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Croatian Crisis Negotiation Model (SPECTRA): Experimental Validation of the Croatian Crisis Negotiation Training Course

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Keywords

Crisis intervention; education, professional; police training; negotiating; validation study

Abstract

Aim: Crisis negotiation is one of the most effective police tools for managing crisis interventions. Expressive crises, involving perpetrators experiencing intense emotions and often psychiatric disorders, are most common. Few crisis negotiation models or training programs have been scientifically validated. This study aimed to validate the Croatian Crisis Negotiation Training based on the principles of the Croatian Model of Crisis Negotiation (SPECTRA). **Subjects and Methods:** Twenty-two police officers from riot and special police units in Croatia participated. The methodology of Van Hasselt and colleagues was partially replicated. Data were collected using self-assessments, trainers' assessments, and the Competitive State Anxiety Inventory-2 (CSAI-2) questionnaire. Blood pressure, heart rate, and respiratory rate were also measured. **Results:** Significant differences were observed before and after the course across all measures. Participants and trainers reported better negotiation performance after training, with less talking, more listening, reduced problem-solving attempts, and lower blood pressure, heart rate, and respiratory rate during role-play tests. Effect sizes were in the medium-to-large range. **Conclusion:** Training produced significant improvements in self-assessments, trainer assessments, biological parameters, and response duration. After the course, police officers were mentally and physically calmer during negotiation simulations. This research is among the few to validate negotiation training using both psychological measures and autonomic nervous system activation as a physiological response to stress.

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Introduction

Police practice as well as the literature have continuously and consistently shown that crisis negotiation is one of the most effective police tools for resolving all types of crisis interventions peacefully, i.e. without the use of force. In the negotiation context, crisis interventions, and thus the perpetrators, are divided into instrumental and expressive categories. Expressive situations are statistically much more frequent, both in police work in general and in crisis negotiation. This category includes perpetrators who experience strong emotions such as sadness, anger, despair, etc. and they often suffer from some psychiatric disorder [1,2]. From the very beginning of crisis negotiations in the 70s in the USA,

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various negotiation models have been developed and practiced. Each of them proposed practical and usable principles, but the initial models, although effective in the negotiation context in general, were not significantly usable in police crises. A significant shift in their practical implications is observed with the recognition of the importance of working on the perpetrator's emotions and implementation of the principles of psychological counseling and therapy. Grubb, Grubb and associates and Archer and Todd provide an excellent overview of existing crisis negotiation models [3-5]. BISM (Behavioral Influence Stairway Model) is undoubtedly one of the most used and cited models in crisis negotiation literature and was developed by Vecchi [6]. More precisely, it is a renamed and upgraded version of the BCSM (Behavioral Change Stairway Model) developed by the FBI CNU (Federal Bureau of Investigation Crisis Negotiation Unit) unit [7]. Furthermore, different models of crisis negotiation imply different trainings/courses for crisis negotiators, that is, the process by which police officers become negotiators. Like the model, one of the most famous programs for crisis negotiators in the world is the FBI's National Crisis Negotiation Course (NCNC) at the Quantico Academy.

An extensive literature review shows that a smaller number of crisis negotiation models have been empirically validated, that is, the effectiveness of a small number of models has been scientifically proven. So far, the Cylindrical Model of Crisis Communications, the Four Phase Model of Hostage Negotiation, BISM, and D.I.A.M.O.N.D. model by Grubb and associates have been empirically tested [4,8,9]. The previous does not point to the inefficiency of other existing models, but without scientific verification, their efficiency remains at the level of subjective assessment. Namely, it is not uncommon for scientists and researchers to work on certain topics without immersion in the operative work, while on the other hand, operatives often work efficiently, but without scientific verification of the effectiveness of their operating principles. Therefore, the combination of the two mentioned areas is the most effective and correct way of work. Furthermore, only research by Van Hasselt and associates is found regarding the validation of the crisis negotiation programs' effectiveness [1]. The previous is the first validation of the crisis negotiation training program, which refers to the NCNC FBI course.

Crisis negotiation in Croatia was formally established in 2004 and Croatian crisis negotiators are very active in various areas besides crisis interventions - international cooperation, education, and scientific work. This study aims to validate the Croatian Crisis Negotiation Training Course created according to the principles of the Croatian Crisis Negotiation Model (SPECTRA).

This is one of the rare papers on this topic. The results are unique due to the biological measures used to test the effectiveness of the course. Although biological measures are often used to validate the effectiveness of various programs, including police training programs like for example iPREP, according to the literature review, this is the first study that used indicators of ANS (autonomic nervous system) activation to evaluate the effectiveness of a crisis negotiation training program [10].

Subjects and Methods

Part of the methodology was replicated from the research of Van Hasselt and associates [1]. We replicated part of the procedure related to the instructions and scenarios used in the role-play test (RPT). Van Hasselt and associates employed the RPT procedure originally developed by supervisory special agents at the Crisis Negotiation Unit of the FBI and validated by Van Hasselt and associates [1,11,12]. That procedure was specially designed for the evaluation and training of crisis negotiators' skills necessary for the successful resolution of critical incidents. We also used problem-solving (statements directed toward determining a solution to the subject's problem) and response duration (participants' total scenario response time measured in seconds) as measures of the course effectiveness, as Van Hasselt and associates [1]. The rest of the methodology and measures were designed for this research.

Twenty-two Croatian police officers who had participated in the Crisis Negotiation Basic Course participated in the study. All participants were male, with an average age of M 32.5 (SD = 2.12), and all were members of the riot and special police units.

Before conducting the research, consent from the Ethics Committee of the University of Applied Science of Criminal Investigation and Public Security in Zagreb was obtained. The research was voluntary; participants could withdraw at any time. All participants gave their written consent before the start of the study. All participants stayed at the Police Academy in Zagreb during the three-week course. The instruction used in Van Hasselt and associates, as well as three scenarios, were translated into Croatian and recorded [1]. On the first day of the training, participants gave their written consent for research participation, after which their baseline blood pressure was measured and they filled out the CSAI-2 questionnaire. The questionnaires were coded, and the data were known only to the main researcher. The participants did not know what kind of RPT they would engage in and they couldn't communicate with each other until the test was over. They were engaged in the RPT one by one. Upon entering the room, a chest strap was placed on participants to measure heart and respiration rates during the test. Then the instructions for the RPT were played on the speaker. The test involved 3 scenarios used in the Van Hasselt and associates study, which described 3 different crisis situations (suicide attempt, family violence, crisis at work) whose

audio recordings were played to the participants via speakers [1]. The participants had to react/answer to the 4 perpetrators' statements that would follow each scenario, with the instruction stating that there is no time limit for the answer. At the end of the test, the participants had their blood pressure measured again, and they filled out the CSAI-2 questionnaire again. The whole performance was recorded with a camera. After three weeks, i.e. at the end of the course, the procedure was repeated.

Instruments and Measures

Competitive State Anxiety Inventory-2

Martens and associates developed the Competitive State Anxiety Inventory-2 (CSAI-2) [13]. This 27-item measure has three subscales: cognitive anxiety, somatic anxiety, and self-confidence. Participants are asked to indicate "how you feel right now" for each item on a 4-point Likert scale (1 = not at all, 4 = very much so). Examples of cognitive anxiety items include "I am concerned about this competition," and "I am concerned about choking under pressure." These items differ from somatic anxiety statements such as "I feel nervous" or "I feel tense in my stomach." The self-confidence subscale includes items such as "I feel at ease," and "I'm confident I can meet the challenge." Each of the three subscales has 9 items, which are summed to get a score representing the level of intensity the participant feels for each anxiety component, and for self-confidence about performing.

Performance assessment for participants

The scale includes ten items to which participants respond using a 5-point Likert scale (1 = not at all, 5 = completely) to assess their performance. Items refer to different states and capacities (e.g. concentration, agitation, self-confidence) that can occur during the performance of the RPT.

Test complexity assessment for participants

The scale includes seven items to which the participants respond using a 5-point Likert scale (1 = not at all, 5 = completely) to assess the difficulty of the RPT. The items refer to different aspects of the test (e.g., clarity, stress level, challenge level).

Performance assessment for trainers

This questionnaire consists of 5 scales. Experienced crisis negotiators/trainers completed the questionnaire to assess the performance of the participants. The first scale includes the same items as the previously described scale for performance assessment for participants. The second scale consists of ten items, and it measures communication style and includes items such as assessment of the quality of participants' questioning of the crisis background, effective first presentation, etc. The third scale was a measure of active listening techniques used and consisted of 7 items referring to the 7 most frequently used active listening techniques in crisis negotiation (emotion labeling, pause, paraphrasing, minimal encouragements, I-messages, open-ended questions, mirroring). The last two scales examined problem-solving (statements directed toward determining a solution to the subject's problem) and the trainer's overall impression of the participant's performance, on a single item. Greater results on the problem-solving scale indicated an attempt to solve or „fix "perpetrators' difficulties too quickly before adequate rapport has been established as non-expert negotiators usually do. Trainers evaluated the participants on all scales using a 5-point Likert scale (1 = not at all, 5 = completely). Only on the scale of overall impression of the performance, 1 indicated "very bad" and 5 "excellent".

Response duration

This measure calculated how long the participant spoke in seconds during the test (measuring the total duration of the speech for all three scenarios). Longer duration indicated poorer performance because experienced negotiators speak far less than beginners and listen more.

Biological measures

Among the measured biological parameters were blood pressure, heart rate, and respiratory rate. More precisely, blood pressure was measured before and after the RPT, and heart and respiratory rates were measured during the entire performance. The average results were taken into analysis. Blood pressure was measured with an Omron M2+ device, and heart and respiratory rate with a Polar H10 strap.

Statistical analysis

Given the amount of used measures and the text limitation standard for research papers, to write this paper, the results on anxiety measures are in preparation for the next article, as well as the results regarding active listening techniques. Also, regarding the trainer's assessment scale, this paper will present an assessment of the overall impression and problem-solving. Results were analyzed with IBM SPSS Statistics 26 Software. Given the sample size, the Wilcoxon signed rank test was performed.

Results

Descriptive data of the sample are shown in Table 1.

Table 1. Descriptive data

Sex	Male (%)	Female (%)
	100	0
Age	M	SD
	32.5	2.12
Length of service	M	SD
	14.27	3.42
Education level	High school education	Higher education
	17	5

Table 2. Results of Wilcoxon signed rank test for participants' assessment of their performance before and after the training

Performance	M	SD	W	z	Sig	N
Performance1	35.045	5.851	20.50	-3.307	0.001*	22
Performance2	39.545	4.295				
*p < 0.01						

Tables 2 and 3 show the results of the Wilcoxon signed-rank test for participants' self-assessment of negotiation performance and perceived test complexity before and after the training.

Participants rated their performance in RPT as significantly better after training (M = 39.55) compared to before training (M = 35.05; W = 20.50, z = −3.307, p = 0.001). They also perceived the test as less demanding after the training (M = 25.41) than before (M = 27.73; W = 36.00, z = −2.596, p = 0.001).

Tables 4 and 5 summarize trainers' assessments of participants' overall performance and problem-solving approaches before and after training.

Trainers rated participants as negotiating significantly better after training (M = 28.00) compared to before (M = 16.32; W = 32.00, z = −2.211, p = 0.000). Trainers also estimated that after the training the participants imposed their solutions less during the negotiation (M = 14.454) compared to the use of problem-solving i.e. imposition of solutions before the training (M = 26.727). The Wilcoxon test indicated a statistically significant difference in the assessment of the problem-solving variable before and after the training (W = 29.30, z = -1.366, p = 0.000).

Table 3. Results of Wilcoxon signed rank test for participants' assessment of test complexity before and after the training

Test complexity	M	SD	W	z	Sig	N
TestComplexity2	27.727	3.216	36.00	-2.596	0.001*	22
TestComplexity1	25.409	3.057				
*p < 0.01						

Table 4. Results of Wilcoxon signed rank test for related samples – trainer's evaluation of overall participant's performance before and after the training

Performance	M	SD	W	z	Sig	N
Performance1	16.318	3.371	32.00	-2.211	0.000*	22
Performance2	28.000	3.817				
*p < 0.01						

Table 6 shows the results of the Wilcoxon signed rank test for related samples for the response duration of participants' reactions toward perpetrator statements before and after the training.

The participants talked less during the RPT after the training (M = 124.285 s) compared to the duration of their answer before the training (M = 194.800 s). The Wilcoxon test indicated a statistically significant difference in the response duration before and after the training (W = 187.50, z = -3.080, p = 0.002). The participants talked a whole minute (70.515 s) less after the training.

Table 7 shows the results of the Wilcoxon signed rank test for related samples for the used biological parameters before and after the training.

Table 5. Results of Wilcoxon signed rank test for trainers' assessment of participants' use of problem-solving before and after the training

Problem-solving	M	SD	W	z	Sig	N
Problem-solving1	26.727	3.769	29.30	-1.366	0.000*	22
Problem-solving2	14.454	4.808				
*p < 0.01						

Table 6. Results of Wilcoxon signed rank test for response duration before and after the training (in seconds)

Response duration	M	SD	W	z	Sig	N
ResponseDuration1	194.800	105.349	187.50	-3.080	0.002*	22
ResponseDuration2	124.285	83.224				
*p < 0.01						

Table 7. Results of Wilcoxon signed rank test for biological measures before and after the training

Blood pressure before training	M	SD	W	z	Sig	N
Sistolic1	126.818	7.835	2.00	4.079	0.000*	22
Sistolic2	149.500	9.505				
Diastolic1	81.181	5.645	0.00	4.022	0.000*	22
Diastolic2	89.409	5.474				
Blood pressure after training	M	SD	W	z	Sig	N
Sistolic1	129.681	14.670	59.00	-2.240	0.025	22
Sistolic2	134.000	11.303				
Diastolic1	76.181	5.474	71.00	-1.577	0.115	22
Diastolic2	79.772	9.149				
Blood pressure difference	M	SD	W	z	Sig	N
Sistolic2 after RPT (before training)	149.500	9.505	4.50	-3.861	0.000*	22
Sistolic2 after RPT (after training)	134.000	11.303				
Diastolic2 after RPT (before training)	89.409	5.474	7.00	-3.774	0.000*	22
Diastolic2 after RPT (after training)	79.772	9.149				
Heart rate	M	SD	W	z	Sig	N
HeartRate1	92.681	15.923	215.00	-2.875	0.004*	22
HeartRate2	82.090	13.327				
Respiratory rate	M	SD	W	z	Sig	N
RespiratoryRate1	16.772	3.130	160.00	-3.262	0.001*	22
RespiratoryRate2	14.590	2.039				

*$p < 0.01$

The systolic (M = 149.500) and diastolic (M = 89.409) blood pressures after the RPT before training were higher compared to the height of the pressures measured before the RPT (Ms = 126.818, Md = 81.181). Those differences are statistically significant (Ws = 2.00, z = 4.079, p = 0.000; Wd = 0.00, z = 4.022, p = 0.000). However, after the training, no statistically significant differences were found in the height of both types of blood pressure (Ws = 59.00, z = -2.240, p = 0.025; Wd = 71.00, z = -1.577, p = 0.115) in the measurements before and after the RPT. Finally, statistically significant differences were found in systolic and diastolic blood pressures after the RPT – before and after the training (Ws = 4.50, z = -0.861, p = 0.000; Wd = 7.00, z = -3.774, p = 0.000). Both blood pressures were significantly lower after the RPT – after the training (Ms = 134.000, Md = 79.772). Furthermore, the heart rate was lower during the negotiation after the training (M = 82.090) compared to the rate before the training (M = 92.681). Those differences also are statistically significant (W = 215.00, z = 2.875, p = 0.004). Finally, the breathing rate was slower during the test after the training (M = 14.590) compared to the breathing rate during RPT before the training (M = 16.772) and that difference also was statistically significant (W = 160.00, z = -3.262, p = 0.001). The participants negotiated/performed the RPT without significant changes in the basic indicators of the physiological reaction of the autonomic nervous system to stress, after completing the training.

Table 8 reports the effect sizes for all measures. Except for problem-solving (d = 0.29, small effect), all other measures showed medium to large effect sizes, indicating a robust impact of the training [14].

Discussion

The results showed that statistically significant differences were found before and after the three-week crisis negotiation training on all used measures (participants' self-assessment, trainers' assessment, biological parameters, and response duration). The participants evaluated

Table 8. Effect sizes for all measures

Performance - participant	M	SD	D
Performance1	35.045	5.851	0.70
Performance2	39.545	4.295	
Exercise complexity	M	SD	D
ExerciseComplexity1	25.409	3.216	0.55
ExerciseComplexity2	27.727	3.057	
Performance - trainer	M	SD	D
Performance1	16.318	3.371	0,47
Performance2	28.000	3.817	
Problem-solving	M	SD	D
ProblemSolving1	26.727	3.769	0.29
ProblemSolving2	14.454	4.808	
Response duration	M	SD	D
ResponseDuration1	194.800	105.349	0.66
ResponseDuration2	124.285	83.224	
Blood pressure	M	SD	D
Sistolic2 after RPT (before training)	149.500	9.505	0.82
Sistolic2 after RPT (after training)	134.000	11.303	
Diastolic2 after RPT (before training)	89.409	5.474	0.80
Diastolic2 after RPT (after training)	79.772	9.149	
Heart rate	M	SD	D
HeartRate1	92.681	15.923	0.61
HeartRate2	82.090	13.327	
Respiratory rate	M	SD	D
RespiratoryRate1	16.772	3.130	0.69
RespiratoryRate2	14.590	2.039	

*$p < 0.01$

their negotiation, that is, performance in the RPT after the training, as better compared to the one before the training. They also evaluated negotiation in RPT as less demanding after the completed training. Experienced Croatian crisis negotiators estimated that the participants negotiated better after the training and that they significantly less imposed their views of solutions for the perpetrator's problems during the negotiation. Furthermore, the results showed that the participants listened more – they talked significantly less during the test after completing the training. What should be emphasized in particular are the biological measures, or statistically significant results on all used measures of activation of the ANS as a physiological response to stress. Namely, the blood pressure, heart, and respiratory rates of the participants were statistically significantly lower after the training during the negotiation in an RPT. After the three-week course, police officers were significantly mentally and physically calmer during the negotiation simulation.

Like other recent models, the Croatian crisis negotiation model named SPECTRA focuses on the perpetrator's emotions, establishing a relationship with the perpetrator by showing respect and a non-judgmental attitude. The letters in the acronym stand for ie indicate all the key factors according to the model principles. S stands for Sterilization (undoing the damage), P for Preparation (of self and others), E for Extraordinary solutions (out-of-the-box thinking - creative solutions of the crisis situation), C for Concentration/Control/ Calming down/ Communication (concentration as important factor for control, calming down self, the environment and everyone involved in the crisis situation – wich all are prerequisites for effective communication), T for Tactical prediction (of the possible outcomes and danger), R for Resilience and Remodeling (building resilience toward stress and change of own perspective and perspective of others involved in the crisis situation) and finally A stands for Adaptability (quick adaptation to the change in the negotiation process). Active listening techniques are integral to our negotiation training, but the Croatian model does not give as much attention to active listening as some models. Namely, the effectiveness of active listening techniques largely depends on the authenticity, credibility, and sincere and relaxed attitude of the negotiator. Otherwise, clumsily performed techniques can trigger unwanted reactions from the perpetrator. Naturalness in performance comes with experience and is related to the personality structure and characteristics of the negotiator, therefore, in the Croatian Crisis Negotiation Training Course, participants are theoretically introduced to the techniques of active listening. More detailed elaboration and practice of these techniques take place in higher education modules. What is most emphasized in SPECTRA is the preparation of negotiators (operative and mental) and control of the environment. Crisis negotiators often act in the so-called contaminated work environment, which includes other police officers' attempts to communicate with the perpetrator until the arrival of the negotiators, a multitude of physical stimuli that hinder the negotiation process (noise, sirens, crowd, etc.) as well as a large audience dur-

ing the negotiation process (different police officers involved in crisis intervention, other emergency services, perpetrator's relatives, neighbors, etc.). Therefore, after the negotiator's mental preparation for the intervention, the next important step is to control the environment which implies creating the most suitable and pleasant working environment. SPECTRA emphasizes the negotiator's calming effect on the entire environment, not only on the perpetrator. His appearance and communication need to be natural and relaxed toward all those included in the crisis. A more detailed description of this model will be presented in a publication that is currently in preparation.

According to the previously described assumptions of the Croatian model, a Basic Crisis Negotiation Training Course was designed and implemented over the years. Croatian negotiation trainers concluded that two weeks are not enough for a negotiation course so the duration of the Croatian course was increased to three weeks. Also, in the previous years, it was noticed that during the course, the interest of the participants in the area of crisis negotiation grew, but that the self-confidence of the participants decreased with the completion of the course. The former happens due to the classic effect that occurs when individuals discover a new area, in this case, a very specific and demanding one, which implies awareness of one's inexperience and the comprehensiveness and necessary knowledge to perform a specific job i.e. crisis negotiators' work. In addition to basic negotiation techniques and tactics, the emphasis in this course is therefore placed on creating the participants' self-confidence in the form of their feeling of readiness to act. However, SPECTRA cautiously approaches the level of necessary self-confidence. On the one hand, low self-confidence is negatively related to performance, but unrealistically high self-confidence can be just as problematic [15,16]. Therefore, during the course, through carefully designed exercises and the timely introduction of certain negotiation concepts, an optimal level of self-confidence is trained or built. The former implies encouragement of participants' motivation for success (successful resolution of the crisis by negotiation) and their curiosity toward the crisis situation but with simultaneous feelings of modesty, caution, and readiness for unexpected stimuli. Since it is noticed that in the first week of the course, after getting acquainted with the basics and the difficulty of this specific police work, the level of self-confidence of the participants drops - in the new three-week course a quite time is dedicated to participants relaxation, i.e. to learn difficult material in comfortable working conditions. Negotiation role-plays, simulation, and other stressful exercises are intertwined with mental resilience and concentration exercises, breathing techniques, and other validated and useful techniques derived from MBCT (Mindfulness-Based Cognitive Therapy). This leads to an increase in self-confidence in the second week of the course, and in the third week, the desired optimal level is reached. That optimal level implies a slight drop in self-esteem level which is significantly elevated after successfully mastering role-play tests and other assignments during the second week. The drop is a desirable result during the final week in which participants encounter harder negotiation exercises, to make sure to develop their constant caution although they feel confident regarding negotiation tasks. Negotiation interventions are very unpredictable and caution is always needed and high confidence can be problematic. Further, many programs that train participants for difficult and specific tasks such as dealing with crisis situations are based on very stressful simulation exercises. The aforementioned is done according to the basic principles of habituation, i.e. achieving a reduced reaction to a repeated stimulus or overwhelming as a form of sudden exposure to a high intensity of an unpleasant stimulus [17,18]. These methods are undoubtedly useful, but the experience of our negotiators shows that the same results can be achieved in different teaching conditions. This does not exclude simulation and other stressful exercises, which are included in the course, but it significantly contributes to the learning process as well as the desired level of self-confidence and self-sufficiency in acting as a negotiator. Furthermore, this course gives a lot of attention to encouraging participants to adopt a different approach to solving problems. Namely, crisis negotiation requires creativity in thinking and the so-called out-of-the-box thinking, since it implies solving interventions differently from the classic police approach (in the form of the use of force). Changing the approach is demanding, given that all participants are riot and special police unit officers (in Croatia, only members of these units can become negotiators) who are trained for specific types of actions and situations. During the course, we try to "transfer" them to a completely different role, that is, a mode of action, different from the previous „combat" mode. Given the above-mentioned control of the environment, a lot of time and attention in the course is devoted to the acquisition of self-control and skills for calming the offender as well as everyone else involved in the crisis intervention. Course trainers include the head of Croatian crisis negotiators, the chiefs of the negotiation teams, and the negotiator's psychologist.

The lack of research is the sample size, which is, on the other hand, common for this type of experimental research. The non-parametric test used gives interpretive credibility to the presented results, and more importantly, almost all effect sizes are in the category of medium or large effect sizes.

As already stated, this is rare research of this type, and its greatest value is its practical applicability regarding the implementation in different types of police work, but also outside the police and negotiation context. Namely, the basic postulates of the Croatian Crisis Negotiation Model and validation of the course's effectiveness through the physiological response to stress enable its use in various police activities as well as other domains of work. More precisely, it allows its the use in the form of training for stressful and unpleasant situations in general. The authors conduct the training with various police officers in Croatia as well as related professions, using negotiation training segments. Finally, as mentioned, according to an extensive literature review this is the first study in which indicators of ANS activation were used to evaluate the effect of a crisis negotiation course.

Everyday police practice as well as literature show that crisis negotiation is one of the most effective police tools for solving crisis interventions. Crisis interventions are divided into instrumental and expressive. Expressive are more often and include perpetrators who experience strong emotions and often suffer from some psychiatric disorder. From the very foundation of crisis negotiations in the 70s in the USA to the present day, various negotiation models have been developed and practiced. Different models imply different training/courses for crisis negotiators. A small number of negotiation models and training courses have been scientifically validated. This does not diminish their effectiveness, which is undoubtedly notable in practice, but empirical validation is required.

This paper presents the results of the experimental validation of the Croatian Crisis Negotiation Training Course created and implemented according to the principles of the Croatian Crisis Negotiation Model (SPECTRA). The results showed that statistically significant differences were found before and after the three-week negotiation course on all the used measures (participants' self-assessments, trainer assessments, biological parameters, and response duration). Participants evaluated their negotiation, i.e. performance of the RPT after the course as better compared to the one before the course, and they evaluated the test complexity as less demanding after the course. Experienced Croatian crisis negotiators/trainers assessed that the participants negotiated better, i.e. performed the test better after the course, and that after the course they significantly less imposed their views of solutions for perpetrator's problems during the negotiation. Furthermore, the results showed that the participants listened more – they talked significantly less during the test after completing the training. What should be emphasized in particular are the biological measures, or statistically significant results on all used measures of activation of the ANS as a physiological response to stress. Namely, the blood pressure, heart, and respiratory rate of the participants were statistically significantly lower after the training during the negotiation in a role-play. After the training, police officers were significantly mentally and physically calmer during the negotiation simulation.

This is rare research of this type and unique in terms of validating the effect of crisis negotiation training with biological parameters. The value of research also lies in the practical implications of the results. The course can be adapted and used as training for stressful and unpleasant situations in general, not just in negotiation and police contexts.

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Conflict of Interest

None to declare.

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References

1. Van Hasselt VB, Baker MT, Romano SJ, Schlessinger KM, Zucker M, Dragone R, et al. Crisis (Hostage) Negotiation training: a preliminary evaluation of program efficacy. Crim Just Behav. 2006;33:56-69.
2. Beaudette JN, Stewart LA. National prevalence of mental disorders among incoming Canadian male offenders. Can J Psychiatry. 2016;61:624-32.
3. Grubb AR. Modern Day Hostage (Crisis) Negotiation: The evolution of an art form within the policing arena. Aggress Violent Behav. 2010;15:341-8.
4. Grubb A, Brown SJ, Hall P, Bowen E. From Deployment to debriefing: Introducing the D.I.A.M.O.N.D. Model of hostage and crisis negotiation. Police Pract Res. 2020;22:953-76.
5. Archer D, Todd M. Police Crisis Negotiation: An assessment of existing models. In: Coulthard M, May A, Sousa-Silva R, eds. Handbook of Forensic Linguistics. London (UK): Routledge; 2020. p. 608-24.
6. Vecchi GM. Conflict & crisis communication: The Behavioral Influence Stairway Model and suicide intervention. Ann Am Psychother Assoc. 2009;12:32-9.

7. Vecchi GM, Van Hasselt VB, Romano SJ. Crisis (Hostage) negotiation: Current strategies and issues in high-risk conflict resolution. Aggress Violent Behav. 2005;10:533-51.
8. Taylor PJ. A cylindrical model of communication behavior in crisis negotiations. Hum Commun Res. 2002;28:7-48.
9. Madrigal DO, Bowman, DR, McClain, BU. Introducing the four-phase model of hostage negotiation. J Police Crisis Negot. 2009;9:119-33.
10. Andersen JP, Arpaia J, Gustafsberg H, Poplawski S, Di Nota PM. The International Performance, Resilience and Efficiency Program Protocol for the application of HRV biofeedback in applied law enforcement settings. Appl Psychophysiol Biofeedback. 2024;49:483-502.
11. Noesner GW, Romano SJ. A role play test of crisis (hostage) negotiation skills. [Unpublished manuscript]. Crisis Negotiation Unit, FBI Academy; Quantico (USA): 2002.
12. Van Hasselt VB, Baker MT, Romano SJ, Sellers AH, Noesner GW, Smith S. Development and validation of a role play test for assessing crisis (hostage) negotiation skills. Crim Just Behav. 2005;32:345–61.
13. Martens R, Burton D, Vealey RS, Bump LA, Smith DE. Development and validation of the Competitive State Anxiety Inventory-2 (CSAI-2). In: Martens R, Vealey RS, Burton D, eds. Competitive Anxiety in Sport. Champaign (USA): Human Kinetics; 1990. p. 117–213.
14. Cohen J. Statistical Power Analysis for the Behavioral Sciences. 2nd ed. New York (USA): Lawrence Erlbaum Associates; 1988. p. 567.
15. La Fratta I, Franceschelli S, Speranza L, Patruno A, Michetti C, D'Ercole P, et al. Salivary oxytocin, cognitive anxiety and self-confidence in pre-competition athletes. Sci Rep. 2021;11:16877.
16. Yang ML, Chuang HH, Chiou WB. Long-term costs of inflated self-estimate on academic performance among adolescent students: a case of second-language achievements. Psychol Rep. 2009;105:727–37.
17. Rankin CH, Abrams T, Barry RJ, Bhatnagar S, Clayton D, Colombo J, et al. Habituation revisited: an updated and revised description of the behavioral characteristics of habituation. Neurobiol Learn Mem. 2008;92:135–8.
18. Bufford RK. Flooding [Internet]. Berlin (DE): ResearchGate; 1999 [cited 2025 Jan 27]. Available from: https://www.researchgate.net/publication/304579943_Flooding/