role of executive functioning in the relationship between emotional management and the academic-vocational DM process has been reflected. Previous literature shows some statements about the role of "affectivity-laden" cognitions[45] during the phases of career indecision. In the same line, the research by Lan trip et al.[46] reported that adolescents using adaptive ER strategies had more cognitive resources that allowed them better self-regulation and self-direction in life. Some research goes

further and introduces self-perception variables. According to the findings of Bullock-Yowell et al.[47], perceived self-efficacy on one's ability to plan, to set goals, was linked to better satisfaction in one's choices.

Altogether these results suggest that good executive functioning can lead to better management of negative emotions arising from stressful or transitional situations, providing the person with security about the choices made and satisfaction with their own life.

Therefore, this research is relevant, taking into account the results of the works of Rapoport et al.[48] and Gilmore and Cragg[49] who emphasize the lack of knowledge among teachers of the term EF and their role in adolescent learning and development. Counselors must make known the important role of executive processes and encourage educational practices that seek to develop them.

As for ER and training in strategies that help make this process effective, our results report the need for real and effective practices in this area, with a view to improving DM. Ford et al.[50] highlight that students' false belief in the control of emotions, considering them to be uncontrollable, and the use of non-adaptive ER strategies, negatively affects their psychological health, predicting the appearance of depressive symptoms, and therefore conditioning their life decisions. González et al. [21] point to the importance of dedicating time in the school years to teach students to understand, manage and confront their emotions and the situations that cause them to arise, as well as the procedures, techniques and strategies needed to deal with all types of emotions. Finally, Fernández-Pérez and Martín-Rojas[51] underline the direct influence of ER on academic performance.

With good training or practice in executive functioning, and a broad background of ER strategies, we can ensure that the decisions that students make at the most critical stages of their lives can be a little more accurate, thus avoiding all kinds of negative feelings that accompany wrong decisions.

5. Limitations

Despite the positive results, this study must be understood within its limitations. Firstly, the study sample, although large, is quite limited, considering the profile of the participants. Also, the sample recruiting method itself has its limitations, especially for the topic of the article. It would be very beneficial in future research to have a larger and more representative sample of each of the areas of study, which would allow studying the differences in means, and provide more information regarding the branches of knowledge. In this sense, a greater representation of the male gender would be equally positive.

Also this work was of a cross-sectional nature and the evaluation of emotional management may be affected by difficulties related to the moment the person being evaluated is living and, therefore, does not represent a true score of his or her capacity to regulate himself or herself. Moreover, executive functioning has been measured through a self-reporting instrument, that is, of a subjective nature. A follow-up from high school to university and an evaluation that combines self-report measures with objective laboratory tests could result in research with fewer limitations and more enriching results.

It would have been just as interesting to have more detail in the answers, mainly from those who are not satisfied with their choices, in order to know the reason for this dissatisfaction. In this way, we would obtain data on which to design possible DM workshops.

6. Conclusions and implications

This work supports theoretical models of DM that contemplate the inclusion of the work of ER and executive elements, as well as the link between the two variables. Our results confirm the importance of executive functioning and the regulation of emotions in DM processes suggesting the need to approach

interventions from this perspective. Guidance and tutorial action programs are an adequate space for the inclusion of EF and emotional management in relation to DM as an object of intervention. This is a preventive rather than a reactive vision. We believe it is necessary to work explicitly on executive functioning and adaptive ER throughout the entire training period, as this will have favorable repercussions on DM, not only in vocational education. This should be carried through to educational policies and laws that should include topics such as emotions and choice processes as part of the curriculum. Education professionals should know how to accompany students in vital processes such as vocational decision-making.

In the last two decades, executive functioning has been gaining ground in the world of education. However, research shows how some teachers still do not know or understand this term and therefore do not consciously include it in their teaching practices[48,52]. Our findings can be helpful to counselors and tutors in understanding the process of DM and in directing their interventions. Counselors should make known the important role of EF and ER and encourage practices that seek to develop them.

From the university we can help this task by organizing workshops focused on DM through self-knowledge, an essential variable to be able to decide in a way closer to the adequate one.

It can be concluded that it is necessary and beneficial to help students in their DM, particularly in those that involve a change of stage[53], to accompany them in a DM process that is of vital importance, and thus help them to make the best possible choices.

Author contributions

Conceptualization, MAC and GPSS; methodology, MAC and GPSS; data curation MAC and GPSS; formal analysis, GPSS; writing—original draft preparation, MAC and GPSS; writing—review and editing, MAC and GPSS.

Conflict of interest

The authors declare no conflict of interest.

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