Criminal Thinking: Exploring its Relationship with Prosocial Behavior, Emotional Intelligence, and Cultural Dimensions

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ABSTRACT

This study explores the relationship between criminal thinking and other variables related to criminal cognition. Prosocial behavior, emotional intelligence, and cultural dimensions were chosen to check their predictive capacity for criminal thinking. The research sample comprised 695 young university students and adults, chosen by a non-probabilistic sampling method. The instruments used were the Criminal Sentiments Scales (CSS-M), the Prosociality Scale, the Emotional Intelligence Scale (EQI-C), and the Scale of Cultural Dimensions in its Spanish adaptation. A MANOVA, correlations, and lineal regressions were conducted using SPSS 26 and a SEM was proposed with the results obtained. Criminal thinking's scores showed differences depending on the age of the participants. The SEM indicated that uncertainty avoidance is a good predictor of criminal thinking. Also, prosocial behavior and emotional intelligence are good predictors of uncertainty avoidance. Although future studies are needed, these results could be used to help future research, rehabilitation, or prevention programs.

El pensamiento delictivo: análisis de la relación con el comportamiento prosocial, la inteligencia emocional y las dimensiones culturales

RESUMEN

El presente estudio explora la relación entre el pensamiento delictivo y otras variables relacionadas con la cognición delictiva. Se eligió la conducta prosocial, la inteligencia emocional y las dimensiones culturales para comprobar su capacidad para predecir el pensamiento delictivo. La muestra constó de 695 estudiantes universitarios y adultos no universitarios elegidos por muestreo no probabilístico. Los instrumentos utilizados fueron las *Criminal Sentiments Scales* (CSS-M), la escala de prosocialidad, la escala de inteligencia emocional (EQI-C) y la escala de dimensiones culturales en su adaptación española. Las pruebas realizadas incluyen un MANOVA, correlaciones y regresiones lineales utilizando el programa SPSS 26 y finalmente se propone un modelo de ecuaciones estructurales (SEM) con los resultados obtenidos. Las puntuaciones en pensamiento delictivo mostraron diferencias significativas según la edad de los participantes. El SEM indicó que evitar la incertidumbre es un buen predictor del pensamiento delictivo. Además, la conducta prosocial y la inteligencia emocional son buenos predictores de la evitación de la incertidumbre. Aunque sean necesarios futuros estudios, estos resultados pueden ser útiles en próximas investigaciones y para mejorar los programas de rehabilitación o prevención del comportamiento delictivo.

The study of criminal thinking and criminal behavior is complex because they can be influenced by many variables. Traditionally, researchers have tried to explain them through the study of several biological, psychological, and social factors. As an example, Ward et al. (2019) aimed to understand criminal behavior by including biological, psychological, social, and cultural aspects from different disciplines. Also, it is important to remember that decision making, a construct that contains both rational and emotional variables, has a heavy impact on human behavior, and suggests criminal behavior can be influenced by those variables (Campello et al., 2016). In this study, it is proposed that some psychological dimensions, such as criminal thinking, prosocial behavior, or emotional intelligence, have an impact on the study of criminal behavior and can also be used to predict it. Also, despite the fact that they have not

been studied as much as other factors, cultural dimensions were included in the study as social factors that can impact those kinds of behaviors.

A Brief Overview of Criminal Thinking and its Relationship to Prosocial Behavior, Emotional Intelligence and Cultural Dimensions

From a cognitive perspective, the execution of behavior is usually preceded by thought: in general, thinking has a fundamental role when it comes to performing or not performing a behavior (Company & Andrés-Pueyo, 2015). Although the existence of criminal thinking does not necessarily imply criminal conduct (Andrews & Bonta, 1995; Gendreau et al., 1996), it is nevertheless one of the variables that precedes criminal behavior. In this sense, Arregui (2013) indicated that criminal thinking is one of the main components of criminal lifestyles.

Andrews et al. (2006) defined criminal thinking as the set of attitudes, values, and beliefs that support crime, and which predispose people to the performance of a certain criminal behavior after a decision-making process (Ajzen & Fishbein, 2005; Maio & Haddock, 2010). In other words, Walters (2009) described criminal thinking as the set of cognitions whose purpose is to initiate or maintain a violation of the rules, codes or laws that have been established by a government. Walters (1998) established three factors that help understand criminal conduct: conditions, choices, and cognitions. The last one emphasizes the important role of thinking as a factor that determines whether behavior is going to occur or persist over time.

Sex and age seem to have some influence on criminal thinking. Walters (2018) found differences in the type of criminal thinking that men used compared to women. Walters (2002) pointed out higher levels of criminal thinking among women, while Holsinger et al. (2003) and Manchak et al. (2009) found no differences between men and women. Vaske et al. (2017) determined in their study that both sexes were equally prone to attitudes related to criminal thinking, but that there were differences in the type of responses they made. Walters et al. (1998) indicated that women scored higher in seven of the eight types of thinking. To explain it, the study of Bennet et al. (2005) showed differences in social cognition between men and women. Specifically, women tend to have greater prosocial skills and develop social cognitive skills earlier than men.

Regarding age, neuroscience suggests that the parts of the brain that control the reward system (in this case, risk and reward derived from behavior) are not fully developed until the age of 25 (Goldstein, 2015). This period between 18 and 25 years can be described as an intermediate stage between adolescence and adulthood with specific characteristics, what Arnett (2000) referred to as emerging adulthood. In the case of criminal thinking, Walters (2020) and Walters et al. (2019) pointed out a moderating effect of criminal thinking regarding the perception of being punished in the group of emerging adults and university students. This effect did not occur in adolescents (Walters, 2020). In more recent studies, Walters (2022) states that there is a change in criminal thinking between early adolescence and mid adolescence/early adulthood.

Criminal thinking seems to have a negative relationship with prosocial behavior (Martí-Vilar et al., 2019). This results indicate that a greater presence of one of these variables tends to reduce the presence of the other, an aspect that was also found in Llorca et al. (2016) regarding the commission of aggressive behavior. For Walters (2017b), the development of prosocial thinking and prosocial skills reduced antisocial behavior in prisoners, which has an impact on criminal thinking. In this sense, the Risk-Need-Responsivity model of Andrews and Bonta (2010a, 2010b) shows the relationship between lack of prosociality and criminal recidivism. Thus, prosocial behavior can be considered as a variable that helps reducing criminal thinking

and criminal and antisocial behaviors (Martí-Vilar, 2010; Redondo et al., 2016). Recent studies also highlighted the possible role of criminal thinking as a mediator between social influence and delinquency (Walters, 2021b).

Emotional intelligence can also be negatively related to criminal thinking. Megreya (2013) studied the relationship between emotional intelligence and criminal thinking styles. In his sample of participants, they studied 56 prisoners from the Egyptian population. They concluded that general criminal thinking, reactive criminal thinking, and five of the specific criminal thinking styles showed a negative relationship with emotional intelligence. Greater skills in emotional intelligence were related to a lower degree of criminal thinking. In a further investigation, Megreya (2015) used a sample of inmates and another of non-inmates to study the link between emotional intelligence and criminal behavior. This study concluded that non-inmates showed a greater degree of emotional intelligence than inmates. In addition, the degree of emotional intelligence decreased according to the seriousness of the crime committed, being higher for crimes related to robberies and lower for crimes such as murder. Emotional intelligence can also act as a good predictor of prosocial behavior, as it was found in studies like Martí-Vilar et al.'s (2022).

Culture is another variable that has an ability to create and maintain norms, values or behaviors in a society (Garaigordobil, 2014). Most of the people follow this norms for various reasons, like internalization or maintaining a specific social image (Gross & Vostroknutov, 2022). However, it is not the case of criminal offenders. Hofstede (1991) identified five dimensions that help to understand different cultures according to the intensity with which each dimension is present: power distance, collectivism, masculinity, uncertainty avoidance, and long-term orientation. The study of these dimensions can lead to a better understanding of the reasons to conduct or maintain a criminal behavior. As an example, in a study made with a sample of black women, Link and Oser (2018) argued that criminal thinking can act as a poorly adaptive way of dealing with social stressors such as racism, stress arising from economic conditions, or the loss of social relationships. Other economic factors, such as being a culture with free-market ethos, can moderate the relation between criminal thinking and delinquency (Walters, 2021a). Also, Ilan (2019) understood both, crimes and attempts to control them, as products that are derived from culture. It is the same culture that determines what a crime is and, consequently, ends up creating and controlling these behaviors. This is consistent with studies like Vagg's (1998), that pointed out how the perception of what is considered criminal or counter-normative behavior can vary between more or less conservative societies.

The Present Study

The current study aims to determine the predictive potential that the scores on prosocial behaviors, emotional intelligence, and cultural dimensions have on criminal thinking scores.

The first objective is to investigate whether the results of criminal thinking vary depending on the sex or age of the participants. The first hypothesis of the research is derived from this objective: the scores on criminal thinking of the two age groups used in the sample will have significant differences due to changes that occur at the end of the early adulthood. Specifically, it is expected that the group over 25 years old will obtain a lower score in criminal thinking than the group younger than 25. No significant differences are expected regarding sex, based on studies such as Vaske et al.'s (2017) and Walters's (2018).

The second objective is to examine the possible predictive ability that prosocial behavior, emotional intelligence, and cultural dimensions scores have over criminal thinking scores. Regarding prosocial behavior, López et al. (2002) and Redondo et al. (2016)

demonstrated the existence of a direct positive relationship between antisocial behavior and criminal thinking. Martí-Vilar et al. (2019) found an inverse relationship between prosocial behavior and this type of thinking. Regarding emotional intelligence, Mariano et al. (2016) demonstrated a relationship between traits such as empathy and criminal thinking. Megreya (2013, 2015) found an inverse relationship between emotional intelligence and both criminal thinking and criminal behavior. Regarding cultural dimensions, Link and Oser (2018) stated that criminal thinking can be a poorly adaptive way of facing social stressors. Ilan (2019) declared that the role of culture is fundamental both in the meaning of criminal behaviors and criminal thinking, and in their creation and control.

From this second objective, three hypotheses are formulated. Our second hypothesis is that prosocial behavior can inversely predict scores in criminal thinking. The third hypothesis is that emotional intelligence scores will inversely predict scores in criminal thinking. And the fourth and final hypothesis suggests that scores on cultural dimensions will predict scores on criminal thinking.

Method

Participants

The total sample consisted of 695 participants chosen through convenience sampling. Of the overall sample, 417 (60%) were women while 278 (40%) were men. Regarding age, 355 (51%) were students between 18 and 25 years old, while 340 (49%) were adults over 25, not students. Table 1 shows the mean scores for each age group according to sex.

Table 1. Descriptive Statistics for the Age of the Sample

	Sex	Age Range	Average	Standard Deviation
Age	Women	18-25 years	20.96	1.392
		26 < years	51.61	10.681
		Total	31.98	16.094
	Men	18-25 years	21.20	1.789
		26 < years	57.14	10.279
		Total	45.76	18.800
	Total	18-25 years	21.02	1.501
		26 < years	54.70	10.798
		Total	37.49	18.493

The group of younger than 25 years old were university students. To request their participation, the group of researchers went to classrooms at the end of the lessons and explained what the research consisted of. The sample of adults over 25 years old consisted of direct relatives of students from other courses. In both cases, the procedure and the guarantee of anonymity were reported, and the informed consent and completed instruments were delivered and collected in a sealed envelope. The instruments that were used required individual completion. They were provided to each participant so that they could fill them out by themselves.

With respect to age, it was decided that participants were divided into two groups, considering the period of emerging adulthood. The first group was composed of subjects between 18 and 25 years old and the second by older than 25. The term "emerging adulthood" was coined by Arnett (2000). It was used to name the stage that includes the end of adolescence and early adulthood, usually located between 18 and 25 years old. This is a stage of transition to adulthood and represents an important change in the cognition and emotions of young adults, so it was decided that it was an ideal cut-off point to try to observe the differences that may occur in criminal thinking regarding age.

Materials

To measure criminal thinking, a Spanish adaptation of the Criminal Sentiments Scales (CSS-M; Company & Andrés-Pueyo, 2015) was used. This instrument measures criminal attitudes and thoughts. This Spanish adaptation consists of a total of 30 items divided in 2 factors: feelings towards normative levels (FNL, a factor that measures the rejection of social norms and institutions that are responsible for compliance) and criminal self-benefits (CSB, a factor that measures internal thoughts that allow a person to identify himself as a criminal). Reliability analyses established a Cronbach's alpha of .78.

The instrument chosen to measure the construct of prosocial behavior was the Prosociality Scale (Caprara et al., 2005). This scale measures behaviors that can be considered prosocial, including actions related to helping, trusting or sympathizing with others, in adult population. The instrument consisted of 16 items with Likert response options. The Cronbach's alpha for this instrument was .88.

The Emotional Intelligence Scale (EQI-C) in its Spanish adaptation was used to measure emotional intelligence (López-Zafrá et al. 2014). This instrument was used in its short version, consisting of 28 items. These are divided into four factors: interpersonal intelligence (ability to understand others' emotions), intrapersonal intelligence (ability to understand one's emotions), adaptability (ability to adapt emotions to surrounding situations), and stress management (ability to regulate and manage stress). In the present study, only the total score for the entire emotional intelligence scale was used. The Cronbach's alpha for this scale was .86.

The scale of cultural dimensions was used to measure the impact of cultural dimensions. This scale measures its impact on a personal level. The Spanish adaptation (Hernán-Rodríguez 2011) of the instrument designed by Yoo and Dontu (2002) was used. It has 23 items and measures five cultural dimensions: collectivism (feeling of unity in society), power distance (acceptance that power and wealth are distributed unevenly in society), masculinity (separation of gender roles according to sex), uncertainty avoidance (intolerance of ambiguous situations that do not have clear rules established), and long-term orientation (rewarding behaviors that are aimed at future objectives). The Cronbach's alpha for this instrument was .78.

Plan of Analysis

To test the hypotheses, a MANOVA was first performed to see if there were differences in the mean scores of criminal thinking according to sex and age. Secondly, a Pearson's correlation analysis was carried out, which allowed finding the existence of linear relationships between criminal thinking and the other variables studied (variables that did not correlate were left out). It was conducted together with a regression analysis to investigate how the conjunction of these variables affected the presence of criminal thinking in individuals. Finally, a structural equation model (SEM) was proposed. All the analyses were performed with the statistical program IBM Statistical Product and Service Solutions (SPSS), version 26.0. The SEM was performed with Amos Graphics version 23.

Results

Table 2 shows the descriptive statistics of the total scores of Criminal Thinking, the scores of the Feelings factor with respect to normative levels and the scores of the Criminal Self-Benefits factor of the criminal thinking test.

**Table 2.** Descriptive Statistics of the Criminal Thinking and Its Two Factors

	Sex	Age range	Average	Standard Deviation
Criminal Thinking	Women	18-25 years	24.67	7.63
		26 < years	18.42	7.74
		Total	22.42	8.23
	Men	18-25 years	28.15	8.72
		26 < years	17.54	9.12
		Total	20.90	10.25
	Total	18-25 years	25.53	8.04
		26 o más años	17.93	8.54
		Total	21.81	9.11
Feelings towards normative levels	Women	18-25 years	19.87	5.13
		26 < years	14.87	5.14
		Total	18.07	5.66
	Men	18-25 years	21.55	5.12
		26 < years	14.45	6.34
		Total	16.70	6.83
	Total	18-25 years	20.28	5.17
		26 < years	14.64	5.83
		Total	17.52	6.19
Criminal self-benefits	Women	18-25 years	4.80	3.54
		26 < years	3.55	3.62
		Total	4.35	3.61
	Man	18-25 years	6.60	4.82
		26 < years	3.09	3.80
		Total	4.20	4.46
	Total	18-25 years	5.25	3.96
		26 < years	3.29	3.73
		Total	4.29	3.97

Table 3 shows the results of the MANOVA that was carried out to study differences in criminal thinking with respect to sex and age range. The interaction between sex and age was significant for the total score and the two factors of criminal thinking (F = 10.369, p = .001; F = 5.364, p = .021; and F = 13.062, p < .001, respectively). Regarding the age group, all scores had significant differences as well (all p < .001). Regarding sex, there were no significant differences in the total score or the first factor (F = 3.694, p = .055 and F = 1.956, p = 0.162, respectively), but there was a significant effect in the second factor (F = 4.552, p =.033).

Regarding the statistics in Table 2, with respect to the interaction effect between age and sex on criminal thinking, men younger than 25 years old obtained, on average, higher scores than women of the same age, whereas in the group aged more than 26 years it is women who obtained higher average scores compared to men.

In order to test hypotheses 2, 3, and 4, which concerned the predictive value of prosocial behavior, emotional intelligence, and cultural dimensions of criminal thinking, a multiple regression analysis was performed. Before that, a correlation matrix was done, in order to exclude all the variables that did not have a significant relation with criminal thinking (see Table 4). As shown in Table 4, prosocial behavior is the only variable that does not have a significant correlation with criminal thinking.
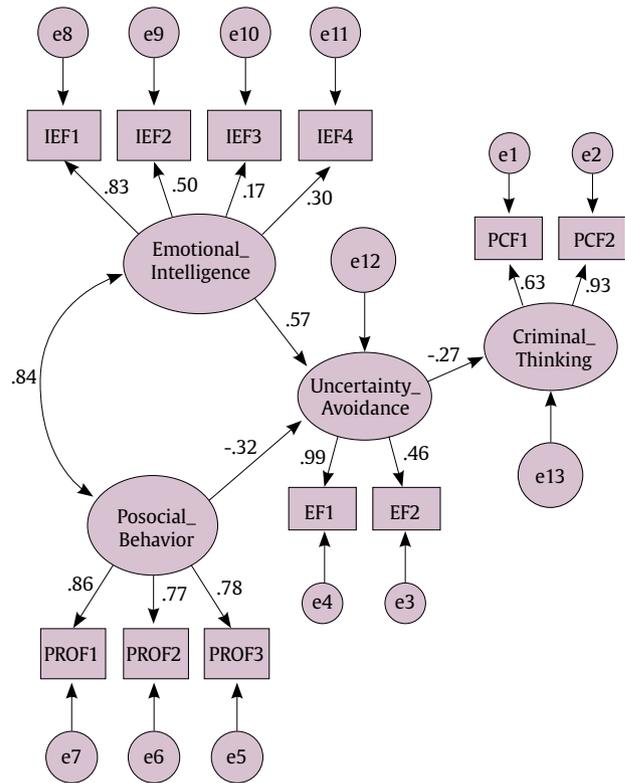
Figure 1. Final SEM Model.
Note. EIF = grouping of items used as uncertainty avoidance indicators; PROF = grouping of items used as prosocial behavior indicators; IEF = indicators of emotional intelligence, direct scores from the EQI-C; PCF = indicators of criminal thinking, direct scores from the CSS-M.

Table 3. MANOVA results for the dependent variables of criminal thinking, sex and age group

Independent Variable	Dependent Variable	df	η_p^2	F	p
Corrected model	Criminal thinking	3	.189	53.725	.000
	Feelings normative levels	3	.216	63.525	.000
	Criminal self-benefits	3	.082	20.558	.000
Intersection	Criminal thinking	1	.862	4308.863	.000
	Feelings normative levels	1	.899	6140.554	.000
	Criminal self-benefits	1	.546	829.472	.000
Sex	Criminal thinking	1	.005	3.694	.055
	Feelings normative levels	1	.003	1.956	.162
	Criminal self-benefits	1	.007	4.552	.033
Age range	Criminal thinking	1	.184	155.325	.000
	Feelings normative levels	1	.206	179.544	.000
	Criminal self-benefits	1	.077	57.73	.000
Sex*Age range	Criminal thinking	1	.015	10.369	.001
	Feelings normative levels	1	.008	5.364	.021
	Criminal self-benefits	1	.019	13.062	.000

Table 4. Correlation Matrix

	Criminal Thinking	Emotional Intelligence	Collectivism	Uncertainty Avoidance	Masculinity	Power Distance	Long-term Orientation
Emotional Intelligence	-.128**						
Collectivism	-.110**	.144**					
Uncertainty Avoidance	-.209*	.146**	.317**				
Masculinity	-.083*	-.251**	.060	.012			
Power Distance	-.096*	-.231**	.091*	.030	.541**		
Long-term Orientation	-.120**	.250**	.271**	.688**	-.082*	-.118**	
Prosocial Behavior	-.047	.430**	.086*	.141**	-.151**	-.218**	.297**

*$p < .05$, **$p < .01$.

Table 5. Results of the Multiple Linear Regression Analysis between Criminal Thinking, Emotional Intelligence, and Cultural Factors

	β	Standard Error	B	t	p
Constant		3.597	43.354	12.052	.000
Uncertainty Avoidance	-.220	.092	-0.391	-4.228	.000
Emotional Intelligence	-.143	.029	-0.103	-3.626	.000
Masculinity	-.076	.125	-0.216	-1.728	.084
Power Distance	-.072	.089	-0.143	-1.607	.108
Long-term Orientation	.059	.104	0.117	1.127	.260
Collectivism	-.024	.090	-0.056	-0.619	.536
Corrected R^2	.073				
F	9.042**				

**$p < .01$.

Table 6. Regression Weights of the Hypothesized SEMs Relations

Relation between Variables			Regression Weight				
			Estimate	SE	CR	p	Standarized beta
Uncertainty Avoidance	←	Prosocial Behavior	-0.112	0.054	-2.097	.036	-.32
Uncertainty Avoidance	←	Emotional Intelligence	0.124	0.041	3.005	.003	.57
Criminal Thinking	←	Uncertainty Avoidance	-1.586	0.365	-4.350	***	-.27

Note. SE = standard error; CR = critical ratio.
***$p < .001$.

Thus, a regression analysis was conducted excluding prosocial behavior, since it did not show correlation with criminal thinking. The results of the multiple regression can be observed in Table 5.

Only uncertainty avoidance (t = -4.228, p < .001) and emotional intelligence (t = -3.626, p < .001) were considered significant predictors of criminal thinking. The coefficient of determination had a value of .073.

Finally, a SEM was proposed. Initially, a model where emotional intelligence and uncertainty avoidance were predictors of criminal thinking and predicted by prosocial behavior was proposed since prosocial behavior was not correlated with criminal thinking. Unfortunately, that model showed weak, non-significant effects. Due to that, a model where uncertainty avoidance predicts criminal thinking and, at the same time, is predicted by both emotional intelligence and prosocial behavior, was proposed. This model can be seen in Figure 1.

The goodness-of-fit indexes showed a god fit of this model. The chi-square test was significant, with $\chi^2(40)$ = 299.693, p < .001. Other fit indexes, like the CFI (.89), NFI (.87), and IFI (.886), showed adequate fit.

The overall represented standardized relationships that are showed in Figure 1 are statistically significant at a .001 level. There were two exceptions: the relationship between emotional intelligence and uncertainty avoidance (p = .003) and the relationship between prosocial behavior and uncertainty avoidance (p = .036), both of which are still under p < .05.

In Table 6, regression weights of the relationships of the SEM are shown. All of them were statistically significant, meaning pro-social behavior and emotional intelligence are good predictors of uncertainty avoidance. Uncertainty avoidance is a good predictor of criminal thinking.

Discussion

The objective of this research was to study the relationship between prosocial behavior, emotional intelligence, cultural dimensions, and criminal thinking. The focus was on finding out if the first three could predict the latter. To this end, a series of hypotheses were formulated, and tested against the results.

The first of the hypotheses predicted that, due to the end of the emerging adulthood stage, there would be a significant difference in criminal thinking scores between the different age groups, regardless of biological sex. This hypothesis was supported, given that MANOVA indicated the existence of statistically significant differences in these scores between the groups of people younger than 25 years old and those over 25. These results are consistent with Arnett's (2000) emerging adulthood theory, which postulates that this stage involves changes in cognitive, behavioral, and social aspects of the individual. These changes may be related to the decrease in criminal behavior with age, as Hirschi and Gotfreddson (1983) pointed out. The results of this study suggest that people who are 25 years old or less seem to have higher scores on criminal thinking. If this could be generalized in future studies, we could argue that the use of interventions to prevent criminal thinking can be more necessary in that age range.

Regarding the influence of sex, the results are in line with those found by Holsinger et al. (2003) and Manchak et al. (2009), as there

were no significant sex differences in general scores and in the first factor. However, women scored higher than men in the second factor: criminal self-benefits. Women scoring higher in some types of criminal thinking is also found in literature (Walters, 2002, 2018; Walters et al., 1998). In this sense, it is necessary to take into account the characteristics of our sample, which may be very homogeneous according to the typology of criminal thought used in various studies. Nonetheless, it is necessary to perform future studies which evaluate sex differences.

The second hypothesis postulated that the scores on the prosocial behavior test would be good predictors of criminal thinking scores according to an inverse relationship. This was, however, not the case in our study, since prosocial behavior did not have any correlation with criminal thinking (Table 4). This could be caused by the convenience sampling, and should be taken into consideration in future research.

The third hypothesis proposed that emotional intelligence scores would act as good predictors of criminal thinking scores. The results supported the hypothesis (Table 5), with emotional intelligence showing a rather low, but significant, prediction power on criminal thinking (β = -.0143, p < .001). A negative relationship between both variables can be seen, as it was expected by the literature (Megreya, 2013, 2015). These results can be used to justify the implementation of intervention programs aimed to increase emotional intelligence among people who have committed a crime or who have predisposition.

However, these results were not achieved when the SEM was performed. This led to a change in the proposed model. Two aspects must be taken into consideration. On the one hand, criminal thinking is conceptualized in its relationship with attitudes or believes towards the law by the instrument that was used. For that reason, it is necessary to talk about judgements regarding law's trust and perceived fairness. On the other hand, the sample that was used in this study was not related with criminal perpetuation. Due to that, the fact that the objection to the law does not necessarily mean the commitment of a crime can be inferred.

The fourth hypothesis predicted an inverse relationship between cultural dimensions and criminal thinking and sought to find out which cultural dimensions could have a predictive capacity for that type of thinking. In our study, only uncertainty avoidance stood as a significant predictor of criminal thinking, as shown in Table 5 (t = -4.228, p < .001).

Finally, a SEM model was hypothesized, bearing in mind the previous results, with uncertainty avoidance being labeled as a predictor of criminal thinking, and prosocial behavior and emotional intelligence both being predictors of uncertainty avoidance. The model showed a good fit and all the relationships were significant (Figure 1 and Table 6).

The definition of uncertainty avoidance leads to understand that having clear, consensual, and well-known rules can help to deal with uncertain or ambiguous situations. For that reason, the existence of arbitrary rules, their subjective interpretation or their ignorance, can be related or predict criminal thinking. It happens the same with the mistrust of the institutions and their rules whose fairness can be questioned. Also, the moral reasoning that takes place over the rule interpretation. Concretely, the assessment of each person based on which rights and duties should a society have to be considered fair. This is very important to be considered in future research.

In a positive way, this study provides an update to the information available in the scientific literature on criminal thinking and its relationship with other variables. This allows future studies to focus their attention on the study of these relationships to obtain more information about the role they play in criminal thinking. The main limitation of this study is that it used the convenience sample, not random, method. Another important limitation is the limited number of variables related with criminal thinking prediction that have been measured.

If we want a more practical application, future research can lead to create prevention programs. One of the most important objectives of the criminal psychology is the prevention of criminal

behavior (Garrido, 1995). In this sense, the most effective practical application of these results could be found in crime prevention, social reintegration, or educational programs in terms of having new variables on which to work with when trying to reduce or prevent the appearance of criminal thinking. For example, women scoring higher in some ways of criminal thinking may lead to create more effective, sex differentiated, intervention programs. Intervention programs that highlight the value of having fair and clear rules and that help people to work with those rules may have a better result. Some types of cognitive behavioral therapies that are aimed at reducing aggressive or antisocial behaviors (Walters, 2017a) could also benefit from these results.

Conclusion

In conclusion, the relationship between uncertainty avoidance and its power to predict criminal thinking is highlighted. Therefore, a population with an increase in their reliance and familiarity of the rules and institutions, as well as living in societies with equity rules, can reduce uncertainty. This, in turn, will lead to a reduction of their criminal thinking.

Conflict of Interest

The authors of this article declare no conflict of interest.

References

Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 173-221). Lawrence Erlbaum Associates.

Andrews, D. A., & Bonta, J. (1995). *The LSI-R: The Level of Service Inventory–Revised*. Multi-Health Systems.

Andrews, D. A., & Bonta, J. L. (2010a). Rehabilitating criminal justice policy and practice. *Psychology, Public Policy, and Law, 16*(1), 39-55. https://doi.org/10.1037/a0018362

Andrews, D. A., & Bonta, J. L. (2010b). *The psychology of criminal conduct* (5th ed.). Anderson.

Andrews, D. A., Bonta, J., & Wormith, J. S. (2006). The recent past and near future at risk and/or need assessment. *Crime & Delinquency, 52*(1), 7-17. https://doi.org/10.1177/0011128705281756

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469-480. https://doi.org/10.1037/0003-066X.55.5.469

Arregui, J. L. (2013). *Variables cognitivas y motivacionales relacionadas con el nivel de riesgo y el comportamiento de delincuentes juveniles y adultos*. Universidad de La Laguna, Servicio de publicaciones.

Bennett, S., Farrington, D. P., & Huesmann, L. R. (2005). Explaining gender differences in crime and violence: The importance of social cognitive skills. *Aggression and Violent Behavior, 10*(3), 263-288. https://doi.org/10.1016/j.avb.2004.07.001

Campello, M., Campello, B., Bilsky, W., & Roazzi, A. (2016). The culture of honor as the best explanation for the high rates of criminal homicide in Pernambuco: A comparative study with 160 convicts and non-convicts. *Anuario de Psicología Jurídica, 26*(1), 114-121. https://doi.org/10.1016/j.apj.2015.03.001

Caprara, G. V., Steca, P., Zelli, A., & Capanna, C. (2005). A new scale for measuring adults' prosocialness. *European Journal of Psychological Assessment, 21*(2), 77-89. https://doi.org/10.1027/1015-5759.21.2.77

Company, V., & Andrés-Pueyo, A. (2015). The Spanish version of the criminal sentiment scale modified (CSS-M): Factor structure, reliability and validity. *The European Journal of Psychology, 7*(2), 67-72. https://doi.org/10.1016/j.ejpal.2015.03.001

Garaigordobil, M. (2014). Conducta prosocial: el papel de la cultura, la familia, la escuela y la personalidad. *Revista Mexicana de Investigación en Psicología, 6*(2), 146-157.

Garrido, V. (1995). El psicólogo criminalista y sus desafíos actuales. *Anuario de Psicología Jurídica, 5*(1), 33-49.

Gendreau, P., Little, T., & Goggin, C. (1996). A meta-analysis of the predictors of adult offender recidivism: What works! *Criminology, 34*(4), 575-608. https://doi.org/10.1111/j.1745-9125.1996.tb01220.x

Goldstein, D. (2015). *Too old to commit crime? The Marshall project*. https://www.themarshallproject.org/2015/03/20/too-old-to-commit-crime

Gross, J., & Vostroknutov, A. (2022). Why do people follow social norms? *Current Opinion in Psychology, 44*, 1-6. https://doi.org/10.1016/j.copsyc.2021.08.016

Hernán-Rodríguez, R. (2011). *Estudio relacional entre dimensiones de calidad en el Servicio Dimensiones Culturales de Hofstede para estudiantes de intercambio.* Tecnológico de Monterrey, Nuevo León.

Hirschi, T., & Gottfredson, M. (1983). Age and the explanation of crime. *American Journal of Sociology, 89*(3), 552-584. https://doi.org/10.1086/227905

Hofstede, G. (1991). *Cultures and organizations: Software of the mind.* McGraw-Hill.

Holsinger, A., Lowenkamp, C., & Latessa, E. (2003). Ethnicity, gender and the LSI-R. *Journal of Criminal Justice, 31*(4), 309-320. https://doi.org/10.1016/S0047-2352(03)00025-4

Ilan, J. (2019). Cultural criminolgy: The time is now. *Critical Criminology, 27*(5), 5-20. https://doi.org/10.1007/s10612-019-09430-2

Link, T. C., & Oser, C. B. (2018). The role of stressful life events and cultural factors on criminal thinking among African American women involved in the criminal justice system. *Criminal Justice and Behavior, 45*(1), 8-30. https://doi.org/10.1177/0093854817736083

Llorca, A., Malonda, E., & Samper, P. (2016). Prosocial reasoning and emotions in young offenders and non-offenders. *The European Journal of Psychology Applied to Legal Context, 9*(2), 65-73. https://doi.org/10.1016/j.ejpal.2017.01.001

López, M. J., Garrido, V., Rodríguez, F. and Paíno, S. (2002). Youth and social competence: An intervention program. *Psicothema, 14*, 155-163.

López-Zafrá, E., Pulido, M., & Berrios, P. (2014). EQi-versión corta (EQi-c): adaptación y validación al español del EQ-i en universitarios. *Boletín de Psicología, 110,* 21-36.

Maio, G. R., & Haddock, H. (2010). *The psychology of attitudes and attitude change.* Sage.

Manchak, S., Skeem, J., Douglas, K., & Siranosian, M. (2009). Does gender moderate the predictive utility of the Level of Service Inventory-Revised (LSI-R) for serious violent offenders? *Criminal Justice and Behavior, 36*(5), 425-442. https://doi.org/10.1177/0093854809333058

Mariano, M., Chiara, M., Peretti, S., Valenti, M., & Mazza, M. (2016). Understanding criminal behavior: Empathic impairment in criminal offenders. *Social Neuroscience, 12*(4), 379-385. https://doi.org/10.1080/17470919.2016.1179670

Martí-Vilar, M. (2010). *Razonamiento moral y prosocialidad.* CCS.

Martí-Vilar, M., Serrano-Pastor, L., & González-Sala, F. (2019). Emotional, cultural and cognitive variables of prosocial behavior. *Current Psychology, 38*(4), 912-919. https://doi.org/10.1007/s12144-019-0168-9

Martí-Vilar, M., Trejos-Gil, M. A., & Betancur-Arias, J. D. (2022). Emotional intelligence as a predictor of prosocial behaviors in Spanish and Colombian older adults based on path models. *Healthcare, 10*(2), 284. https://doi.org/10.3390/healthcare10020284

Megreya, A. M. (2013). Criminal thinking styles and emotional intelligence in Egyptian offenders. *Criminal Behavior and Mental Health, 23*(1), 56-71. https://doi.org/10.1002/cbm.1854

Megreya, A. M. (2015). Emotional intelligence and criminal behavior. *Journal of Forensic Science, 60*(1), 84-88. https://doi.org/10.1111/1556-4029.12625

Redondo, J., Inglés, C., Parra, L., Nieto, L., & Navarro, M. L. (2016). Prosocial behavior: Theoretical perspectives. *International Journal of Psychology Research, 11*(3-4), 300-320.

Vagg, J. (1998). Delinquency and shame: Data from Hong Kong. *British Journal of Criminology, 38*(2), 247-264. https://doi.org/10.1093/oxfordjournals.bjc.a014234

Vaske, J., Gehring, K., & Lovins, B. (2017). Gender differences in the measurement of criminal thinking. *Criminal Justice & Behavior, 44*(3), 395-415. https://doi.org/10.1177/0093854816677311

Walters, G. D. (1998). *Changing lives of crime and drugs: Intervening with substance abusing offenders.* Wiley.

Walters, G. D. (2002). The Psychological Inventory of Criminal Thinking Styles (PICTS): A review and meta-analysis. *Assessment, 9*(3), 278-291. https://doi.org/10.1177/1073191102009003007

Walters, G. D. (2009). Criminal thinking. In E. M. McMurran & R. Howard (Eds.), *Personality, personality disorder and violence* (pp. 281-296). Wiley-Blackwell.

Walters, G. D. (2017a). Effect of a brief cognitive behavioral intervention on criminal thinking and prison misconduct in male inmates: Variable-oriented and person-oriented analysis. *Criminal Behavior and Mental Health, 27*(5), 457-469. https://doi.org/10.1002/cbm.2028

Walters, G. D. (2017b). Reactive criminal thinking as a consequence of low self-control and prior offending. *Deviant Behavior, 38*(2), 119-129. https://doi.org/10.1080/01639625.2016.1196951

Walters, G. D. (2018). Black-White and Male-Female differences in criminal thinking: Examining instrumental and expressive motives for crime in federal supervisees. *The Prison Journal, 98*(3), 277-293. https://doi.org/10.1177/0032885518764914

Walters, G. D. (2020). Criminal thinking as a moderator of the perceived certainty-offending relationship: Age variations. *Psychology Crime & Law, 26*(3), 267-286. https://doi.org/10.1080/1068316X.2019.1652749

Walters, G. D. (2021a). Moderating the criminal thinking-delinquency relationship with a free market cultural ethos: Integrating micro and macro-level concepts in criminology. *European Journal on Criminal Policy and Research.* Published online. https://doi.org/10.1007/s10610-021-09480-9

Walters, G. D. (2021b). Social influence and delinquency: The role of criminal thinking. *Criminal Behavior and Mental Health, 31*(6), 368-371. https://doi.org/10.1002/cbm.2219

Walters, G. D. (2022). Changes in criminal thinking from midadolescence to early adulthood: Does trajectory direction matter? *Law and Human Behavior.* Advance online publication. https://doi.org/10.1037/lhb0000468

Walters, G. D., Elliot, W. N., & Miscoll, D. (1998). Use of the Psychological Inventory of Criminal Thinking Styles in a group of female offenders. *Criminal Justice and Behavior, 25*(1), 125-134. https://doi.org/10.1177/0093854898025001008

Walters, G. D., Morgan, R., & Scanlon, F. (2019). The moderating effect of criminal thinking on certainty of apprehension in decisions to engage in antisocial behavior: Replication and extension. *Journal of Forensic Sciences, 64*(3), 805-813. https://doi.org/10.1111/1556-4029.13905

Ward, T., Durrant, R., & Sullivant, J. (2019). Understanding crime: A multilevel approach. *Psychology, Crime & Law, 25*(6), 709-711. https://doi.org/10.1080/1068316X.2019.1572754

Yoo, B., & Donthu, N. (2002). The effects of marketing education and individual cultural values on marketing ethics of students. *Journal of Marketing Education, 24*(2), 92-103. https://doi.org/10.1177/0273475302242002