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Research Article

EVALUATION OF RISK FACTORS CAUSING JUVENILE DELINQUENCY BY FULL CONSISTENCY METHOD

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ABSTRACT

Juvenile delinquency is the consequence of complex and comprehensive interactions with multiple risk factors. The experimental research highlighted that the public authorities have conducted tremendous efforts to determine juveniles at risk of delinquency and the factors related to delinquency, as well. Nevertheless, the basic research gap is to investigate which risk factor is more significant than others for allocating the limited resources and efforts. To close this gap, in this study, the Full Consistency Method (FUCOM) was utilized to determine the significance degrees of factors that cause juvenile delinquency. The findings indicate that the most significant risk factors causing juvenile delinquency are out and away "Family" and "Economic and Social Factors Relevant factors are of vital importance in determining both the social aspects and broader perspective on juvenile delinquency. In the planning phase of strategies to be developed for the prevention of juvenile delinquency, it is defined, which risk factor may be focused on to what extent, and which risk factor should be allocated more resources and effort to prevent juvenile delinquency more effectively. Besides, it has been concluded that the FUCOM method can be utilized effectively for juvenile delinquency decision-making analysis.

Keywords: Crime, Adolescent, Juvenile delinquency, Multi Criteria Decision Making, FUCOM

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INTRODUCTION

Juvenile delinquency is a broad term identifying behaviors that range from engaging in status offenses (e.g. running away from home, school truancy, and addiction to drugs/alcohol) to violent and criminal deeds (e.g. breaking and entering, burglary, assault, and use/distribution of illegal substances) (Montgomery and Barczyk, 2011).

The issue of juvenile delinquency is becoming more complicated, and the capacities of the prevention programmes are reported as either inadequate for coping with the current realities or don't exist. Many developing countries have also reported doing little or nothing to cope with this issue. Developed countries are focused on programmes that propose the prevention of juvenile delinquency, but the overall effect of them is relatively inadequate since the systems in effect are generally insufficient to identify the existing problem (World Youth Report, 2003: 190).

Juvenile delinquency affects not just the individual's personal structure, but also his or her social life and even the general society (Marshall and Enzmann, 2012). Minimizing the negative impacts caused by juvenile delinquency is vital for the futures of countries. Although many youths violate norms and break laws, substantially fewer engage in more serious transgressions that lead to processing and sanction by juvenile courts. For this reason, it is unsatisfactory to take into account just legal aspects; besides, it is compulsory to consider all the individual, social, and environmental factors causing juvenile delinquency (Lai et al., 2015).

Individual factors may cover depression (Chung et al., 2020), personal habits, attitudes, motivations (Pyle et al., 2015), mental illness (Snehil and Sagar, 2020), adolescents' hyperactivity (Falk et al., 2017), antisocial beliefs (Antunes and Eileen, 2017), low self-control (Holt et al., 2012), and addiction (drugs, alcohol, etc.) (Racz et al., 2016; Ramer and Colder, 2022).

Social factors can be considered as a combination of all potential criminal influences arising from the social environment such as family (Moitra et al., 2018), peers (Thomas, 2015), and school (Laeeque et al., 2022).

Environmental factors include any situations and possibilities that may promote or stimulate criminal behaviour (i.e., vulnerable victims, unprotected properties, disadvantages of neighbourhoods) (Martins et al., 2018; Azeredo et al., 2019; Joo and Chung, 2019).

In the case of juvenile delinquency, it is a generally agreed fact that no single theory or factor can cover the complexity of the field in which factors operate cumulatively and interactively (Yun et al., 2016; Jolliffe et al., 2017).

Besides, studies have also been published that focused on a single effect/cause of juvenile delinquency such as: single-parent households (Reeta and Singh, 2020), gender (Chapple et al., 2005; Choi, 2022), age (Sweeten et al., 2013), academic achievement levels (Lee, 2013), exclusion (Duran-Bonavila et al., 2017), peer influence (Thomas, 2015), physical/emotional abuse (van Berkel et al., 2018), cyber delinquency (Nam, 2021), low income (Joo and Chung, 2019), and relationships with teachers (Gao et al., 2022).

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It is a common fact that juveniles who exhibit criminal behaviour are more likely to continue similar behaviours in adulthood. If the risk factors that lead adolescents to delinquency are identified along with their significance degrees, the risk of juvenile delinquency may be determined before they commit crimes, and delinquency may be prevented at an early stage with appropriate preventive improvement programs. However, considering that criminal behaviour is influenced by multiple factors and conditions rather than a single risk factor, early warning systems and diagnostic tools are needed to assess multiple risk factors in concert. Thus, juveniles at risk may be identified before criminal behaviour manifests by considering predefined risk factors (Ucuz et al., 2020).

The aim of this study is to demonstrate that delinquency is a potential threat to juveniles in Türkiye and should also be considered an important problem.

The rest of this study is organized as follows: Section 1.1 briefly defines the theoretical background and risk factors causing juvenile delinquency. Section 1.2 summarizes the aim and novelty of the study. Section 2 defines the computational steps of the utilized method. Section 3 describes the application of the analysis and discusses the obtained results. Section 4 concludes the paper while highlighting some of the implications and limitations of this research, and future scope.

Theoretical Background and Risk Factors Causing Juvenile Delinquency

Numerous authors have proposed both theoretical and experimental research on the phenomenon of juvenile delinquency, demonstrating specific cases and the procedures for approaching and intervening from a diversity of perspectives, including theoretical and statistical aspects. The statistical perspective determines the significance of the phenomenon in correlation with several economic, cultural, social, and geographical indicators, etc., using descriptive (e.g., frequencies, averages) and inferential (e.g., t-test for independent samples, Cohen's d, Pearson correlation test, Mann-Whitney U test, Wilcoxon test) statistics (Mohammad and Nooraini, 2021; Ramer and Colder, 2022). The theoretical perspectives can be categorized as:

(i) The psychological perspective on delinquency focuses on individual-level characteristics that exist within all of us and interact with the environment (Gosain, 2020; Laeeque et al., 2022);

(ii) The sociological perspective on juvenile delinquency proposes that societal factors and social processes affect delinquent behavior (Mohammad and Nooraini, 2021);

(iii) The economic perspective focuses on the costs incurred as a result of the direct and indirect consequences of delinquencies (Mack et al., 2007; Martins et al., 2018);

(iv) The legal perspective relates to the manner and forms of violating common rules, as well as the legal system of punishments based on the seriousness of the acts and approaches to preventing recidivism (Lai et al., 2015; Snehil and Sagar, 2020);

(v) The prospective perspective refers to the future evolution of the phenomenon as well as particular adjacents' or social groups' proclivity for criminality (Unnever and Chouhy, 2020);

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(vi) A holistic, integrative vision of all these perspectives is the focus of today's efforts (Yun et al., 2016; Jolliffe et al., 2017; Bobbio et al., 2020).

Throughout the literature, innumerable studies have been conducted to understand the risk factors causing juvenile delinquency from theoretical and statistical perspectives, but very few have utilized more comprehensive and recent methods such as structural equation models (van Dijk et al., 2020), panel data analysis (Dutta et al., 2020), meta-analysis (Emmelkamp et al., 2020; Geerlings et al., 2020), and machine learning methods (Pelham et al., 2020; Ucuz et al., 2020). No study, however, can be identified that utilizes multi-criteria decision-making (MCDM) methods.

When considering that any change in the constants of social and cultural life not only affects human behaviors but also alters the risk factors associated with delinquency, utilizing MCDM or machine learning methods can capture the overall features with regard to these changes and can be adopted to identify critical risk factors for juvenile delinquency.

A variety of studies have well explained the most important risk factors, especially the World Youth Report (2003), prepared biennially, which is the flagship publication on youth issues of the Department of Economic and Social Affairs of the United Nations Secretariat. This report outlines the causes of juvenile delinquency as (i) economic and social factors, (ii) cultural factors, (iii) urbanization, (iv) family, (v) migration, (vi) the media, (vii) exclusion, (viii) peer influence, (ix) delinquent identities, and (x) offenders and victims, as described in the World Youth Report, 2003: 188-207; Nelson, 2016; Pardini, 2016: 259-260; Siegel and Welsh, 2018; Bobbio et al., 2020; Kennedy et al., 2020; Kratcoski et al., 2020; Roberson and Azaola, 2021.

Economic and social factors. Juvenile delinquency is triggered by the unfavourable outcomes of economic and social conditions such as political instability, weakening of major institutions, and economic contractions/crises. Socio-economic problems often lead to unemployment and low incomes among adolescents, which may increase the probability of their involvement in deviant acts.

Cultural factors. Delinquent behavior is common in social environments where acceptable behavioral norms have collapsed. Under such circumstances, many of the cultural rules that dissuade members from acting unacceptably may lose their importance, allowing adolescents to engage in rebellious, deviant, or even criminal acts.

Urbanization. A variety of studies have highlighted that crime rates are greater in countries with more urbanized populations. In rural areas, family and community control among adolescents is easier, helping to cope with antisocial behaviour and criminal acts.

Family. Many studies have proved that juvenile delinquency is less common in children who receive proper parental care and supervision. Inappropriate family structure and conditions such as weak internal linkages and integration, poor parenting skills, single-parent households, physical/emotional abuse, family criminal history, and socioeconomic status are closely related to juvenile delinquency.

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Migration. Because of adaptation difficulties to new social and economic life, immigrants usually find ease in their sub-cultural environments. Divergences in social and cultural norms and values in different ethnic sub-cultures often lead to cultural conflicts that are a major cause of antisocial behaviour and criminal activity.

Media. Many studies have demonstrated that children and adolescents who watch violence tend to behave more aggressively or violently. Especially, boys aged 8 to 12 have been reported to be more vulnerable to such influences.

Exclusion. Under the impact of some circumstances such as individual identity crises, broken social relationships, and unemployment, a growing number of members face exclusion. Juveniles' exclusion has an immense impact on building delinquent careers, which later conclude in delinquent acts.

Peer influence. Peer groups can play a vital role in developing behavioural patterns through the transition period to adulthood. Many criminological studies have provided strong empirical support that peer group affiliations are responsible for non-trivial amounts of identified varieties of antisocial behaviour, delinquency, and substance use.

Delinquent identities. Delinquent identity is a comprehensive phenomenon of identities related to delinquency itself and an individual's ethnicity, race, class, and gender. Delinquent identity is generally formed as a variant to the society's formal identity. Through the creation process of deviant identities, conflict and violence are crucial aspects. In many socio-cultural environments, the criminal lifestyle has been idealised to some extent, and becoming a member of a deviant group is one of the limited ways of social association for disadvantaged youth.

Offenders and victims. A victim's behaviour is highly connected with criminal deeds. A victim's reaction may provoke an offender; nevertheless, "appropriate" behaviour also may help to prevent or at least lessen the consequences of criminal behaviour. A variety of studies have indicated that the aforementioned victim's behaviour can involve personal characteristics (e.g., a social role/situation, individual or family status, financial prosperity) or logistical characteristics (e.g., the time and place of a confrontation).

The Current Study

The experimental studies highlighted that the authorities have exerted tremendous effort to determine juveniles at risk of delinquency and the factors related to delinquency. Nevertheless, a fundamental limitation is that no other papers have focused on identifying the comparative significance of risk factors after considering all possible degrees of risk factors in a quantitative model. This limitation hinders the public authorities from forming a varied perspective on what interventions are compulsory to prevent or at least minimize adolescents' delinquent behaviour (Choi, 2022). In this study, a quantitative analysis was employed to determine the significance degrees of risk factors that contribute to the emergence of juvenile delinquency according to evaluations from five experts.

At this point, it was considered appropriate to use MCDM methods because of the subjective nature of juvenile delinquency and the risk factors that cause it, and the necessity of performing the analysis based on expert opinions. Thus, it is aimed to provide decision support for the strategies to be developed for the

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prevention of juvenile delinquency, focusing on which risk factors may be prioritized to what extent, and which should be allocated more resources and effort in order to prevent juvenile delinquency more effectively.

A limited number of subjective methods have been proposed for weighting the evaluation criteria in decision problems (e.g., AHP, DEMATEL, SWARA, etc.). The FUCOM method, one of the most recent methods whose robustness has been proven in many studies, was utilized (it is described in detail why FUCOM is utilized in Section 3) to overcome the disadvantages and limitations of other methods such as the complexity of the computational steps, the need for special software, and the inconsistency in pairwise comparisons.

Throughout the literature review, many qualitative and quantitative studies have been identified that investigate the causes of juvenile delinquency and the relationships between these causes, respectively. On the other hand, to the best of our knowledge, no other study has been identified that:

i. Prioritizes or determines the significance degrees of risk factors causing juvenile delinquency;

ii. Utilizes MCDM methods in general and the FUCOM method in particular, for juvenile delinquency. Thus, it is believed that this study may provide a different perspective to the juvenile delinquency literature.

FULL CONSISTENCY METHOD

The Full Consistency Method (FUCOM), a subjective weighting MCDM method, was developed by Pamucar, Stevic, and Sremac. This linear programming-based method employs a minimization model consisting of two groups of constraints to obtain the optimal values of each criterion's weights (Pamucar et al., 2018: 1). The aim is to minimize the Deviation from Full Consistency (DFC) in the objective function of FUCOM. The level of DFC is the deviation value of the computed significance degrees/weight coefficients from the predicted comparative priorities of the criteria. Thus, DFC confirms the reliability of the computed weights of criteria according to the evaluations of experts/decision-makers. The FUCOM model includes two constraint groups that ensure the optimal values of significance degrees are met, incorporating conditions that the relations of the significance degrees of criteria should be equal to the comparative priorities and conditions of mathematical transitivity (Pamucar et al., 2018: 1). The main advantages of FUCOM compared to existing subjective weighting methods are listed as follows (Pamucar et al., 2018: 2; Puska et al., 2021: 9 and Erdal and Korucuk, 2023:910):

i. It requires fewer pairwise comparisons of criteria (only n-1 pairwise comparisons);

ii. It eliminates the problem of inconsistency in pairwise comparisons, thus providing convenience to the decision-maker by fully respecting the principle of transitivity;

iii. Due to its optimization-based nature, it allows for the computation of reliable values of the significance degrees of decision criteria;

iv. The computational steps are not complicated;

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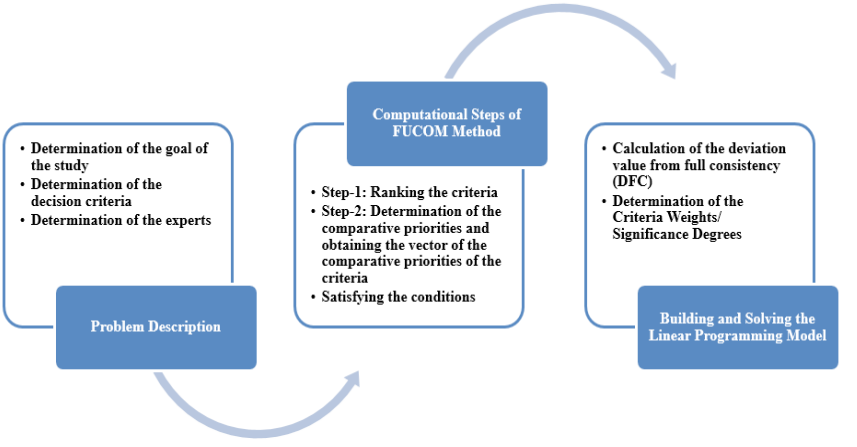
v. It enables the use of decimal numbers in pairwise comparisons, eliminating the need to use only integers.

Due to these advantages, FUCOM has been effectively used in many real-life problems such as ranking airline companies (Badi and Abdulshahed, 2019), selecting forklifts (Fazlollahtabar et al., 2019), choosing landfill sites (Badi and Kridish, 2020), locating a brigade command post during combat operations (Božanić et al., 2020), determining a distribution channel (Dalic et al., 2020), selecting fighter aircraft (Hoan and Ha, 2021), e-commerce applications (Mahendra, 2021), healthcare waste incinerators (Puška et al., 2021), and wind farm site locations (Deveci et al., 2022). Its superiority over many methods has been emphasized (Pamucar et al., 2018; Badi and Abdulshahed, 2019; Fazlollahtabar et al., 2019).

FUCOM can be implemented after the experts and decision criteria are determined, and evaluations are made by applying the calculation steps of the method within the group decision-making process, where 'n' symbolizes the number of decision criteria and 'E' symbolizes the experts.

A scale of [1-9], where '1' represents the highest preference, is generally used for subjective evaluations where the objective values of the criteria are not known (Fazlollahtabar et al., 2019: 52). Before proceeding to the calculation steps of the method, the problem description must be defined. At this step, it is necessary to determine the goal(s) to be achieved as a result of the analysis, the factors affecting the problem, and the decision-makers or experts whose opinions will be consulted (Erdal, 2021: 475). The schematic representation of the method is demonstrated in Fig. 1, and the computational steps are presented below (Pamucar et al., 2018: 5-7; Badi and Abdulshahed, 2019: 4-7; Hoan and Ha, 2020: 54-55):

Figure 1. *Schematic Representation of FUCOM*



Step-1: Ranking the criteria

In the first step, the decision criteria are ranked in descending order of importance by the decision-makers/experts, starting from the criterion considered to have the highest degree of significance to the least. In cases where more than one decision-maker participates in the process, each decision-maker ranks the criteria in

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descending order of importance. Accordingly, the ranking of criteria corresponds to the number of decision-makers. In the group decision application, the final ranking is determined by taking the geometric mean of the criteria rankings determined by the decision-makers. Thus, consistent with the expected values of the weight coefficients, the decision criteria are ranked as shown in Eq. (1):

$$C_{j(1)} > C_{j(2)} > \cdots C_{j(k)} \quad (1)$$

where *k* depicts the criterion rank.

Step-2: Determination of the comparative priorities and obtaining the vector of the comparative priorities of the criteria

In this step, a pairwise comparison of the ranking criteria from the previous step is carried out. Comparisons are made according to the criterion evaluated as the most important. In this context, since comparing the most important criterion with itself results in a score of '1', this criterion is assigned a '1'. Scoring for all other criteria is then conducted using the predefined scale, respectively. After the scoring of all criteria is completed, the comparative priority ($\varphi_{k/(k+1)}$, k=1,2,…,n, where k depicts the rank of the criteria), of the evaluation criteria is computed as in as in Eq. (2). If two successive criteria are considered to be of equal importance by the decision-maker/experts, the result of this comparison will be be $\varphi_{k/(k+1)}=1$.

$$\Phi=(\varphi_{1/2}, \varphi 2/3), \varphi 3/4), \ldots, \varphi_{k/(k+1)}) \quad (2)$$

For instance, let's assume a problem with three-criteria that the criteria are ranked as $C_2 > C_1 > C_3$ by the decision-maker/experts, a scale of [1-9] is used for scoring the preferences ($\omega_{C_{j(k)}} \in [1,9]$), and the weights of criteria are determined as $\omega_{C_2}=1, \omega_{C_1})=3.5$ *ve* $\omega_{C_3})=6$, respectively. In this case, the comparative priority(φ_{C_2/C_1}) of C_2 to C_1 can be computed as $\varphi_{C_2/C_1}=3.5/1=3.5$ where $\varphi_{C_1/C_3})=6/3.5=1.714$.

Step-3: Satisfying the conditions

At this step, the final values the significance degrees of the decision criteria ($(w_1, w_2, \ldots, w_n)^T$) are determined. For this, two conditions are required to be satisfied:

Condition-1. The ratio of weight coefficients of the decision criteria should be equal to the comparative priority among the observed criteria ($\varphi_{k/(k+1)}$) described in Step-2; i.e., that the condition depicted in Eq. (3) is satisfied;

$$w_{k/w_{k+1}} = \varphi_{k/(k+1)} \quad (3)$$

Condition-2. The final values of the weight coefficients/degrees of the significance of the decision criteria should satisfy the requirements of mathematical transitivity. Namely, the Eq. (4) should be satisfied;

$$\varphi_{k/(k+1)} \otimes \varphi_{(k+1)/(k+2)} = \varphi_{(k/(k+2)} \quad (4)$$

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The comparative priority among the observed decision criteria can be described as Eq. (5) by using the Eqs. (3 and 4);

$$\varphi_{k/(k+1)}={}^{w_k}/_{w_{k+1}} \text{ ve } \varphi_{(k+1)/(k+2)}={}^{w_{k+1})}/_{w_{k+2}} \quad (5)$$

The expression of this equation (Eq. (5)) as weight coefficients will define the Eq. (6);

$${}^{w_k}/_{w_{k+1}} \otimes {}^{w_{k+1}}/_{w_{k+2}} = {}^{w_k}/_{w_{k+2}} \quad (6)$$

Thus, the condition-2 that the final values of the weight coefficients/degrees of the significance of the decision criteria required to satisfy are computed, namely (Eq. (7));

$${}^{w_k}/_{w_{k+2}} = \varphi_{k/(k+1)} \otimes \varphi_{(k+1)/(k+2)} \quad (7)$$

By building and solving the step of the linear programming model, the final values of the decision criteria/degrees of significance are determined with the DFC value. Full consistency, namely, minimum DFC (χ) is met just if transitivity is fully regarded. In other words, if Condition-1 expressed in Eq. (3) and Condition-2 expressed in Eq. (7) are met, the minimum DFC is obtained. Thus, the necessity for maximum consistency is satisfied, namely, DFC is for the computed values of the significance degrees. To satisfy the conditions, the values of the weight coefficients, satisfy the conditions, expressed in Eq. (8), with the minimization of the value χ;

$$\left|{}^{w_k}/_{w_{k+1}} - \varphi_{k/(k+1)}\right| \leq \chi \text{ ve } \left|{}^{w_k}/_{w_{k+2}} - \varphi_{k/(k+1)} \otimes \varphi_{(k+1)/(k+2)}\right| \leq \chi \quad (8)$$

By solving the linear programming model (9), the final values/degrees of the significance of the decision criteria $((w_1,w_2,...,w_n)^T)$ and the value of DFC (χ) is calculated.

$$\min \chi$$

$$\text{s.t.} \begin{cases} \left|\frac{w_{j(k)}}{w_{j(k+1)}} - \varphi_{k/(k+1)}\right| \leq \chi, \quad \forall j \\ \left|\frac{w_{j(k)}}{w_{j(k+2)}} - \varphi_{k/(k+1)} \otimes \varphi_{(k+1)/(k+2)}\right| \leq \chi, \quad \forall j \\ \sum_{j=1}^{n} w_j = 1, \quad \forall j \\ w_j \geq 0, \quad \forall j \end{cases} \quad (9)$$

DETERMINATION OF SIGNIFICANCE DEGREES OF RISK FACTORS CAUSING JUVENILE DELINQUENCY UTILIZING FUCOM

First of all, the subjective criteria weighting MCDM methods were investigated due to the subjective nature of the factors expressing juvenile delinquency and its causes. Based on the outcome of this investigation, it was decided to utilize the FUCOM method, and the alternative methods listed below were not preferred for the reasons specified:

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i. Methods such as Swing, SMART, SMARTS, and SMARTER, some of the earliest proposed in the literature, have a mathematical infrastructure that is relatively ineffective compared to more recent methods (especially, these methods do not account for consistency).

ii. The AHP and BWM methods allow certain deviations in pairwise comparisons and do not fully maintain transitivity, leading to a decrease in model consistency, which negatively affects the reliability of the findings. Additionally, these methods require a high number of pairwise comparisons when there are n=10 criteria;

- 45, from the (n(n-1)/2) number of pairwise comparisons with AHP,
- 17, from the (2n-3) number of pairwise comparison with BWM, and
- 9, from the (n-1) number of pairwise comparisons with FUCOM.

iii. The reluctance of the experts due to the long evaluation process and complexity of the calculation steps of the DEMATEL and MACBETH methods,

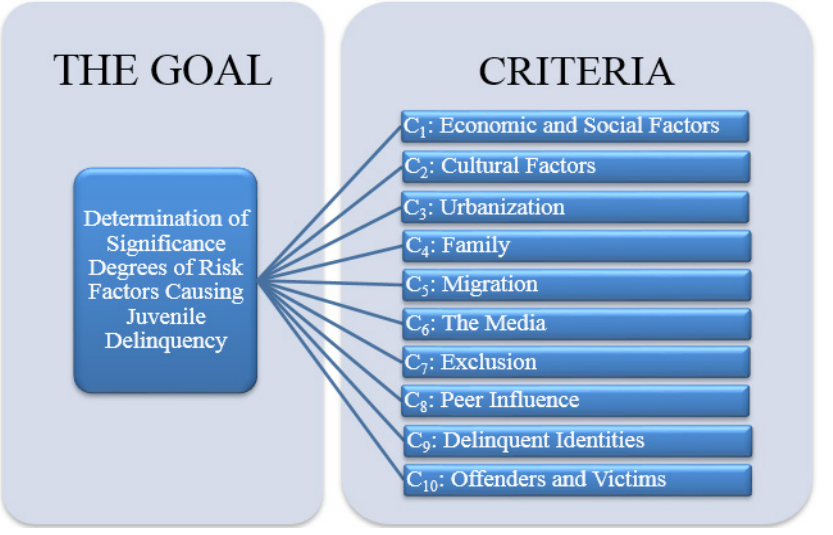
iv. The SWARA method, which is one of the closest and recent methods comparing to FUCOM in terms of ease of computational steps and the number of pairwise comparisons, does not take into account the consistency as much as FUCOM (Pamucar et al., 2018: 22; Badi and Abdulshahed, 2019: 12).

Problem Description

Before proceeding with the computational steps of the FUCOM method, it is essential first to define the problem, as demonstrated in Fig. 3. At this stage, it is necessary to determine the goals to be achieved, the factors affecting the problem (decision criteria), and the experts whose opinions will be consulted. In this context, the goal of the study is 'to determine the significance degrees of the risk factors causing juvenile delinquency.

As for the decision criteria, the causes of juvenile delinquency, approved by the experts, are taken into consideration and are explained in detail in Section 1.1. The problem hierarchy, showing the goal and the risk factors causing juvenile delinquency (decision criteria) and their abbreviations, is presented in Fig. 2.

Figure 2. *Problem hierarchy*



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The experts whose evaluations were consulted are the person who still gives lessons on crime and security subjects at the levels of bachelor and postgraduate as academic members of the Turkish Gendarmerie and Coast Guard Academy, and also worked as commanders in the law enforcement units of the Turkish General Command of Gendarmerie for many years.

Results and Discussion

The computational steps of the FUCOM method started with the first step, ranking the decision criteria from the most significant to the least. The results of the ranking process performed separately by each expert are presented in Table 1. For instance, the "Family (C4)" criterion has the highest significance according to the first expert (E1).

Table 1. *Ranking the Criteria by Experts*

Criteria	E_1	E_2	E_3	E_4	E_5
C_1	2	1	2	2	2
C_2	7	6	3	7	3
C_3	8	10	10	8	10
C_4	1	2	1	1	1
C_5	9	7	6	9	4
C_6	10	8	9	10	9
C_7	5	5	5	4	6
C_8	4	3	4	5	5
C_9	3	4	8	3	8
C_{10}	6	9	7	6	7

Then, pairwise comparisons of the ranking criteria are carried out and the comparative priorities are determined according to the [1,9] scale. So that, the vectors of the comparative priorities of the decision criteria are determined. Table 2 presents the experts' evaluations of each criterion by the [1,9] scale, and the geometric mean of the expert's evaluations, reflecting the group decision. For instance, since the the "C_4" criterion has the highest significance according to the first expert, the weights of C_4 (ω_{C_4}) equals "1" and ω_{C_1} is evaluated as "2" by the first expert. Thus, the comparative priorities are calculated: $\varphi_{C_4}/C_1 = 2/1 = 2$. In other words, the comparative priority of the C_4 criterion compared to C_1 equals "2", for the first expert.

Table 2. *The experts' evaluations of each criterion and the geometric mean of them, reflecting the group decision*

Rank	E_1		E_2		E_3		E_4		E_5		Geo. Mean	
	Rank	ω_{Cj}	Rank	ω_{Cj}	Rank	ω_{Cj}	Rank	ω_{Cj}	Rank	ω_{Cj}	Rank	ω_{Cj}
1	C_4	1	C_1	1	C_4	1	C_4	1	C_4	1	C_4	1.246
2	C_1	2	C_4	3	C_1	2	C_1	2	C_1	3	C_1	1.888
3	C_9	4	C_8	4	C_2	2	C_9	2	C_2	4	C_8	3.728
4	C_8	4	C_9	4	C_8	3	C_7	3	C_5	4	C_7	4.129
5	C_7	4	C_7	5	C_7	4	C_8	3	C_8	5	C_2	4.416
6	C_{10}	4	C_2	6	C_5	4	C_{10}	5	C_7	5	C_9	4.555

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7	C_2	7	C_5	8	C_{10}	5	C_2	5	C_{10}	6	C_{10}	5.833
8	C_3	9	C_6	8	C_9	7	C_3	6	C_9	7	C_5	6.044
9	**C_5**	9	**C_{10}**	9	**C_6**	9	**C_5**	7	**C_6**	8	**C_3**	8.299
10	**C_6**	9	**C_3**	9	**C_3**	9	**C_6**	9	**C_3**	9	**C_6**	8.586

After obtaining the comparative priorities presented in Table 2, the third step, satisfying the conditions, is initiated. At this step, Condition-1 is calculated with Eq. (3) whereas Condition-2 is calculated with Eq. (7), and the obtained results are presented in Table 3. For instance, Condition-1 is obtained for : and Condition-2 are obtained for : .

Table 3. *Satisfying the conditions*

Significance Rank	C_4	C_1	C_8	C_7	C_2	C_9	C_{10}	C_5	C_3	C_6
Vectors	1.246	1.888	3.728	4.129	4.416	4.555	5.833	6.044	8.299	8.586
Condition-1	1.516	1.974	1.108	1.070	1.031	1.281	1.036	1.373	1.035	
Condition-2	2.993	2.187	1.185	1.103	1.321	1.327	1.423	1.421		

At the last step, the linear programming model was built and solved with Eq. (9), to determine the optimal values of the weight coefficients/degrees of the significance of the criteria:

$$\min \chi$$

$$s.t. \begin{cases} \left|\frac{w_4}{w_1} - 1.516\right| \le \chi, \left|\frac{w_1}{w_8} - 1.974\right| \le \chi, \left|\frac{w_8}{w_7} - 1.108\right| \le \chi, \\ \left|\frac{w_7}{w_2} - 1.070\right| \le \chi, \left|\frac{w_2}{w_9} - 1.031\right| \le \chi, \left|\frac{w_9}{w_{10}} - 1.281\right| \le \chi, \\ \left|\frac{w_{10}}{w_5} - 1.036\right| \le \chi, \left|\frac{w_5}{w_3} - 1.373\right| \le \chi, \left|\frac{w_3}{w_6} - 1.035\right| \le \chi, \\ \left|\frac{w_4}{w_8} - 2.993\right| \le \chi, \left|\frac{w_1}{w_7} - 2.187\right| \le \chi, \left|\frac{w_8}{w_2} - 1.185\right| \le \chi, \\ \left|\frac{w_7}{w_9} - 1.103\right| \le \chi, \left|\frac{w_2}{w_{10}} - 1.321\right| \le \chi, \left|\frac{w_9}{w_5} - 1.327\right| \le \chi, \\ \left|\frac{w_{10}}{w_3} - 1.423\right| \le \chi, \left|\frac{w_5}{w_6} - 1.421\right| \le \chi, \\ \sum_{j=1}^{10} w_j = 1, \quad w_j \ge 0, \quad \forall j \end{cases} \quad \forall j$$

In this study, the Solver plug-in of Microsoft Excel software was used to solve the linear model. The significance degrees (the final values of weight coefficients) of the decision criteria, final rankings, and DFC (χ) are computed and presented in Table 4 and Fig. 3.

Table 4. *The final values of weight coefficients of the criteria, final rankings and DFC (χ)*

Criteria	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}
Degrees of Significance	0.185	0.079	0.042	0.280	0.058	0.041	0.085	0.094	0.077	0.060

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Final Ranking	2	5	9	1	8	10	4	3	6	7
DFC	0,000000004									

Accordingly, the final ranking of the risk factors causing juvenile delinquency were obtained as; Family (C_4) >> Economic and Social Factors (C_1) >> Peer Influence (C_8) >> Exclusion (C_7) >> Cultural Factors (C_2) >> Delinquent Identities (C_9)>> Offenders and Victims (C_6) >> Migration (C_5) >> Urbanization (C_5) >> The Media (C_1) by utilizing the FUCOM method. In addition, the DFC value was calculated as 0.000000004, and it was determined that the pairwise comparisons conducted by the experts were perfectly consistent and the results obtained could be trusted.

Figure 3. *The values of weight coefficients of the criteria (degrees of significance)*

The obtained results indicate that the most significant risk factors causing juvenile delinquency are, by far, 'Family' and 'Economic and Social Factors', respectively. In fact, these results align with the literature. Sociologists, researchers, and criminologists have recognized that youths who have strong attachments to their parents and a high commitment to their social environment are less likely to engage in delinquency (Chapple et al., 2005; Kroher and Tobias, 2015). The literature supports the results of this study, emphasizing family and economic/social perspectives as the most focused topics in statistical factor analysis and crime prediction studies. Contrary to the literature, only one paper has been identified where no statistically significant effect was found on juvenile delinquency from familial subfactors (Mack et al., 2007).

The findings of this study may be useful for public authorities and crime prevention specialists in determining the expected impact of targeting a known shared factor for intervention purposes. It is concluded that they should focus their attention and concentrate their limited resources significantly on family-related subfactors. Similarly, they should give more consideration to both macro

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and micro-level economic and social subfactors to mitigate the negative consequences of juvenile delinquency.

The following managerial insights can be drawn for the application of the utilized method. In MCDM studies using AHP and DEMATEL, which are other subjective weighting methods widely used in the literature, some authors have reported that face-to-face interviews with experts can produce some contradictory and inconsistent evaluations, noting that many mistakes could be made when using the questionnaire method in MCDM studies (Erdal, 2018a: 114; Erdal, 2018b: 932; Korucuk and Erdal, 2019: 170). In contrast, while conducting face-to-face interviews according to the FUCOM method for the evaluations of this study, no difficulties were noticed. It is concluded that, as a subjective weighting MCDM method, FUCOM can be used effectively in determining the significance degrees of risk factors causing juvenile delinquency, due to the error-free transfer of expert evaluations to the calculation processes and the consistency obtained.

CONCLUSION

Juvenile delinquents constitute a population not usually recognized as needing services to prevent them from becoming tomorrow's serious, violent, and chronic offenders. Although many preventive programs have been developed over the years, it is clear that public authorities and crime prevention specialists should focus on developing and implementing more effective policies and procedures directed toward using available resources to address the problem.

In this study, the FUCOM was utilized to determine the significance degrees of risk factors that cause juvenile delinquency, a complex MCDM problem that includes subjective and conflicting factors. For this purpose, face-to-face interviews were conducted with five academic members who have provided undergraduate and graduate education on crime and security subjects and also served as commanders in the law enforcement units of the Turkish General Command of Gendarmerie for many years.

Throughout the literature review, many qualitative and quantitative studies have been identified that investigate the causes of juvenile delinquency and the relationships between these causes. On the other hand, to the best of our knowledge, no other study has been identified that: (i) prioritizes or determines the significance degrees of risk factors causing juvenile delinquency, (ii) utilizes MCDM methods in general, and the FUCOM in particular, for juvenile delinquency.

In this context, during the planning phase of strategies for preventing juvenile delinquency, it is essential to define which risk factors should be focused on and to what extent, and which should be allocated more resources and effort to prevent juvenile delinquency more effectively. Furthermore, it has been concluded that the FUCOM method can be effectively used for juvenile delinquency decision-making analysis.

The obtained results indicate that the most significant risk factors causing juvenile delinquency are, by far, 'Family' and 'Economic and Social Factors', respectively, in line with the literature.

Within the framework of the study results, it is necessary to focus on the family factor, which is a fundamental indicator. Juveniles are more open to change than

adults; therefore, supporting them with healthy opportunities based on fundamental skills and social and sports activities can lead to behavioural changes. In other words, it is evident that this will positively impact delinquency rates and perceptions of delinquency. Moreover, to prevent delinquency, it would be appropriate to develop and disseminate comprehensive studies based on the juveniles' families, schools, and society.

Like every study, this one has limitations. One of the main limitations is that the number of expert groups examined is limited, and this number could not be increased due to time constraints. Another limitation is that the study is specific to the field of juvenile delinquency. Additionally, literature reviews did not identify a set of criteria concerning juvenile delinquency.

Especially considering the deficiencies and limitations presented in this study, the number of experts on juvenile delinquency could be increased. Parameters that influence and are influenced by juvenile delinquency could be included.

It is considered that this study may contribute to the literature by expanding on the following issues, both in terms of revealing the limitations of this study and suggesting directions for future research:

i. The risk factors causing juvenile delinquency evaluated in this study could be expanded.

ii. Comparative analyses could be conducted specific to various geographical regions, provinces, or countries.

iii. Although the experts whose opinions were consulted in this study have many years of experience as commanders of law enforcement units fighting against juvenile delinquency, the opinions of experts such as sociologists, pedagogues, and social workers, especially those working in courthouses, may also be consulted.

iv. To prevent juvenile delinquency behaviour, there is a need to develop and strengthen the parenting skills of parents and to ensure that juveniles at risk remain in education. Development of school-focused preventive, protective, supportive, and empowering services is necessary, therefore implementing school social service practices is essential (Çabuk 2022: 140). v. Different subjective weighting methods (e.g., AHP, DEMATEL, SWARA, SMART) may be used, and comparative analyses may be employed with the results obtained in this study (Korucuk, et al., 2022:21).

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REFERENCES

Antunes, Maria Joao L., and Ahlin M. Eileen (2017). "Youth Exposure to Violence in the Vommunity: Towards a Theoretical Framework for Explaining Risk and Protective Factors". *Aggression and violent Behavior,* 34: 166-177. doi: https://doi.org/10.1016/j.avb.2017.01.015

Azeredo, Andreia, Diana Moreira, Patrícia Figueiredo and Fernando Barbosa (2019). "Delinquent Behavior: Systematic Review of Genetic and Environmental Risk Factors". *Clinical Child and Family Psychology Review*, 22(4): 502–526. doi: https://doi.org/10.1007/s10567-019-00298-w

Badi, Ibrahim and Ali M. Abdulshahed (2019). "Ranking the Libyan Airlines by Using Full Consistency Method (FUCOM) and Analytical Hierarchy Process (AHP)". *Operational Research in Engineering Sciences: Theory and Applications*, 2(1): 1-14. doi: https://doi.org/10.31181/oresta1901001b

Badi, Ibrahim and Mustafa Kridish (2020). "Landfill Site Selection Using a Novel FUCOM-CODAS Model: A Case Study in Libya". *Scientific African*, 9: 1-10. doi: https://doi.org/10.1016/j.sciaf.2020.e00537

Bobbio, Antonella, Karin Arbach and Santiago R. Illescas (2020). "Juvenile Delinquency Risk Factors: Individual, Social, Opportunity or All of These Together?" *International Journal of Law, Crime and Justice*, 62: 100388. doi: https://doi.org/10.1016/j.ijlcj.2020.100388

Bozanic, Darko, Dusko Tesic and Aleksandar Milic (2020). Multicriteria Decision Making Model with Z-numbers Based on FUCOM and MABAC Model. *Decision Making: Applications in Management and Engineering*, 3(2): 19-36. doi: https://doi.org/10.31181/dmame2003019d

Cabuk, Gungor (2022). *Cocuk Suclulugu Baglaminda Cocugu Suca Iten Nedenler*. *Sosyal Politika ve Sosyal Hizmet Calismalari Dergisi*, 3(1): 129-142.

Chapple, Constance L., Julia McQuillan and Terceira Berdahl (2005). "Gender, Social Bonds, and Delinquency: A Comparison of Boys' and Girls' Models". *Social Science Research*, 34(2): 357-383. doi: https://doi.org/10.1016/j.ssresearch.2004.04.003

Choi, Jungtae (2022). "Identifying Important Factors to Prevent Juvenile Delinquency among Male and Female Adolescents: an Exploratory Analysis Using the LASSO Regression Algorithm in the Korean Children and Youth Panel Sur". *Child Indicators Research*, 1-36. doi: https://doi.org/10.1007/s12187-022-09916-6

Chung, Yong-Rae, Jeong-Won Hong, Byung-Bae Kim, Jun-Seong Kim, Il Suk Noh, Ji Hee Wee, Nam Hee Kim, Sung Man Bae and Myung Ho Lim (2020). "ADHD, Suicidal Ideation, Depression, Anxiety, Self-Esteem, and Alcohol Problem in Korean Juvenile Delinquency". *Medicine*, 99(11): e19423. doi: https://doi.org/10.1097/MD.0000000000019423

Dalic, Irena, Zeljko Stevic, Zivko Erceg, Perica Macura and Svetlana Terzic (2020). "Selection of a Distribution Channel Using the Integrated FUCOM-MARCOS Model". *International Review,* (3-4): 80-96. doi: https://doi.org/10.5937/intrev2003080Q

Deveci, Muhammet, Dragan Pamucar, Umit Cali, Emre Kantar, Kostanze Kolle and John O. Tande (2022). "A Hybrid Q-Rung Orthopair Fuzzy Sets Based Cocoso Model for Floating Offshore Wind Farm Site Selection in Norway". *CSEE Journal of Power and Energy Systems*. doi: https://doi.org/10.17775/CSEEJPES.2021.07700

Duran-Bonavila, Silvia, Andreu Vigil-Colet, Sandra Cosi and Fabia Morales--Vives (2017). "How Individual and Contextual Factors Affects Antisocial and Delinquent Behaviors: A Comparison between Young Offenders, Adolescents at Risk of Social Exclusion, and a Community Sample". *Frontiers in Psychology*, 8: 1825. doi: https://doi.org/10.3389/fpsyg.2017.01825

Dutta, Nabamita, Dipparna Jana and Saibal Kar (2020). "Does State-Level per Capita Income Affect Juvenile Delinquency? An Empirical Analysis for Indian States". *Economic Modelling*, 87: 109-120. doi: https://doi.org/10.1016/j.econmod.2019.07.011

Emmelkamp, Julie, Jessica J. Asscher, Inge B. Wissink and Geert Jan J.M. Stams (2020). "Risk Factors for (Violent) Radicalization in Juveniles: A Multilevel Meta-Analysis". *Aggression and Violent Behavior*, 55: 101489. doi: https://doi.org/10.1016/j.avb.2020.101489

Erdal, Hamit (2018a). Quantitative Analysis of Factors Influencing the Logistics Strategy (Editor Erdal, H.). *Logistics Strategies*. pp. 83-125. Ankara: Ekin Publishing House.

Erdal, Hamit (2018b). Determination of the importance levels of basic logistics innovation capabilities: an investigation on logistic service providers. IV. International Caucasus-Central Asia Foreign Trade and Logistics Congress, 07-08 September 2018, Didim, Aydin, Türkiye.

Erdal, Hamit (2021). Prioritization of service quality dimensions for tourism enterprises via SWARA method. 2th. International Congress of New Generations and New Trends in Tourism-INGANT'21, 27-28 May 2021, Sakarya, Türkiye.

Erdal, Hamit and Korucuk, Selçuk (2023). Kentiçi Toplu Taşıma Filosu Atama Ve Boyutlandırma Problemi İçin Bir Model Önerisi: Erzurum İli Örneği. Journal of Mehmet Akif Ersoy University Economics and Administrative Sciences Faculty, 10(2), 904-934. https://doi.org/10.30798/makuiibf.1097429

Falk, Avital E., Steve S. Lee and Bruce F. Chorpita (2017). "Differential Association of Youth Attention-Deficit/Hyperactivity Disorder and Anxiety with Delinquency and Aggression". *Journal of Clinical Child & Adolescent Psychology*, 46(5): 653-660. doi: https://doi.org/10.1080/15374416.2015.1055858

Fazlollahtabar, Hamed, Aldina Smailbasic and Zeljko Stevic (2019). "FUCOM Method in Group Decision-Making: Selection of Forklift in a Warehouse". *Decision Making: Applications in Management and Engineering*, 2(1): 49-65. doi: https://doi.org/10.31181/dmame1901065f

Gao, Ling, Jiedi Liu, Suqing Hua, Jiping Yang and Xingchang Wang (2022). "Teacher-Student Relationship and Adolescents' Bullying Perpetration: A Moderated Mediation Model of Deviant Peer Affiliation and Peer Pressure". *Journal of Social and Personal Relationships*, 39(7): 2003-2021. doi: https://doi.org/10.1177/02654075221074393

Geerlings, Yoni, Jessica Asscher, Geert Jan Stams and Mark Assink (2020). "The Association between Psychopathy and Delinquency in Juveniles: A Three-Level Meta-Analysis". *Aggression and Violent Behavior*, 50: 101342. doi: https://doi.org/10.1016/j.avb.2019.101342.

Gosain, Mansha (2020). Psychological Dimensions of Juvenile Delinquency. Available at SSRN: https://ssrn.com/abstract=3697791 or http://dx.doi.org/10.2139/ssrn.3697791

Hoan, Pham V. and Yonghoon Ha (2021). "ARAS-FUCOM Approach for VPAF Fighter Aircraft Selection". *Decision Science Letters*, 10(1): 53-62. doi: https://doi.org/10.5267/j.dsl.2020.10.004

Holt, Thomas J., Adam M. Bossler and David C. May (2012). "Low Self-Control, Deviant Peer Associations, and Juvenile Cyberdeviance". *American Journal of Criminal Justice*, 37(3): 378-395. doi: https://doi.org/10.1007/s12103-011-9117-3

Jolliffe, Darrick, David P. Farrington, Alex R. Piquero, John F. MacLeod and Steve van de Weijer (2017). "Prevalence of Life-Course-Persistent, Adolescence-Limited, and Late-Onset Offenders: A Systematic Review of Prospective Longitudinal Studies". *Aggression and Violent Behavior*, 33: 4-14. doi: https://doi.org/10.1016/j.avb.2017.01.002

Joo, Young Sun and Ick-joong Chung (2019). "The Double Burden of Housing and Neighborhood Poverty on Juvenile Delinquency: The Mediating Effects of Parenting Behavior". *Korea Social Policy Review*, 26(4): 3–26. doi: https://doi.org/10.17000/kspr.26.4.201912.3

Kennedy, Thomas D., David Detullio and Danielle H. Millen (2020). *Juvenile Delinquency Theory, Trends, Risk Factors and Interventions*. Springer Nature Switzerland AG.

Korucuk, Selçuk and Hamit Erdal (2019). A comparative quantitative analysis for the warehouse location problem which is a strategic logistics function (Eds. Korucuk, S. and Atukalp, M.E.). In *Current Applications in Logistics*. pp. 156-172, Academisyen Bookstore.

Korucuk, Selçuk, Aytekin, Ahmet, Ecer, Fatih., Karamaşa, Çağlar., and Zavadskas, Kazimieras Zavadskas, (2022). Assessing green approaches and digital marketing strategies for twin transition via fermatean fuzzy SWARA-COPRAS. *Axioms*, *11*(12), 709.

Kratcoski, Peter C., Lucille Dunn Kratcoski and Peter Christopher Kratcoski (2020). *Juvenile Delinquency Theory, Research, and the Juvenile Justice Process*, Sixth Edition, Springer, Cham. doi: https://doi.org/10.1007/978-3-030-31452-1

Kroher, Martina and Tobias Wolbring (2015). "Social Control, Social Learning, and Cheating: Evidence from Lab and Online Experiments on Dishonesty". *Social Science Research*, 53: 311-324. doi: https://doi.org/10.1016/j.ssresearch.2015.06.003

Laeeque, Syed Harris, Muhammad Ali Saeed and Atif Bilal (2022). "Psychological Mechanisms Linking Sibling Abuse and School Delinquency: An Experien-

tial Sampling Study Based on Conservation of Resources Theory". *Motivation and Emotion*, 46(2): 1-14. doi: https://doi.org/10.1007/s11031-022-09925-6

Lai, Violet, Gerald Zeng and Chi Meng Chu (2016). "Violent and Nonviolent Youth Offenders: Preliminary Evidence on Group Subtypes". *Youth Violence and Juvenile Justice*, 14(3): 313-329. doi: https://doi.org/10.1177/1541204015615193

Lee, Julie (2013). "A Cross-Lagged Longitudinal Study of Relations between Academic Achievement and Korean Adolescent Delinquency". *Health Education Journal*, 72(5): 555-563. doi: https://doi.org/10.1177/0017896912452070

Mack, Kristin Y., Michael J. Leiber, Richard A. Featherstone and Maria A. Monserud (2007). "Reassessing the Family-Delinquency Association: Do Family Type, Family Processes, and Economic Factors Make a Difference?" *Journal of Criminal Justice*, 35(1): 51-67. doi: https://doi.org/10.1016/j.jcrimjus.2006.11.015

Mahendra, Gede Surya (2021). "Implementation of the FUCOM-SAW Method on E-Commerce Selection DSS in Indonesia". *Tech-E*, 5(1): 75-85. doi: https://doi.org/10.31253/te.v5i1.662

Marshall, Ineke Haen and Dirk Enzmann (2012). "The Generalizability of Self-Control Theory". In *The Many Faces of Youth Crime* (pp. 285-325). Springer, New York. doi: https://doi.org/10.1007/978-1-4419-9455-4_11

Martins, Paula Cristina, Vitor Hugo Oliveira and Iva Tendais (2018). "Research with Children and Young People on Sensitive Topics–the Case of Poverty and Delinquency". *Childhood*, 25(4): 458-472. doi: https://doi.org/10.1177/0907568218793931

Mohammad, Taufik and Intan Nooraini (2021). "Routine Activity Theory and Juvenile Delinquency: The Roles of Peers and Family Monitoring among Malaysian Adolescents". *Children and Youth Services Review*, 121: 105795. doi: https://doi.org/10.1016/j.childyouth.2020.105795

Moitra, Tanusree, Indrani Mukherjee and Garga Chatterjee (2018). "Parenting Behavior and Juvenile Delinquency among Low-Income Families". *Victims & Offenders*, 13(3): 336-348. https://doi.org/10.1080/15564886.2017.1323062

Montgomery, Katherine L., Sanna J. Thompson and Amanda N. Barczyk (2011). "Individual and Relationship Factors Associated with Delinquency among Throwaway Adolescents". *Children and Youth Services Review*, 33(7): 1127-1133. doi: https://doi.org/10.1016/j.childyouth.2011.02.005

Nam, Su-Jung (2021). "The Longitudinal Relationships between Cyber Delinquency, Aggression, and Offline Delinquency: An Autoregressive Cross-Lagged Model". *The Journal of Early Adolescence*, 41(4): 634-652. doi: https://doi.org/10.1177/0272431620939187

Nelson, Bonnie A. (2016). *Juvenile Delinquency Causes, Control and Consequences*. New York: Nova Science Publishers, Inc.

Pamucar, Dragan, Zeljko Stevic and Sinisa Sremac (2018). "A New Model for Determining Weight Coefficients of Criteria in Mcdm Models: Full Consistency Method (Fucom)". *Symmetry*, 10(9): 393. doi: https://doi.org/10.3390/sym10090393

Pardini, Dustin (2016). "Empirically Based Strategies for Preventing Juvenile Delinquency". *Child and Adolescent Psychiatric Clinics*, 25(2): 257-268. https://doi.org/10.1016/j.chc.2015.11.009

Pelham, William E., Hanno Petras and Dustin A. Pardini (2020). "Can Machine Learning Improve Screening for Targeted Delinquency Prevention Programs?" *Prevention Science*, 21(2): 158-170. https://doi.org/10.1007/s11121-019-01040-2

Puska, Adis, Zeljko Stevic and Dragan Pamucar (2021). "Evaluation and Selection of Healthcare Waste Incinerators Using Extended Sustainability Criteria and Multi-Criteria Analysis Methods". *Environment, Development and Sustainability*, 24: 11195–11225. doi: https://doi.org/10.1007/s10668-021-01902-2

Pyle, Nicole, Andrea Flower, Anna Mari Fall and Jacob Williams (2016). "Individual-Level Risk Factors of Incarcerated Youth". *Remedial and Special Education*, 37(3): 172-186. doi: https://doi.org/10.1177/0741932515593383

Ramer, Nolan E. and Craig R. Colder (2022). "The Moderating Effects of Alcohol Use with and without Parent Permission on Alcohol Risk Communication in Early Adolescence". *Addictive Behaviors*, 126: 107174. doi: https://doi.org/10.1016/j.addbeh.2021.107174

Razza, Rachel A., Anne Martin and Jeanne Brooks-Gunn (2015). "Are Approaches to Learning in Kindergarten Associated with Academic and Social Competence Similarly?" *Child & Youth Care Forum*, 44(6): 757-776 doi: https://doi.org/10.1007/s10566-015-9307-0

Reeta, V. Rao and Geetika Singh (2020). "Broken Families and Impact on Juvenile Delinquency". *International Journal of Humanities and Social Science Invention (IJHSSI)*, 9(5): 33-38.

Roberson, Cliff and Elena Azaola (2021). *Juvenile Delinquency: Why Do Youths Commit Crime?* Rowman & Littlefield Publishers, London.

Siegel, Larry and Brandon C. Welsh (2018). *Juvenile delinquency: Theory, Practice, and Law*. Cengage Learning, Boston.

Snehil, Gupta and Rajesh Sagar (2020). "Juvenile Justice System, Juvenile Mental Health, and the Role of Mhps: Challenges and Opportunities". *Indian Journal of Psychological Medicine*, 42(3): 304-310. doi: https://doi.org/10.4103/IJPSYM.IJPSYM_82_20

Sweeten, Gary, Alex R. Piquero and Laurence Steinberg (2013). "Age and the Explanation of Crime, Revisited". *Journal of Youth and Adolescence*, 42(6): 921-938. doi: https://doi.org/10.1007/s10964-013-9926-4

Thomas, Kyle J. (2015). "Delinquent Peer Influence on Offending Versatility: Can Peers Promote Specialized Delinquency?" *Criminology*, 53(2): 280-308. doi: https://doi.org/10.1111/1745-9125.12069

Ucuz, Ilknur, Ayla Uzun Cicek, Ali Ari, Ozlem Ozel Ozcan and Seda Aybuke Sari (2020). "Determining the Probability of Juvenile Delinquency by Using Support Vector Machines and Designing a Clinical Decision Support System". *Medical Hypotheses*, 143: 110118. doi: https://doi.org/10.1016/j.mehy.2020.110118

Unnever, James D. and Cecilia Chouhy (2020). "Race, Gender, and Perceptions of Peer Delinquency: A Within-Subject Analysis". *Deviant Behavior*, 41(11): 1413-1430. doi: https://doi.org/10.1080/01639625.2019.1623604

Van Berkel, Sheila. R., Corinna Jenkins Tucker and David Finkelhor (2018). "The Combination of Sibling Victimization and Parental Child Maltreatment on Mental Health Problems and Delinquency". *Child Maltreatment*, 23(3): 244–253. doi: https:// doi. org/ 10. 1177/ 10775 59517 751670

Van Dijk, Rianne, Inge E Van Der Valk, Maja Dekovic and Susan Branje (2020). "A Meta-Analysis on Interparental Conflict, Parenting, and Child Adjustment in Divorced Families: Examining Mediation Using Meta-Analytic Structural Equation Models". *Clinical Psychology Review*, 79: 101861. doi: https://doi.org/10.1016/j.cpr.2020.101861

World Youth Report (2003). The Global Situation of Young People, Juvenile Delinquency. United Nations Publications, New York.

Yun, Minwoo, Eunyoung Kim and Woong-Sub Park (2017). "A Test of an Integrative Model Using Social Factors and Personality Traits: Prediction on the Delinquency of South Korean Youth". *International Journal of Offender Therapy and Comparative Criminology*, 61(11): 1262-1287. doi: https://doi.org/10.1177/0306624x15619615