



THE PSYCHOLOGY OF FIREFIGHTING
AN EXAMINATION OF PSYCHOLOGICAL SKILLS USE AMONG FIREFIGHTERS



AUTHORS

Stacy L. Gnacinski, Barbara B. Meyer, Courtney W. Hess, David J. Cornell, Jason Mims, Aaron Zamzow, and Kyle T. Ebersole

University of Wisconsin-Milwaukee, City of Milwaukee Fire Department, and City of Madison Fire Department

AUTHOR NOTE

Stacy L. Gnacinski, Barbara B. Meyer, Courtney W. Hess, David J. Cornell, and Kyle T. Ebersole are affiliated with the Department of Kinesiology—Integrative Health Care & Performance Unit, at the University of Wisconsin-Milwaukee. Jason Mims is affiliated with the City of Milwaukee Fire Department in Milwaukee, Wisconsin. Aaron Zamzow is affiliated with the City of Madison Fire Department in Madison, Wisconsin.

The current research project was funded in part by the University of Wisconsin-Milwaukee College of Health Sciences Student Research Grant Award Program.

Correspondence concerning this article should be addressed to Stacy Gnacinski, Department of Kinesiology—Integrative Health Care & Performance Unit, College of Health Sciences, University of Wisconsin-Milwaukee, Pavilion—Physical Therapy Suite, Room 375, 3409 N. Downer Avenue, Milwaukee, WI 53211. Email: gnacins4@uwm.edu. Phone: 414-229-3364.

ABSTRACT

Over the past decade, interest has emerged within the emergency services sector regarding the use of psychological skills training (PST) programs to enhance the performance of firefighters—a population of *tactical athletes*. With an eye towards evidence-based PST program design and implementation in firefighter populations, the primary purpose of the current study was to describe firefighters' current psychological skills use during practice and performance. The secondary purpose was to examine the relationship between firefighters' personality and psychological skills use during practice and performance. To assess psychological skills use, firefighters ($N = 109$, $M_{age} = 25.9$ years, $SD = 7.1$ years) completed the Test of Performance Strategies-2 (TOPS-2). To assess the Big Five personality characteristics, firefighters completed Saucier's 40-item Mini-Markers scale. Results of the current study indicated that, like sport athletes, firefighters generally use psychological skills more during performance than practice. Results also indicated that basic skills use was not uniformly related to ability to use advanced skills, and that certain personality characteristics shared more links to psychological skills use than others. Taken together, the results of the current study provide a foundation to support evidence-based PST program design and implementation in this population. While the current study was the first of its kind to examine psychological skills use in a new population of tactical athletes, more research is needed to thoroughly understand the psychology of firefighting performance given the life and death nature of the occupation.





Firefighting is an occupation which requires physical prowess, psychological resilience, and overall performance excellence. Depending on the type and severity of the call, firefighters may be required to perform a variety of job tasks (e.g., fire suppression, search and rescue, emergency medical assistance, etc.) in dangerous and dynamic conditions (e.g., toxic fumes, extreme temperatures, poor visibility, etc.) for long periods of time. The job demands placed on firefighters impact not only their performance, but their health and well-being as well. Researchers have determined that 17.7 of every 100 firefighters in the United States (U.S.) incur an injury annually (Poplin, Harris, Pollack, Peate, & Burgess, 2012), costing U.S. fire departments upwards of \$7.8 billion per year to cover

health care and backfill expenses (National Institute of Standards & Technology, 2004; West, 2005). Research further indicates that the collective stress associated with the demands of firefighting may be linked to the on-duty injuries described above (Kales, Soteriades, Christophi, & Christiani, 2007; Perroni et al., 2009), as well as to mental health concerns (Malek, Mearns, & Flin, 2010; Tuckey & Hayward, 2011) and sub-optimal performance outcomes (Baker, 2007; Compton & Mack, 2004; Robinson, Leach, Owen-Lynch, & Sunram-Lea, 2013). Taken together, the job demands experienced by firefighters prompt the need to consider firefighters as a population of *tactical athletes* (Norwood & Newman, 2014), as well as methods by which firefighting performance can be optimized.

The International Association of Fire Fighters (IAFF) job analysis (2008) states that firefighter performance depends on the ability to complete a range of psychological tasks (e.g., coping with chaotic and emergency situations; communicating and guiding distressed, incoherent, or English-limited victims of all ages; recalling and executing detailed, complex protocols for emergency response, etc.), and these performance tasks have been further confirmed by findings in the psychology literature. Previous research findings have revealed links between firefighters' emotional clarity (i.e., ability to distinguish between emotions experienced), state anxiety, negative self-reactions, and cognitive difficulties during performance (Gohm, Baumann, & Sniezek, 2001). Results of a qualitative investigation on how emotional management skills are learned by firefighters in the fire house indicated that a firefighter's perceived lack of emotional control may increase susceptibility to mental errors and decreased performance, thereby eliciting a need to manage emotions such as fear and disgust in order to adequately perform on the job (Scott & Myers, 2005).

In light of the psychological demands associated with firefighting, experts in the field (i.e., fire chiefs) have suggested that by enhancing psychological skills (e.g., coping with stress, mental preparation, etc.) via psychological skills training (PST) programs, firefighters may be better prepared to meet the psychological demands of the job (Compton & Mack, 2004). Despite this call for PST programs, no empirical evidence exists to support PST program efficacy among firefighters, and little is known regarding firefighters' current use of psychological skills on the job. In light of the extensive evidence to support the efficacy of PST interventions among sport athletes (Craft, Magyar, Becker, & Feltz, 2003; Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011; Kylo & Landers, 1995; Meyers, Whelan, & Murphy, 1996), and in the absence of scientific evidence to support the efficacy of PST programs among firefighters and fire trainees, preliminary descriptive research is needed to inform early intervention research and practice.

In addition to assessments of psychological skills use during practice and performance, scholars have suggested that concomitant assessments of personality should be conducted to best inform the design and delivery of individualized PST programs aimed at performance enhancement (Hardy, Jones, & Gould, 1996; Woodman, Zourbanos, Hardy, Beattie, & McQuillan, 2010). Personality research studies conducted in firefighter populations have been

primarily underpinned by Big Five personality theory (i.e., extraversion, conscientiousness, openness, agreeableness, neuroticism [i.e., antithesis of emotional stability]). In research examining the personality characteristics of firefighters and non-emergency workers, Fannin and Dabbs (2003) determined that: firefighters' extraversion may be positively related to emergency medical service (EMS) and firefighting performance, openness may be inversely related to firefighting performance, and openness and agreeableness were significant predictors of their preference for firefighting over EMS work. Researchers have also identified links between firefighters' extraversion, neuroticism, agreeableness, and openness to psychophysiological responses to stress such as fear response acquisition of an electrodermal response, pre-tone heart rate levels, and pre-tone skin conductance levels (Pineles, Vogt, & Orr, 2009; Salters-Pedneault et al., 2010). Links have also been identified between firefighters' neuroticism and conscientiousness to the type of stress experienced and symptoms emerging after experiences of traumatic stress (Riulli & Savicki, 2012). The literature reviewed above clearly suggests that the unique combination of Big Five characteristics observed in a firefighter may influence his or her psychological (i.e., anxiety) and physiological (i.e., arousal) responses to stressful situations—responses which could influence job performance (Craft et al., 2003; Meyers et al., 1996). As such, and to support early PST intervention research and practice in firefighter populations, there is a need to examine the link between firefighters' personality characteristics and psychological skills use.

To inform future PST program intervention research in the firefighting domain, the primary purpose of the current study was to describe firefighters' psychological skills use during practice and performance. In light of existing sport research (Frey, Laguna, & Ravizza, 2003; Hardy, Roberts, Thomas, & Murphy, 2010; Taylor, Gould, & Rolo, 2008), it was hypothesized that firefighters would report greater psychological skills use during performance than during practice. It was also hypothesized that firefighters' reported use of basic skills would be positively related their reported ability to use advanced skills in both practice and performance. The secondary purpose of the current study was to examine the relationship between firefighters' personality characteristics and psychological skills use during practice and performance. It was hypothesized that all characteristics of the Big Five would be related to psychological skills use among firefighters in the current study.

METHOD

PARTICIPANTS

A convenience sample of Midwest career firefighters (i.e., fire cadets, fire recruits, active duty firefighters) was recruited to participate in the current study. The homogeneity of the sample as it relates to psychological skills use was confirmed prior to conducting any other statistical analyses (see Results section). In total, 96 males and 13 females ($N = 109$) volunteered and provided their informed consent to participate. Participants ranged in age from 18-44 years ($M = 25.9$ years, $SD = 7.1$ years). Participants reported their ethnicities as: White/Caucasian (64.2%), Black/African American (15.6%), other (11.0%), Hispanic (8.3%), and Asian American (0.9%).





MEASURES

PSYCHOLOGICAL SKILLS USE

To assess psychological skills use, participants completed the practice and competition subscales of the Test of Performance Strategies-2 (TOPS-2; Hardy et al., 2010). Cronbach's alpha reliability coefficients were calculated using the current data and reported in Table 1. Reliability coefficients equal to or greater than .70 were considered minimally acceptable (Nunnally,

1978). For the purposes of the current study, all TOPS-2 subscales were labeled as either practice (PR) or performance (PE) for clarity, and the original TOPS-2 competition subscale items which included sport-specific terms such as *competition* were modified to fit the context of firefighting performance. For example, the item "During *competition* I set specific goals for myself." was modified to "During *performance* I set specific goals for myself." Prior to completing the TOPS-2, all participants were informed that the term *performance* refers to live firefighting performance.

PERSONALITY

To assess the Big Five personality characteristics (i.e., extraversion, openness, conscientiousness, agreeableness, emotional stability), Saucier's 40-item Mini-Markers scale was used (Saucier, 1994). Cronbach's alpha reliability coefficients were calculated using the current data and reported in Table 4.





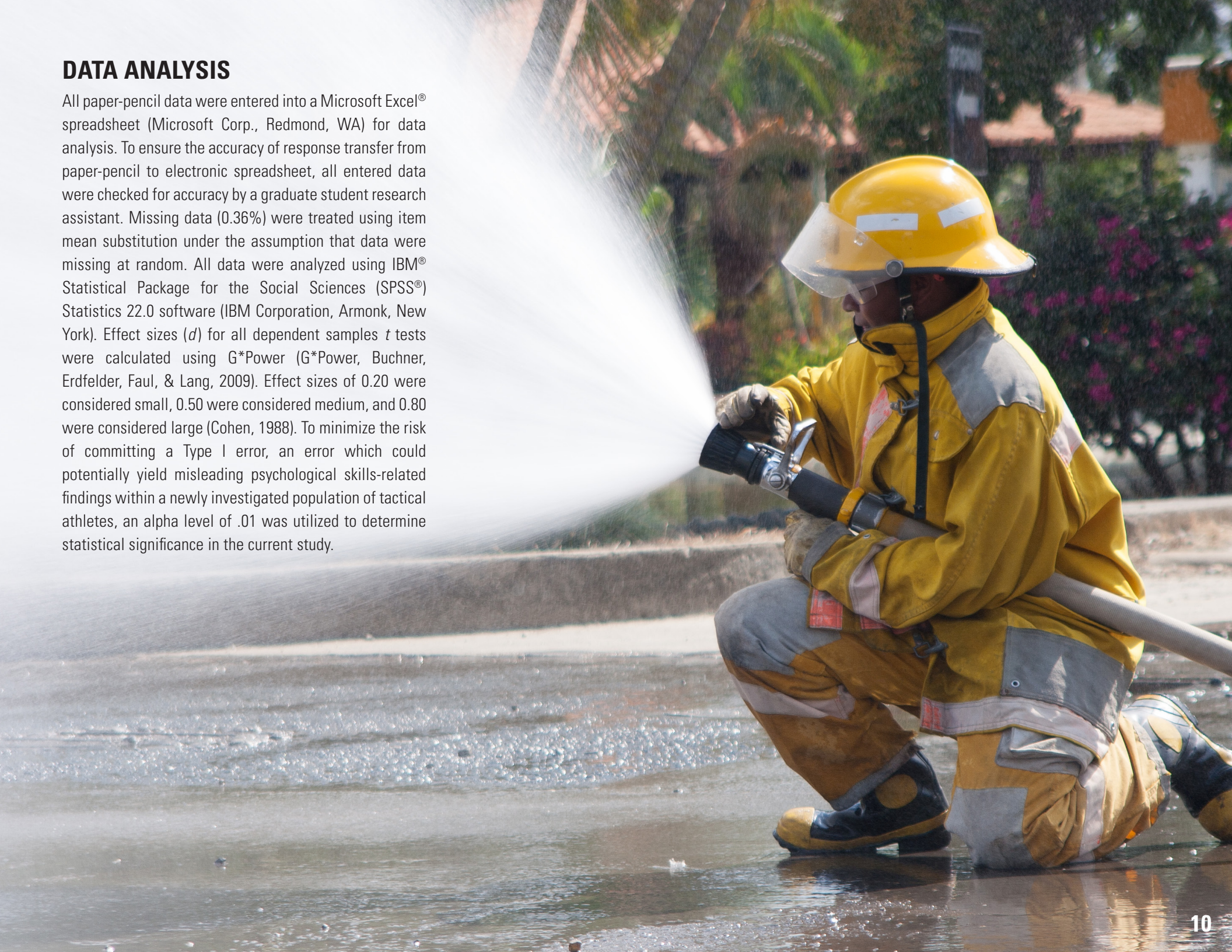
PROCEDURE

Prior to data collection, approval was granted by the university's institutional review board for the protection of human subjects. Data collected for the current study were obtained as part of a longitudinal, interdisciplinary research project on firefighting performance, in which participants completed batteries of physical and psychological tests on a regular basis (i.e., three to

four times per year). All psychological measures were completed via paper-pencil method. Due to a logistical limitation during one of the data collection sessions, 24 fire cadets were unable to complete the Mini-Markers concurrently with the TOPS-2. As such, a sample size of 85 was used to conduct the personality-related analyses in the current study.

DATA ANALYSIS

All paper-pencil data were entered into a Microsoft Excel® spreadsheet (Microsoft Corp., Redmond, WA) for data analysis. To ensure the accuracy of response transfer from paper-pencil to electronic spreadsheet, all entered data were checked for accuracy by a graduate student research assistant. Missing data (0.36%) were treated using item mean substitution under the assumption that data were missing at random. All data were analyzed using IBM® Statistical Package for the Social Sciences (SPSS®) Statistics 22.0 software (IBM Corporation, Armonk, New York). Effect sizes (d) for all dependent samples t tests were calculated using G*Power (G*Power, Buchner, Erdfelder, Faul, & Lang, 2009). Effect sizes of 0.20 were considered small, 0.50 were considered medium, and 0.80 were considered large (Cohen, 1988). To minimize the risk of committing a Type I error, an error which could potentially yield misleading psychological skills-related findings within a newly investigated population of tactical athletes, an alpha level of .01 was utilized to determine statistical significance in the current study.





RESULTS

Multivariate analysis of variance (MANOVA) calculations were conducted to confirm the homogeneity of the current sample as it relates to psychological skills use. Results of the MANOVA calculation revealed no group differences (cadet [$n = 48$], recruit [$n = 43$], active duty firefighter [$n = 18$]) in the basic or advanced skill scores of the TOPS-2 practice subscales, $F(8) = 0.966$, $p = .464$; $F(8) = 1.640$, $p = .115$, respectively. Similarly, no group differences emerged in the basic and advanced skill scores of the TOPS-2 competition subscales, $F(8) = 0.683$, $p = .707$; $F(8) = 1.498$, $p = .160$, respectively. The lack of group differences supports the use of one homogenous sample in all remaining statistical analyses.

PSYCHOLOGICAL SKILLS USE

To address the primary purpose of the current study, which was to describe firefighters' psychological skills use during practice and performance, descriptive statistics were calculated and reported in Table 1. Of the basic skills, firefighters' reported using goal setting most frequently and relaxation least frequently in both practice and performance. Of the advanced skills, firefighters' reported highest scores for their ability to use emotional control and lowest scores for their ability to use automaticity in both practice and performance. All findings associated with the automaticity subscales should be interpreted with caution given the low alpha reliability coefficients reported in Table 1.

To address the corresponding hypothesis that firefighters would report greater psychological skills use during performance than during practice, dependent samples *t* tests were calculated and reported in Table 2. Results of the *t* test calculations revealed significant differences in the use of the following basic skills during practice and performance: relaxation, self-talk, and goal setting. Significant differences also emerged in ability to use of the following advanced skills during practice and performance: emotional control and automaticity. The direction of the difference observed for self-talk between practice and performance was inconsistent with the authors' *a priori* hypothesis, as firefighters in the current study reported using self-talk more during practice than during performance. The directions of all other significant differences observed were consistent with the *a priori* hypothesis. Moderate to large effect sizes were associated with all significant *t* test results, and three of the five significant *t* tests reached a high level of statistical power. Taken together, the effect sizes and statistical power levels reached reinforce the interpretation that the independent variables (i.e., practice vs. competition environments) are associated with the dependent variables (i.e., use of specific psychological skills) of the current study.

To address the additional hypothesis that firefighters' use of basic skills would be positively related to their ability to use advanced skills in both practice and performance, Pearson product-moment correlation coefficient calculations were conducted and reported in Table 3. Results specific to the *a priori* hypothesis include the following: goal setting subscale scores were significantly related to most of the advanced skills scores in both practice and performance, and activation subscale scores were significantly related to all four of the basic skill scores in both practice and performance. As such, and contrary to the *a priori* hypothesis, little evidence was gained to support the contention that the increased use of basic skills would be associated with a greater ability to use advanced skills in practice and performance among firefighters.





RELATIONSHIP BETWEEN PERSONALITY AND PSYCHOLOGICAL SKILLS USE

To address the secondary purpose of the current study, which was to examine the relationship between firefighters' Big Five personality characteristics and psychological skills use during practice and performance, Pearson product-moment correlation coefficient calculations were conducted and reported in Table 4. It was hypothesized that all characteristics of the Big Five would be related to psychological skills use among firefighters. The personality characteristics that shared the greatest number of correlations with psychological skills use were openness, with 11 significant correlations of 16 possible; and conscientiousness, with 10 significant correlations of 16 possible. The personality characteristic that shared the fewest number of

correlations with psychological skills use was extraversion, with only two significant correlations of 16 possible. The basic psychological skill most related to personality characteristics was goal setting (PR and PE); while the advanced skills most related to personality characteristics were activation (PR and PE), emotional control (PR and PE), attentional control (PR), and negative thinking (PE). The results presented in Table 4 support, in part, the authors' *a priori* hypothesis in that firefighters' personality characteristics are significantly related to their reported psychological skills use in both practice and performance.



DISCUSSION

The current study, one of the first investigations of firefighters' psychological skills use, provides a seminal base of knowledge to support the design and implementation of PST programs in firefighter populations. The primary purpose of the current study was to describe firefighters' psychological skills use during practice and performance. It was specifically hypothesized that firefighters would report greater psychological skills use during performance than during practice, and that firefighters' reported use of basic skills would be positively related to their ability to use advanced skills in both practice and performance. The secondary purpose of the current study was to examine

the relationship between firefighters' personality and psychological skills use during practice and performance. It was hypothesized that all characteristics of the Big Five would be related to psychological skills use among firefighters. Collectively, the results of the current study generally supported the authors' *a priori* hypotheses as well as findings from previous sport (Frey et al., 2003; Hardy et al., 2010; Taylor et al., 2008) and firefighting literature (Mitchell & Bray, 1990; Scott & Myers, 2005; Tuckey & Hayward, 2011). However, the results of the current study also revealed several notable inconsistencies, for which explanations are provided in the paragraphs below.



PSYCHOLOGICAL SKILLS USE

Results of the current study revealed that firefighters generally use psychological skills more in performance than practice settings, a finding which is consistent with the authors' *a priori* hypothesis as well as findings from previous sport research (Frey et al., 2003; Hardy et al., 2010; Taylor et al., 2008). A finding that is not consistent with the *a priori* hypothesis is that firefighters use self-talk more in practice than performance settings. This unexpected finding may be due to measurement error. Given the known psychological demands associated with firefighting (IAFF, 2008), self-talk may not be commonly utilized in the way the skill is measured by the items of the TOPS-2 (i.e., "talk positively to get the most out of performances," "manage self-talk effectively," "say things to help performance," "say specific cue words or phrases to help performance"). This explanation is further supported by the moderate effect size and inadequate statistical power reached for the self-talk dependent *t* test result.

Results of the current study also revealed that firefighters' use of basic skills is not uniformly related to their ability to use advanced skills, a finding which is not consistent with the authors' *a priori* hypothesis nor the previous sport literature (Hardy et al., 1996; Taylor et al., 2008; Vealey, 1988). This unexpected finding may be attributed to the inherent differences between the sport and firefighting domains, whereby the life and death nature of firefighting prompts a trained and/or instinctive ability to utilize advanced psychological skills such as emotional control over basic skills such as relaxation or imagery. This assertion is supported by results of previous firefighting research which suggest that a firefighter's lack of emotional control may increase susceptibility to mental errors and poor performance (Mitchell & Bray, 1990; Scott & Myers, 2005), as well as by results of the current study (see Table 1), which demonstrate lower scores in basic skills (i.e., relaxation, self-talk, imagery) than advanced skills (i.e., activation, emotional control).



RELATIONSHIP BETWEEN PERSONALITY AND PSYCHOLOGICAL SKILLS USE

Results of the current study suggest that firefighters' personality characteristics of conscientiousness and openness shared strong links to psychological skills use, while extraversion shared a weak link to psychological skills use. These findings partially support the authors' *a priori* hypothesis as well as findings from previous sport research (Woodman et al., 2003). However, that so few

correlations emerged between firefighters' extraversion and psychological skills use was unexpected given the previous link identified between extraversion and firefighting performance (Fannin & Dabbs, 2003). This inconsistency may be due to the fact that different inventories were used to measure extraversion in the current and previous studies.



LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

While the current study was the first of its kind to examine the psychology of performance in a new population of tactical athletes, there were a number of limitations which warrant future research before generalizations can be offered. First and foremost, because it was not possible within the current investigation to include measures of firefighting performance, the authors were unable to determine which if any of the psychological skills used by firefighters are directly related to firefighting performance. As such, and in an effort to support PST program intervention research aimed at firefighting performance enhancement, future research should include performance measures such as the Candidate Physical Ability Test (Sheaff et al., 2010) and timed firefighting drills. Second, and prompted by the lack of consistent relationships between basic and advanced skills use among firefighters in the current study, qualitative research should be conducted to explore firefighters' perceptions of psychological skills use during practice and performance. Results of such research will inform the work of professionals in performance psychology, and may also provide information that can be used to refine and/or modify the TOPS-2 to better fit this population of tactical athletes. Finally, although the concurrent validity and reliability analyses of the TOPS-2 provided preliminary evidence to support the use of the inventory within a population of firefighters, future research should be conducted to explore the psychometric properties of the inventory in a large sample of firefighters. Regarding the validity of the inventory specifically, studies should be conducted to investigate the content validity of the items used in the TOPS-2, and a CFA should be conducted to confirm the factorial validity of the instrument in firefighter populations. Given the poor internal consistencies identified for the automaticity (PR and PE), attentional control (PR), and imagery (PR) subscales in the current study, item level analyses (i.e., item response theory-based analysis) are warranted to improve the reliability of TOPS-2 subscales as well.

CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

The results of the current study advance the body of performance psychology literature by extending the theoretical principles and measurement instruments of sport to the emergency services sector. Findings of the current study demonstrate consistencies with the sport performance literature, while illuminating distinct and important differences between the psychology of sport and firefighting. These distinctions between the worlds of sport and firefighting hold several implications for practice. Counter to observations among sport athletes (Frey et al., 2003), firefighters' use of basic skills was not consistently related to their ability to use advanced skills. This finding suggests that the *typical* progression from basic to advanced skills use in PST programs for sport athletes may not follow the same progression when working with tactical athletes. This finding can also serve to remind performance psychologists of the inherent differences between client populations in different performance domains, and the subsequent need to consider modes of gaining entry, dissemination of knowledge, and techniques of assessment (Fifer, Henschen, Gould, & Ravizza, 2008). Taken together, results of the current study provide preliminary evidence to support PST interventions in firefighting, and yet highlight the need for practitioners to familiarize themselves with the unique performance needs of this population.



REFERENCES

- Baker, M. S. (2007).** Creating order from chaos: Part II: Tactical planning for mass casualty and disaster response at definitive care facilities. *Military Medicine*, 172, 237-243.
- Buchner, A., Erdfelder, E., Faul, F., & Lang, A. (2009).** G* power (version 3.1. 2) [computer program].
- Cohen, J. (1988).** *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Compton, D., & Mack, G. (2004).** *The mental aspects of performance for firefighters and fire officers (The M.A.P.)*. Oklahoma State University, International Fire Service Training Association, Fire Protection Publications.
- Craft, L. L., Magyar, T. M., Becker, B. J., & Feltz, D. L. (2003).** The relationship between the Competitive State Anxiety Inventory-2 and sport performance: a meta-analysis. *Journal of Sport and Exercise Psychology*, 25, 44-65.
- Fannin, N., & Dabbs, J. M. (2003).** Testosterone and the work of firefighters: Firefighting fires and delivering medical care. *Journal of Research in Personality*, 37, 107-115.
- Fifer, A., Henschen, K., Gould, D., & Ravizza, K. (2008).** What works when working with athletes. *The Sport Psychologist*, 22, 356-377.
- Frey, M., Laguna, P., & Ravizza, K. (2003).** Collegiate athletes' mental skills use and perceptions of success: an exploration of the practice and competition settings. *Journal of Applied Sport Psychology*, 15, 115-128.
- Gohm, C. L., Baumann, M. R., & Sniezek, J. A. (2001).** Personality in extreme situations: Thinking (or not) under acute stress. *Journal of Research in Personality*, 35, 388-399.
- Hardy, L., Jones, J. G., & Gould, D. (1996).** *Understanding Psychological Preparation for Sport: Theory and Practice of Elite Performers*. Hoboken, NJ: John Wiley & Sons Inc.
- Hardy, L., Roberts, R., Thomas, P. R., & Murphy, S. M. (2010).** Test of Performance Strategies (TOPS): Instrument refinement using confirmatory factor analysis. *Psychology of Sport and Exercise*, 11, 27-35.
- Hatzigeorgiadis, A., Zourbanos, N., Galanis, E., & Theodorakis, Y. (2011).** Self-talk and sports performance: A meta-analysis. *Perspectives on Psychological Science*, 6(4), 348-356.
- International Association of Fire Fighters (2008).** *The Fire Service Joint Labor Management Wellness-Fitness Initiative*, (3rd ed.). Washington, D.C. Retrieved from <http://www.iafc.org/files/healthWell%5FwF13rdEdition%2Epdf.pdf>.
- Kales, S. N., Soteriades, E. S., Christophi, C. A., & Christiani, D. C. (2007).** Emergency duties and deaths from heart disease among firefighters in the United States. *The New England Journal of Medicine*, 356, 1207-1215.
- Kyllo, B. L., & Landers, D. M. (1995).** Goal setting in sport and exercise: a research synthesis to resolve the controversy. *Journal of Sport & Exercise Psychology*, 17, 117-137.
- Malek, M. D. A., Mearns, K., & Flin, R. (2010).** Stress and psychological well-being in UK and Malaysian fire fighters. *Cross Cultural Management: An International Journal*, 17, 50-61.
- Meyers, A. W., Whelan, J. P., & Murphy, S. M. (1996).** Cognitive behavioral strategies in athletic performance enhancement. *Progress in Behavior Modification*, 30, 137-164.
- Mitchell, J. T., & Bray, G. (1990).** *Emergency Services Stress: Guidelines for preserving the health and careers of emergency service personnel*. Englewood Cliffs, NJ: Prentice Hall.
- National Institute of Standards & Technology. (2004).** *The Economic Consequences of Firefighter Injuries and Their Prevention. Final Report*. Arlington, VA: TriData Corporation.
- Norwood, P. J., & Newman, J. (2014).** Train like the tactical athlete you are! *Fire Engineering*, 167, 71-75.
- Nunnally, J. C. (1978).** *Psychometric Theory*. New York, NY: McGraw-Hill.
- Pineles, S. L., Vogt, D. S., & Orr, S. P. (2009b).** Personality and fear responses during conditioning: Beyond extraversion. *Personality and Individual Differences*, 46, 48-53.

REFERENCES (CONTINUED)

Perroni, F., Tessitore, A., Cibelli, G., Lupo, C., D'Artibale, E., Cortis, C., . . . Caprinica, L. (2009). Effects of simulated firefighting on the responses of salivary cortisol, alpha-amylase and psychological variables. In T. Reilly, & G. Atkinson, *Contemporary Sport, Leisure and Ergonomics* (pp. 103-116). New York: Routledge.

Poplin, G. S., Harris, R. B., Pollack, K. L., Peate, W. F. & Burgess, J. L. (2012). Beyond the fireground: Injuries in the fire service. *Injury Prevention, 18*, 228-233.

Rioli, L., & Savicki, V. (2012). Firefighters' psychological and physical outcomes after exposure to traumatic stress: The moderating roles of hope and personality. *Traumatology, 18*, 7-15.

Robinson, S. J., Leach, J., Owen-Lynch, J. P., & Sunram-Lea, S. I. (2013). Stress reactivity and cognitive performance in a simulated firefighting emergency. *Aviation, Space, and Environmental Medicine, 84*, 592-599.

Salters-Pedneault, K., Ruef, A. M., & Orr, S. P. (2010). Personality and psychophysiological profiles of police officer and firefighter recruits. *Personality and Individual Differences, 49*, 210-215.

Saucier, G. (1994). Mini-markers: a brief version of Goldberg's unipolar big-five markers. *Journal of Personality Assessment, 63*(3), 506-516.

Scott, C., & Myers, K. K. (2005). The socialization of emotion: Learning emotion management at the fire station. *Journal of Applied Communication Research, 33*, 67-92.

Sheaff, A. K., Bennett, A., Hanson, E. D., Kim, Y., Hsu, J., Shim, J. K., . . . , Hurley, B. F. (2010). Physiological determinants of the candidate physical ability test in firefighters. *Journal of Strength and Conditioning Research, 24*, 3112-3122.

Taylor, M. K., Gould, D., & Rolo, C. (2008). Performance strategies of US Olympians in practice and competition. *High Ability Studies, 19*, 19-36.

Tuckey, M. R., & Hayward, R. (2011). Global and occupation-specific emotional resources as buffers against the emotional demands of fire-fighting. *Applied Psychology: An International Review, 60*, 1-23.

Vealey, R. S. (1988). Future directions in psychological skills training. *The Sport Psychologist, 2*, 318-336.

West, P. (2005). NIST: Firefighter injuries cost billions per year. *Fire Chief*. Retrieved from http://firechief.com/health_safety/firefighter-injuries-cost032505.

Woodman, T., Zourbanos, N., Hardy, L., Beattie, S., & McQuillan, A. (2010). Do performance strategies moderate the relationship between personality and training behaviors? An exploratory study. *Journal of Applied Sport Psychology, 22*, 183-197.

TABLE 1

DESCRIPTIVE STATISTICS				
Variable	<i>M</i>	<i>SD</i>	<i>CI</i>	<i>a</i>
Relaxation (PR)	2.85	0.90	2.67 – 3.02	.93
Relaxation (PE)	3.11	0.77	2.96 – 3.26	.78
Self-Talk (PR)	3.46	0.75	3.32 – 3.60	.82
Self-Talk (PE)	3.29	0.81	3.14 – 3.45	.80
Goal Setting (PR)	3.81	0.59	3.69 – 3.92	.74
Goal Setting (PE)	3.92	0.59	3.80 – 4.03	.80
Imagery (PR)	3.55	0.69	3.42 – 3.68	.68*
Imagery (PE)	3.56	0.74	3.42 – 3.71	.83
Activation (PR)	3.76	0.54	3.66 – 3.87	.70
Activation (PE)	3.75	0.59	3.64 – 3.86	.74
Emotional Control (PR)	3.87	0.70	3.74 – 4.00	.80
Emotional Control (PE)	4.18	0.66	4.06 – 4.31	.85
Automaticity (PR)	3.28	0.56	3.17 – 3.38	.58*
Automaticity (PE)	3.66	0.52	3.56 – 3.76	.48*
Attentional Control (PR)	3.81	0.61	3.69 – 3.93	.63*
Negative Thinking (PE)	1.86	0.62	1.74 – 1.98	.78

Note. *N* = 109. *PR* = practice subscale, *PE* = performance subscale, *CI* = 95% confidence interval.

*falls below standards of acceptability (Nunnally, 1978).

TABLE 2

DIFFERENCES IN FIREFIGHTERS PSYCHOLOGICAL SKILLS USE BETWEEN PRACTICE AND PERFORMANCE						
Variable	<i>t</i>	<i>df</i>	<i>p</i>	<i>d</i>	$(1 - \beta)$	<i>SE</i>
Relaxation	-5.437	108	< .001	.521	.997	.049
Self-Talk	3.439	108	.001	.329	.791	.049
Goal Setting	-2.652	108	.009	.254	.514	.042
Imagery	-0.234	108	.816	.022	.012	.047
Activation	0.333	108	.740	.032	.014	.044
Emotional Control	-8.252	108	< .001	.791	> .999	.038
Automaticity	-8.286	108	< .001	.794	> .999	.046

Note. *N* = 109. *SE* = standard error of the mean.

TABLE 3

CORRELATIONS BETWEEN FIREFIGHTERS' PSYCHOLOGICAL SKILLS USE DURING PRACTICE AND PERFORMANCE									
Variable	1	2	3	4	5	6	7	8	9
1. Relaxation	(.828*)	.549*	.479*	.565*	.643*	.019	.329*	—	-.021
2. Self-Talk	.593*	(.788*)	.519*	.610*	.587*	.012	.235	—	-.040
3. Goal Setting	.272*	.502*	(.722*)	.633*	.615*	.228	.410*	—	-.318*
4. Imagery	.530*	.671*	.423*	(.766*)	.577*	.029	.331*	—	-.166
5. Activation	.271*	.470*	.619*	.372*	(.665*)	.227	.588*	—	-.227
6. Emotional Control	-.118	.029	.344*	-.041	.519*	(.836*)	.303*	—	-.730*
7. Automaticity	.187	.153	-.102	.144	.127	.087	(.601*)	—	-.308*
8. Attentional Control	.054	.267*	.510*	.132	.571*	.632*	.041	—	—
9. Negative Thinking	—	—	—	—	—	—	—	—	—

Note. $N = 109$. Correlations between practice subscales are reported in the grey area (lower diagonal) and correlations between competition subscales are reported in the white area (upper diagonal).

* $p < .01$.

TABLE 4

CORRELATIONS BETWEEN THE BIG FIVE PERSONALITY CHARACTERISTICS AND PSYCHOLOGICAL SKILLS USE					
Variable	EX	CON	AG	OP	ES
1. Relaxation (PR)	.033	.230	.144	.393*	.169
2. Self-Talk (PR)	.109	.280*	.192	.444*	.127
3. Goal Setting (PR)	.047	.401*	.421*	.489*	.262
4. Imagery (PR)	-.081	.187	.118	.436*	.007
5. Activation (PR)	.193	.354*	.317*	.395*	.363*
6. Emotional Control (PR)	.225	.334*	.400*	.160	.514*
7. Automaticity (PR)	.091	.012	.053	-.091	.150
8. Attentional Control (PR)	.104	.544*	.331*	.263	.432*
9. Relaxation (PE)	.102	.205	.025	.364*	.083
10. Self-Talk (PE)	.004	.313*	.127	.378*	.040
11. Goal Setting (PE)	.176	.372*	.294*	.443*	.324*
12. Imagery (PE)	-.165	.135	.011	.345*	.036
13. Activation (PE)	.212	.293*	.143	.400*	.328*
14. Emotional Control (PE)	.331*	.396*	.321*	.299*	.434*
15. Automaticity (PE)	.118	.247	.145	.236	.269
16. Negative Thinking (PE)	-.296*	-.491*	-.299*	-.275	-.407*
<i>M</i>	6.51	6.36	7.41	6.47	6.50
<i>SD</i>	1.28	0.95	0.86	1.10	1.24
<i>a</i>	.83	.79	.74	.83	.82

Note. *N* = 85. *EX* = extraversion; *CON* = conscientiousness; *AG* = agreeableness; *OP* = openness; *ES* = emotional stability.

**p* < .01