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## **Risk-taking Behavior in Police Officers and Martial Artists: Investigating potential Differences using the Balloon Analogue Risk Task**

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### **Abstract**

This study investigated the effects of regular threat exposure on risk-taking by comparing risk-taking propensity between police officers, martial artists, and a control group not regularly exposed to real or simulated threats. The behavioral measure of risk-taking propensity known as the Balloon Analogue Risk Task (BART) was administered to a sample of 205 participants (police officers, martial artists, and controls). Results showed no difference between the groups, which indicates that experience as a police officer and/or a martial artist did not lead to a change in risk taking propensity. The potential importance of risk-taking propensity to a better understanding of decision-making of police officers and martial artists are discussed.

*Keywords:* martial arts, police use of force, risk-taking propensity

## Introduction

Police officers are regularly exposed to threats (Jager, Klatt, & Bliesener, 2013). In this context, taking and managing risk is a common element of the police profession and a routine action for police officers, especially when decisions with impact on officer and civilian safety have to be made within split seconds (Beauregard & Michaud, 2015; Hill, 2002). Compared to police officers, martial artists (including practitioners of combat sports and self-defense) are not exposed to real-life threats on a regular basis. However, martial artists engage in simulated, confrontational situations (Staller, Bertram, Althaus, Heil, & Klemmer, 2016) or physical combat settings (e.g. Branco et al., 2013; Jensen, Roman, Shaft, & Wrisberg, 2013; Markovic, Vucetic, & Cardinale, 2008). Even though risk-taking behaviors that place an individual at risk for health or safety outcomes have received particular attention in the literature (e.g. Banducci, Felton, Dahne, Ninnemann, & Lejuez, 2015; Bornovalova, Gwadz, Kahler, Aklin, & Lejuez, 2008; Hanson, Thayer, & Tapert, 2014; Lejuez, Simmons, Aklin, Daughters, & Dvir, 2004; Zuckerman, Ball, & Black, 1990), police officers and martial artists have not been subject to any investigations so far. Therefore, the study reported with this article aims to assess whether experience as a police officer or martial artist can consequently lead to an increase in risk taking behavior. The study compared police officers to martial artists, as both differ from normal populations due to experiences of being in hostile situations where risk assessment, management, and mitigation may bring some benefit.

## Literature

Risk-taking behaviors can be defined as behaviors that involve some potential for danger or harm, while simultaneously providing an opportunity to obtain a reward of some kind (Leigh, 1999). Such behaviors are neither positive nor negative on their own in the sense that they are neither functional nor dysfunctional. Rather they encompass a broad range of behaviors that fall along both positive and negative dimensions (Byrnes, Miller, & Schafer, 1999; Foersterling, 1980; Leigh, 1999; Lejuez et al., 2002).

The specific risks that police officers and martial artists have to manage differ from each other. In the context of policing, the management of risk (with potentially detrimental outcomes for health and safety) is an everyday task (Hoyle, 1998; Kane, 1999; 2000; Perez Trujillo & Ross, 2008). On the other hand, martial artists have to deal with risks to health and safety associated with combat and training settings (Gauthier, 2008; Jensen et al., 2013). In this context, their decision-making can have serious consequences as well. In situations where every alternative regularly has drawbacks (Yates & Tschirhart, 2006) and the environment is uncertain, time pressured, and dynamic (Endsley, Hoffman, Kaber, & Roth, 2007; Lipshitz, Klein, Orasanu, & Salas, 2001; Parent & Verdun Jones, 1998; Staller & Zaiser, 2015), experienced decision-makers are thought to rely on intuitive decision-making based on recognition of situational cues (K. G. Ross, Klein, Thunholm, Schmitt, & Baxter, 2004). Accordingly, police officers have to take risks, since the environment is uncertain and they need to balance the potential positive outcomes of their behavior against potential negative outcomes associated with the situation. In situations that pose threats to the police officer or members of the public, the acting officer has to make quick and complex decisions. The officer has to compare potential courses of action to contextual constraints and the familiarity of the unfolding situation (Klein, 2008; Klein, Orasanu, Calderwood, & Zsombok, 1993). Correspondingly, experience plays a crucial role and the process by which experts make decisions based on experience and an increased ability to assess risk (Wickens, 1992). Furthermore, through the use of heuristics, experts are able to quickly select the best tool or strategy for a given task in an uncertain world (Gigerenzer & Gaissmaier, 2011; Todd, Gigerenzer, ABC Research Group, 2012). These strategies ignore “part of the information,

with the goal of making decisions more quickly, frugally, and/or accurately than more complex methods” (Gigerenzer & Gaissmaier, 2011, p. 454). With this in mind, a propensity for risk-taking behavior in police officers and martial artists may be affected by past experiences, where risk-taking has been used effectively. This may lead to the increased accessibility of heuristics related to risk-taking behavior (Fischer, Guter, & Frey, 2008).

### **Hypothesis**

Given that police officers and martial artists have to manage risks on a regular basis, it is hypothesized that both groups would show a difference in risk-taking behavior compared to a control group.

### **Operationalization**

One potential tool for gauging risk-taking behavior within a laboratory setting is the Balloon Analogue Risk Task (BART), a computerized assessment of risk taking propensity (Hopko et al., 2006; Lejuez et al., 2002; Lejuez, Aklin, Zvolensky, & Pedulla, 2003b; Lejuez et al., 2007; White, Lejuez, & de Wit, 2008). It is one of the most widely used and tested sequential risk-taking tasks and is proven to be a sensitive measure to real world risk-taking in different clinical and non-clinical populations (Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005; Banducci et al., 2015; Bornovalova et al., 2008; Campbell, Samartgis, & Crowe, 2013; Crowley, Raymond, Mikulich-Gilbertson, Thompson, & Lejuez, 2006; Hanson et al., 2014; Lauriola, Panno, Levin, & Lejuez, 2014; Lawyer, 2013; Lejuez et al., 2002; 2004; 2007; 2003a; Lejuez, Aklin, Bornovalova, & Moolchan, 2005). The BART requires participants to inflate a series of balloons. The more an individual balloon is inflated, the more money a participant will earn. The caveat is that all money earned for a given balloon will be lost if the balloon is inflated too much and explodes. Hence, the BART is able to determine the likelihood of behaving in a risky manner by measuring the average number of pumps that balloons are inflated to in the context of earning monetary rewards (Banducci et al., 2015). Since performance on the BART is associated with substance and alcohol use, smoking, psychopathy, and risky sex among adults (Campbell et al., 2013; Gonzalez et al., 2012; Hanson et al., 2014; Hopko et al., 2006; Hunt, 2005; Lejuez et al., 2002; 2003a; Schuster, Crane, Mermelstein, & Gonzalez, 2012), it can be assumed that it captures adults’ likelihood of behaving in a risky manner across a variety of contexts (Banducci et al., 2015). Therefore, performance on the BART serves as an accessible proxy of the participants’ risk-taking propensity across multiple contexts.

### **Methods**

#### **Participants**

A total of 205 participants took part in the study. Police officers were sampled through an opportunistic sampling method. Martial artists and the control group were recruited via social media (Facebook). Participants were asked about experience as police officers and in martial arts and were subsequently assigned to different groups for the study. Two cases of missing data were identified (police officers with no experience in martial arts) resulting in a final sample of  $N = 203$ .

The sample consisted of (a) police officers ( $n = 72$ ) with no experience in martial arts, except for police training, (b) martial artists ( $n = 50$ ), that had regular training experience in martial arts, and were not part of a police force, (c) police officers with additional martial

arts experience ( $n = 33$ ), and (d) a control group ( $n = 48$ ) with no experience in the policing sector and no experience in any martial art or combat sport. Demographical data of participants is shown in Table 1 (see Table 1).

## Materials

The BART required participants to pump up a simulated balloon on the screen by the click of a mouse. The computer screen shows a small-simulated balloon that gets bigger with every click of the mouse. Participants are asked to gain as much money as possible on each trial and cashing out by clicking “Collect \$\$\$” on the screen. Furthermore, a permanent money-earned display labeled “Total Winnings” and display listing the money that could be earned, when the participants decided to cash out (“Potential earnings”), and the trial number (“Balloon number”) are presented on the screen (see Figure 1).

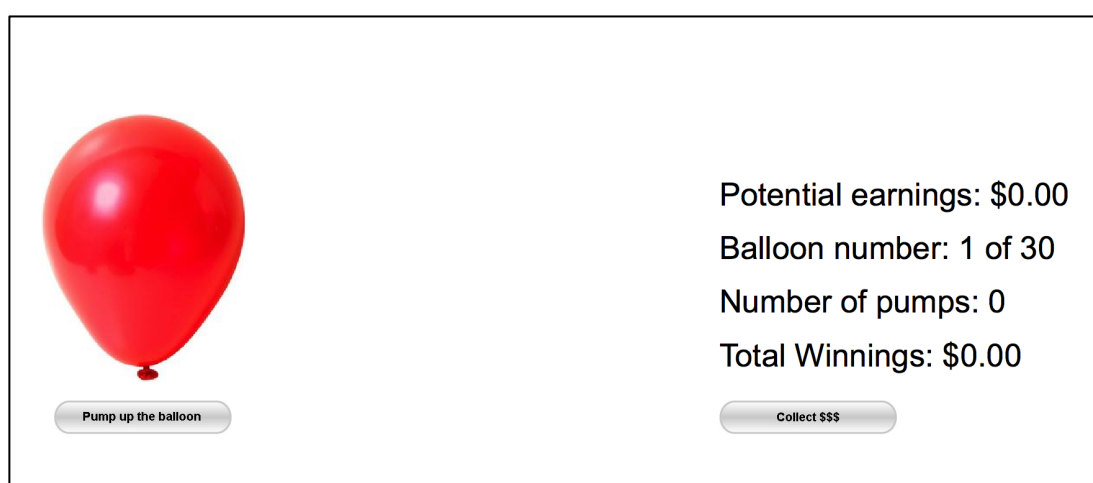


Figure 1. On-screen presentation of the BART

With each click (or pump of the balloon), 5 cents was earned on a temporary account (“Potential earnings”). When a balloon was pumped past its individual explosion point, a sound-effect combined with the explosion of the balloon was presented. In that case, participants lost all money in the temporary account and a new balloon appeared on the screen. Accordingly, participants had to decide when to stop inflating the balloon. After 30 trials the adjusted average pump count (AAPC) was calculated as the behavioral statistic of the task. The AAPC is the mean number of pumps on trials that do not end in an explosion (Pleskac, Wallsten, Wang, & Lejuez, 2008).

## Procedure

Participants accessed a website (hosted on [www.millisecond.com](http://www.millisecond.com)), which outlined information regarding the experiment and issued a consent form. If accepted, the Inquisit web software (Inquisit v4.0.5.0., 2014) was downloaded and screen resolution was automatically set to 800 x 600. Before testing began, participants were informed that the test should be completed in a quiet setting. After the tasks were finished, participants were directed to a website (hosted on [www.soscisurey.de](http://www.soscisurey.de)), which recorded demographic information and any experience of being part of a police force or martial art group. Participants were thanked for their time and presented with debrief information.

## Analytic Strategy

Group differences were assessed using a one-way ANOVA. The dependent variable was the AACP, whereas the groups formed the independent variables. Normality of the data sets were checked using Shapiro-Wilk's test (Razali & Wah, 2011; Shapiro & Wilk, 1965) and a visual inspection of histograms, normal Q-Q plots and box plots (Doane & Seward, 2011). The results showed that the AACP score of the BART was normally distributed. Statistical analysis was conducted using IBM SPSS Statistics version 24.0. A significance level of  $p < .05$  was set.

## Results

Means, standard deviations, and 95% confidence intervals of the AACP are displayed in Table 2.

Table 2.

*Means, Standard Deviations and 95% Confidence Intervals of AACP Scores*

	<i>n</i>	<i>M</i>	<i>SD</i>	95% CI	
				<i>LL</i>	<i>UL</i>
Police	72	32.26	14.69	28.81	35.72
Martial Arts	50	32.89	13.86	28.95	36.83
Police & Martial Arts	33	29.17	14.13	24.16	34.19
Control	48	30.64	11.51	27.30	33.98
Total	203	31.53	13.66	29.64	33.42

Results of the one-way ANOVA yielded no significant difference between the groups,  $F(3, 202) = 0.63$ ,  $p = .600$ . Means and 95% confidence intervals of the AACP are depicted in Figure 2.

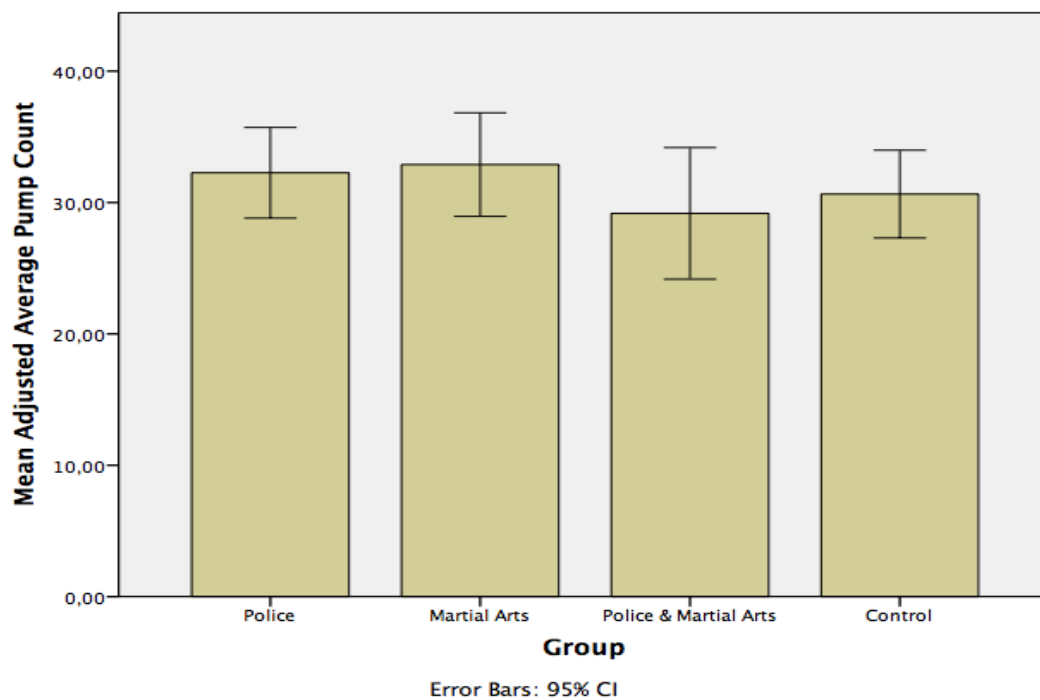


Figure 2. Means and 95% confidence intervals of AACP score

## Discussion

This study investigated the effects of regular threat exposure on risk taking. In particular, it inquired whether exposure to real threats, as typical for police officers, or whether regular exposure to threats associated with training or competition settings, as typical for martial artists, could lead to an increased propensity for risk-taking. The study demonstrated that neither police officers nor martial arts practitioners show a propensity for risk-taking as measured by the BART.

This finding has two implications: First, exposure to situations of mild threat such as practice and competition activities, as common for martial artists, do not lead to an increase in risk taking. Second, the exposure to real threat does also not result in an increase in risk-taking behavior as indicated by the AAPC scores of the participating police officers. Considering that a substantial component of police use of force and martial arts training consists of applying reasonable force, the role of training may act as a mediating factor in situations of real and simulated threat and reduce risk-taking behavior. Yet, further research is needed to investigate this assumption.

There are several limitations that have to be acknowledged. First, even though participants reported their experience as police officers and/or martial artists, the actual exposure to threats was not assessed. Future studies should consider the difference between the experience as a police officer and the actual exposure to real life threats (Schmalzl, 2008). Second, the groups of police officers and martial artists consisted of a broad range of individuals of the specific population. It could be possible that more specialized groups (e.g. special operations officers; mixed-martial artists) display differences in the propensity for risk-taking. Third, since some of the participants completed the test at home via the Internet, there is the possibility of distractions during testing. Although participants were asked to make sure they did not get distracted, it cannot be controlled for (Birnbbaum, 2004).

The study is one of the first of its kind to employ a behavioural assessment measure of risk-taking propensity in order to shed light on the decision-making of police officers and martial artists. Although several questions remain for future research, results from the current study set the stage for future research examining the potential relationship between risk-taking propensity and the exposure to threats as a police officer or a martial artist.

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### About the Authors:

**Dr. Mario Staller** is a German police officer with more than ten years of experience as a police use of force, self-defense, and firearms instructor. His main areas of research are psychological aspects of conflict management in police contexts, skill development and pedagogical practice in police use of force and self-defense training.

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### References

- Aklin, W. M., Lejuez, C. W., Zvolensky, M. J., Kahler, C. W., & Gwadz, M. (2005). Evaluation of behavioral measures of risk taking propensity with inner city adolescents. *Behaviour Research and Therapy*, *43*(2), 215–228. <http://doi.org/10.1016/j.brat.2003.12.007>
- Banducci, A. N., Felton, J. W., Dahne, J., Ninnemann, A., & Lejuez, C. W. (2015). Maternal risk taking on the balloon analogue risk task as a prospective predictor of youth alcohol use escalation. *Addictive Behaviors*, *49*, 40–45. <http://doi.org/10.1016/j.addbeh.2015.05.011>
- Beauregard, E., & Michaud, P. (2015). “HIGH-RISK”: A Useful Tool for Improving Police Decision-Making in Hostage and Barricade Incidents. *Journal of Police and Criminal Psychology*, *30*(3), 125–138. <http://doi.org/10.1007/s11896-014-9151-4>
- Birnbaum, M. H. (2004). Human research and data collection via the Internet. *Annual Review of Psychology*, *55*(1), 803–832. <http://doi.org/10.1146/annurev.psych.55.090902.141601>
- Bornovalova, M. A., Gwadz, M. A., Kahler, C., Aklin, W. M., & Lejuez, C. W. (2008). Sensation seeking and risk-taking propensity as mediators in the relationship between childhood abuse and HIV-related risk behavior. *Child Abuse & Neglect*, *32*(1), 99–109. <http://doi.org/10.1016/j.chiabu.2007.04.009>
- Branco, B. H. M., Massuça, L. M., Andreato, L. V., Marinho, B. F., Miarka, B., Monteiro, L., & Franchini, E. (2013). Association between the rating perceived exertion, heart rate and blood lactate in successive judo fights (randori). *Asian Journal of Sports Medicine*, *4*(2), 125–130. <http://doi.org/10.5812/asjism.34494>
- Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, *125*(3), 367–383. <http://doi.org/10.1037/0033-2909.125.3.367>
- Campbell, J. A., Samartgis, J. R., & Crowe, S. F. (2013). Impaired decision making on the Balloon Analogue Risk Task as a result of long-term alcohol use. *Journal of Clinical and Experimental Neuropsychology*, *35*(10), 1071–1081. <http://doi.org/10.1080/13803395.2013.856382>
- Crowley, T. J., Raymond, K. M., Mikulich-Gilbertson, S. K., Thompson, L. L., & Lejuez, C. W. (2006). A Risk-Taking “Set” in a Novel Task Among Adolescents With Serious Conduct and Substance Problems. *Journal of the American Academy of Child and Adolescent Psychiatry*, *45*(2), 175–183. <http://doi.org/10.1097/01.chi.0000188893.60551.31>
- Doane, D. P., & Seward, L. E. (2011). Measuring skewness: a forgotten statistic? *Journal of Statistics Education*, *19*(2), 1–18.
- Endsley, M. R., Hoffman, R. R., Kaber, D., & Roth, E. (2007). Cognitive Engineering and Decision Making: An Overview and Future Course. *Journal of Cognitive Engineering and Decision Making*, *1*(1), 1–21. <http://doi.org/10.1177/155534340700100101>
- Fischer, P., Guter, S., & Frey, D. (2008). The effects of risk-promoting media on inclinations toward risk taking. *Basic and Applied Social Psychology*, *30*(3), 230–240. <http://doi.org/10.1080/01973530802375029>

- Foersterling, F. (1980). Sex differences in risk taking: effects of subjective and objective probability of success. *Personality and Social Psychology Bulletin*, 6(1), 149–152. <http://doi.org/10.1177/014616728061023>
- Gauthier, J. (2008). Ethical and Social Issues in Combat Sports: Should Combat Sports Be Banned? In *Combat Sports Medicine* (pp. 73–88). London: Springer London. [http://doi.org/10.1007/978-1-84800-354-5\\_5](http://doi.org/10.1007/978-1-84800-354-5_5)
- Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, 62(1), 451–482. <http://doi.org/10.1146/annurev-psych-120709-145346>
- Gonzalez, R., Schuster, R. M., Mermelstein, R. J., Vassileva, J., Martin, E. M., & Diviak, K. R. (2012). Performance of young adult cannabis users on neurocognitive measures of impulsive behavior and their relationship to symptoms of cannabis use disorders. *Journal of Clinical and Experimental Neuropsychology*, 34(9), 962–976. <http://doi.org/10.1080/13803395.2012.703642>
- Hanson, K. L., Thayer, R. E., & Tapert, S. F. (2014). Adolescent marijuana users have elevated risk-taking on the balloon analog risk task. *Journal of Psychopharmacology*, 28(11), 1080–1087. <http://doi.org/10.1177/0269881114550352>
- Hill, J. (2002). High-speed police pursuits: Dangers, dynamics, and risk reduction. *FBI Law Enforcement Bulletin*, 71(7), 14–18. <http://doi.org/10.1037/e320552004-003>
- Hopko, D. R., Lejuez, C. W., Daughters, S. B., Aclin, W. M., Osborne, A., Simmons, B. L., & Strong, D. R. (2006). Construct validity of the Balloon Analogue Risk Task (BART): Relationship with MDMA use by inner-city drug users in residential treatment. *Journal of Psychopathology and Behavioral Assessment*, 28(2), 95–101. <http://doi.org/10.1007/s10862-006-7487-5>
- Hoyle, C. (1998). Negotiating domestic violence: Police, criminal justice, and victims. Oxford, UK: Clarendon.
- Hunt, M. K. (2005). Construct Validity of the Balloon Analog Risk Task (BART): Associations With Psychopathy and Impulsivity. *Assessment*, 12(4), 416–428. <http://doi.org/10.1177/1073191105278740>
- Inquisit 4.0.5.0. (2014). Inquisit 4.0.5.0. Seattle, WA: Millisecond Software LLC.
- Jäger, J., Klatt, T., & Bliesener, T. (2013). *NRW-Studie: Gewalt gegen Polizeibeamtinnen und Polizeibeamte [North Rhine-Westphalian study: Violence against police officers]*. Kiel: Institut für Psychologie, Christian-Albrechts-Universität.
- Jensen, P. R., Roman, J., Shaft, B., & Wrisberg, C. (2013). In the cage: MMA fighters' experience of competition. *Sport Psychologist*, 27(1), 1–12.
- Kane, R. J. (1999). Patterns of arrest in domestic violence encounters. *Journal of Criminal Justice*, 27(1), 65–79. [http://doi.org/10.1016/S0047-2352\(98\)00037-3](http://doi.org/10.1016/S0047-2352(98)00037-3)
- Kane, R. J. (2000). Police responses to restraining orders in domestic violence incidents: Identifying the custody-threshold thesis. *Criminal Justice and Behavior*, 27(5), 561–580. <http://doi.org/10.1177/0093854800027005002>
- Klein, G. A. (2008). Naturalistic decision making. *Human Factors*, 50(3), 456–460. <http://doi.org/10.1518/001872008X288385>
- Klein, G. A., Orasanu, J., Calderwood, R., & Zsombok, C. E. (1993). Decision making in action: Models and methods. Norwood NJ: Ablex Publishing Corporation.
- Lauriola, M., Panno, A., Levin, I. P., & Lejuez, C. W. (2014). Individual differences in risky decision making: A meta-analysis of sensation seeking and impulsivity with the Balloon Analogue Risk Task. *Journal of Behavioral Decision Making*, 27(1), 20–36. <http://doi.org/10.1002/bdm.1784>
- Lawyer, S. (2013). Risk taking for sexual versus monetary outcomes using the Balloon Analogue Risk Task. *The Psychological Record*, 63(4), 803–820. <http://doi.org/10.11133/j.tpr.2013.63.4.007>



- Leigh, B. C. (1999). Peril, chance, adventure: Concepts of risk, alcohol use and risky behavior in young adults. *Addiction*, *94*(3), 371–383. <http://doi.org/10.1046/j.1360-0443.1999.9433717.x>
- Lejuez, C. W., Aklin, W. M., Jones, H. A., Richards, J. B., Strong, D. R., Kahler, C. W., & Read, J. P. (2003a). The Balloon Analogue Risk Task (BART) differentiates smokers and nonsmokers. *Experimental and Clinical Psychopharmacology*, *11*(1), 26–33. <http://doi.org/10.1037//1064-1297.11.1.26>
- Lejuez, C. W., Aklin, W. M., Zvolensky, M. J., & Pedulla, C. M. (2003b). Evaluation of the Balloon Analogue Risk Task (BART) as a predictor of adolescent real-world risk-taking behaviours. *Journal of Adolescence*, *26*(4), 475–479. [http://doi.org/10.1016/S0140-1971\(03\)00036-8](http://doi.org/10.1016/S0140-1971(03)00036-8)
- Lejuez, C. W., Aklin, W., Bornovalova, M., & Moolchan, E. T. (2005). Differences in risk-taking propensity across inner-city adolescent ever- and never-smokers. *Nicotine & Tobacco Research*, *7*(1), 71–79. <http://doi.org/10.1080/14622200412331328484>
- Lejuez, C. W., Aklin, W., Daughters, S., Zvolensky, M., Kahler, C., & Gwadz, M. (2007). Reliability and validity of the youth version of the Balloon Analogue Risk Task (BART-Y) in the assessment of risk-taking behavior among inner-city adolescents. *Journal of Clinical Child and Adolescent Psychology*, *36*(1), 106–111. <http://doi.org/10.1080/15374410709336573>
- Lejuez, C. W., Read, J. P., Kahler, C. W., Richards, J. B., Ramsey, S. E., Stuart, G. L., et al. (2002). Evaluation of a behavioral measure of risk taking: The Balloon Analogue Risk Task (BART). *Journal of Experimental Psychology: Applied*, *8*(2), 75–84. <http://doi.org/10.1037//1076-898X.8.2.75>
- Lejuez, C. W., Simmons, B. L., Aklin, W. M., Daughters, S. B., & Dvir, S. (2004). Risk-taking propensity and risky sexual behavior of individuals in residential substance use treatment. *Addictive Behaviors*, *29*(8), 1643–1647. <http://doi.org/10.1016/j.addbeh.2004.02.035>
- Lipshitz, R., Klein, G. A., Orasanu, J., & Salas, E. (2001). Taking stock of naturalistic decision making. *Journal of Behavioral Decision Making*, *14*(5), 331–352. <http://doi.org/10.1002/bdm.381>
- Markovic, G., Vucetic, V., & Cardinale, M. (2008). Heart rate and lactate responses to taekwondo fight in elite women performers. *Biology of Sport*, *25*(2), 135–146.
- Parent, R. B., & Verdun Jones, S. (1998). Victim-precipitated homicide: police use of deadly force in British Columbia. *Policing: an International Journal of Police Strategies & Management*, *21*(3), 432–448. <http://doi.org/10.1108/13639519810228741>
- Perez Trujillo, M., & Ross, S. (2008). Police response to domestic violence: Making decisions about risk and risk management. *Journal of Interpersonal Violence*, *23*(4), 454–473. <http://doi.org/10.1177/0886260507312943>
- Pleskac, T. J., Wallsten, T. S., Wang, P., & Lejuez, C. W. (2008). Development of an automatic response mode to improve the clinical utility of sequential risk-taking tasks. *Experimental and Clinical Psychopharmacology*, *16*(6), 555–564. <http://doi.org/10.1037/a0014245>
- Razali, N. M., & Wah, Y. B. (2011). Power comparisons of shapiro-wilk, kolmogorov-smirnov, lilliefors and anderson-darling tests. *Journal of Statistical Modeling and Analytics*, *2*(1), 21–33.
- Ross, K. G., Klein, G. A., Thunholm, P., Schmitt, J. F., & Baxter, H. C. (2004). The recognition-primed decision model. *Military Review*, (4), 6–10.
- Schmalzl, H. P. (2008). Einsatzkompetenz [Competence on duty]. Frankfurt: Verlag für Polizeiwissenschaft.

- Schuster, R. M., Crane, N. A., Mermelstein, R., & Gonzalez, R. (2012). The influence of inhibitory control and episodic memory on the risky sexual behavior of young adult cannabis users. *Journal of the International Neuropsychological Society*, *18*(05), 827–833. <http://doi.org/10.1017/S1355617712000586>
- Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika*, *52*(3-4), 591–611. <http://doi.org/10.1093/biomet/52.3-4.591>
- Staller, M. S., & Zaiser, B. (2015). Developing Problem Solvers: New Perspectives on Pedagogical Practices in Police Use of Force Training. *The Journal of Law Enforcement*, *4*(3), 1–15.
- Staller, M. S., Bertram, O., Althaus, P., Heil, V., & Klemmer, I. (2016). Selbstverteidigung in Deutschland – Eine empirische Studie zu trainingsdidaktischen Aspekten von 103 Selbstverteidigungssystemen [Self-defence in Germany - A empirical study of pedagogical aspects in 103 self-defence systems]. In M. J. Meyer (Ed.), *Martial Arts Studies in Germany - Defining and Crossing Disciplinary Boundaries* (pp. 51–56). Hamburg: Czwalina.
- Todd, P. M., Gigerenzer, G., ABC Reserach Group. (2012). *Ecological rationality: Intelligence in the real world*. Oxford: Oxford University Press.
- White, T. L., Lejuez, C. W., & de Wit, H. (2008). Test-retest characteristics of the Balloon Analogue Risk Task (BART). *Experimental and Clinical Psychopharmacology*, *16*(6), 565–570. <http://doi.org/10.1037/a0014083>
- Wickens, C. D. (1992). *Engineering psychology and human performance*. London, UK: Harper Collins.
- Yates, J. F., & Tschirhart, M. D. (2006). Decision-making expertise. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 421–438). Cambridge: Cambridge University Press.
- Zuckerman, M., Ball, S., & Black, J. (1990). Influences of sensation seeking, gender, risk appraisal, and situational motivation on smoking. *Addictive Behaviors*, *15*(3), 209–220. [http://doi.org/10.1016/0306-4603\(90\)90064-5](http://doi.org/10.1016/0306-4603(90)90064-5)