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AN INSTRUMENTAL STUDY OF FIRE SERVICE LEADERS' INFLUENCE ON FOLLOWERS' WORKPLACE AEROBIC EXERCISE ACTIVITY

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By

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DEDICATION

I dedicate this dissertation to my wife and daughters. I hope witnessing my pursuit of this lifelong goal has inspired you all to follow your dreams!

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Abstract

Sudden cardiac events resulting from the physical demands associated with fire suppression among individuals lacking adequate aerobic fitness are known concerns within the firefighting domain. The purpose of this research study was to explore fire service leaders' perceived leadership behaviors that aided in followers' performing workplace aerobic exercise activities (Creswell & Poth, 2018). Following within-case and cross-case analyses of interviewees' data, five leadership themes emerged comprising four behaviors and one influence related to followers' workplace aerobic exercise activities: role model, supportive, cooperative, visionary, and planned exercise regimen. In the present study, thematic findings indicated that fire service leaders' role-modeling exercise and fitness behaviors exemplified the importance of performing workplace aerobic exercise activities among followers. In addition, supportive behaviors focused on interactive exchanges, job-related training, and team-building helped followers perform workplace aerobic exercise activities. Moreover, interviewees portrayed cooperative behaviors towards working out with followers, scaling exercises, and procuring fitness equipment promoted workplace aerobic exercise activities. Furthermore, interviewees described the use of visionary behaviors focused on "thinking outside of the box" and eliciting solutions to barriers limiting followers' from performing workplace aerobic exercise activities. Equally important, interviewees identified that establishing a prescribed planned workout regimen influenced followers' performance of workplace aerobic exercise activities. Therefore, the present study's findings have practical implications for helping fire service leaders lessen followers' cardiovascular disease-related events within the firefighting domain.

Keywords: case study, transformational leadership, fire fighters, aerobic exercise

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I. INTRODUCTION

According to recent medical research, sudden cardiac events, such as cardiopulmonary arrest, are the leading causes of death among individuals worldwide (Amin et al., 2019). Jiménez-Pavón et al.'s (2016) research highlighted that sudden cardiac events (SCEs) are responsible for thousands of individuals' mortality in the American population annually. To be exact, in the United States, every 40 seconds, someone has an SCE. Moreover, current statistical evidence in America indicates that an individual dies from cardiac arrest every 37 seconds (Hillmeister et al., 2020). Compared to other health-related diseases, such as cancer and diabetes, the mortality rates among individuals experiencing a SCE due to cardiovascular disease are expected to exceed 2.2 million people by the year 2030 (Virani et al., 2020).

Although cardiovascular disease-related mortalities are predicted to rise each year, the U.S. Department of Health and Human Services (2018) guidelines suggested that physical activity, such as routine aerobic exercise, could reduce the risk of experiencing a SCE. In addition, research has indicated that adopting an active lifestyle, in contrast to prolonged physical inactivity, aids in reducing the risks of one suffering from a SCE, as well as protects against several other debilitating medical conditions, such as diabetes, high blood pressure, and certain cancers (Ball et al., 2018; Craddock et al., 2016; Lefler et al., 2018). Therefore, the United States (U.S.) Department of Health and Human Services, including the World Health Organization recommended that adults in the United States participate in at least 30 minutes of

moderate-intensity aerobic activity five days a week complemented by strength training twice a week (U.S. Department of Health and Human Services, 2018; World Health Organization, 2020).

Despite the well-intentioned efforts of health and wellness organizations, such as the American Heart Association and medical professionals at the Centers for Disease Control and Prevention, publishing the health-related benefits individuals' gain from engaging in aerobic and strength training activities, cardiovascular disease risks persist among American adults maintaining a sedentary lifestyle (U.S. Department of Health and Human Services, 2018). Throughout this study, the term sedentary lifestyle, or sedentariness, refers to individuals' waking behavior resulting in a low level of expended energy less than, or totaling, 1.5 metabolic equivalents of task during daily periods of sitting or resting, whereas moderate-intensity physical activities, such as walking, are equivalent to 3.0 to 5.9 metabolic equivalents of task (U.S. Department of Health and Human Services, 2018; World Health Organization, 2020).

The American fire service has roughly 1.1 million career and volunteer firefighting specialists that provide fire suppression and Emergency Medical Services in communities nationwide (Sen et al., 2016). However, compared to other American vocations, fire service members are more likely to be injured (Orr et al., 2019) or suffer an on-duty SCE while fighting fires or caring for citizens experiencing pre-hospital medical emergencies (Fahy et al., 2020). More importantly, fire service members, among those lacking adequate aerobic fitness due to physical inactivity, sometimes experience work-related SCEs triggered by cardiovascular strains that occur during firefighting. According to research outlined in the *Fire Service Joint Labor Management Wellness-Fitness Initiative*, SCEs affecting those working within the fire service are increased primarily due to firefighters' physically demanding working conditions, individual medical conditions, and cardiac-related risk factors promoted by culturally induced physical

inactivity in a workplace context (International Association of Fire Fighters & International Association of Fire Chiefs, 2018). Therefore, considering the availability of modifiable risk factors associated with SCEs, this research study follows an instrumental case study approach to explore fire service leaders' perceived leadership behaviors that influence followers' workplace aerobic exercise activities.

Background of the Study

Over the past decade, previous researchers have reported devising workplace policies to improve fire department personnel's health and fitness (McDonough et al., 2015; Pawlak et al., 2015). In particular, to address the emotional, physical, and psychological health concerns of fire department personnel, the International Association of Firefighters and International Association of Fire Chiefs *Fire Service Joint Labor Management Wellness-Fitness Initiative*, National Fire Protection Association, and the National Volunteer Fire Council proposed different health and wellness policies for American fire service organizations. One of the first health and wellness policies associated with improving firefighters' cardiovascular health was the Wellness Fitness Initiative (WFI). The WFI was initiated in 1997 by the International Association of Firefighters and the International Association of Fire Chiefs to address uniformed fire department personnel's physical, mental, and emotional needs (Routley, 2012). Contained within the WFI manual were several workplace considerations that firefighters need to maintain health and wellness, such as on-duty time for exercise, facilities or access to exercise equipment, nutrition advising, and exercise programming personalized to individuals participating in a fire department exercise program (International Association of Fire Fighters & International Association of Fire Chiefs, 2018). Even though the WFI focused on improving fire service members' health and fitness,

Andrews et al.'s (2019) and Sen et al.'s (2016) research studies evidenced that cardiac fatalities affect professional and volunteer firefighter populations in the United States.

Equally important, many fire department personnel have attempted to follow the health-related fitness and occupational health program recommendations outlined in National Fire Protection Association Standards 1582 and 1583. However, despite the need for health and fitness training programs, most fire service organizations that follow the National Fire Protection Association's 1582 and 1583 standards do so voluntarily unless governing jurisdictions adopt a standard into law (Varone, 2012). According to Hollerbach et al. (2019), even though the National Fire Protection Association's 1582 and 1583 standards exist, "there are no nationally-enforced fitness or physical activity requirements for firefighters, which leads to inconsistent fitness training within and between fire departments, substandard fitness levels, and greater risks for obesity, injury, and cardiovascular-related events" (p. 2). Notwithstanding noted inconsistencies involving exercise performance requirements within the firefighting domain, Hollerbach et al. (2019) showed a 10-week high-intensity functional workout program comprising aerobic and weight-lifting activities yielded firefighter recruits significant aerobic capacity and grip strength gains compared to those following a self-guided workout program. Analogous to Hollerbach et al.'s (2019) study, recent occupational health and fitness research has demonstrated that the prevalence of cardiovascular deaths among U.S. workers continues to rise, especially those 45 years or older and employed in service-oriented occupations (MacDonald et al., 2017). For example, Sen et al. (2016) revealed that, of the nation's 1.1 million fire service members, 29% experience cardiovascular-related fatalities while actively conducting firefighting activities, and 25% experience cardiovascular-related fatalities upon return from a building fire or other similar life-threatening emergency involving firefighting operations. Realizing that

cardiac fatalities remained the leading cause of death among professional and volunteer firefighters in 2011, the National Volunteer Fire Council cooperated with several other health agencies to publish the National Volunteer Fire Council Heart-Healthy Firefighter Resource Guide. The National Volunteer Fire Council's Heart-Healthy Firefighter Resource Guide provided practitioners and administrators a comprehensive health and fitness reference to aid in reducing the numbers of fatal cardiac events that fire and Emergency Medical Services providers experience each year while operating at an emergency incident by promoting heart-healthy choices among first responders, such as smoking cessation, physical fitness, and healthy nutrition (National Volunteer Fire Council, 2011).

Research presenting individual and structural contexts surrounding fire service members' SCE and physical inactivity was also essential for this study. As an illustration, advanced job-related SCEs cause approximately 54% of all firefighter line-of-duty deaths; however, a few other non-job-related factors, such as adiposity, lack of physical exercise, and tobacco use, also increase mortality rates among fire service members (Espinoza et al., 2019; Stowell & Murnane, 2013). In addition, several research studies indicated that arduous fire ground suppression activities combined with fire service members low aerobic capacities and underlying cardiovascular risk factors, such as high blood pressure as well as other metabolic conditions, place firefighters at an increased risk of mortality (Andrews et al., 2019; Hales, 2016; Winter et al., 2010). Even though cardiovascular disease and firefighting duties comprise approximately 45% of all on-duty firefighter line-of-duty deaths, recent research data showed that increasing regular physical exercise could enhance the cardiorespiratory health and fitness levels of the firefighting population (Gendron et al., 2018a; Gendron et al., 2018b; Smith, 2016). However, Andrews et al.'s (2019) research highlighted that individuals' fitness levels often decline once

firefighters begin working in a fire department. In addition, nearly 70% of all U.S. fire service organizations do not follow the National Fire Protection Association's 1583 Standard for instituting workplace fitness programs (National Fire Protection Association, 2016). Therefore, given the importance of individuals having suitable cardiorespiratory fitness levels to conduct arduous job-related tasks, fire service leaders' influences on followers' performance of workplace aerobic exercise activities were assessed in this study.

Theoretical Foundation

Researchers often utilize theoretical health behavior frameworks to examine, understand, and predict the effectiveness or ineffectiveness of hypothesized changes in individuals' health-related psychosocial behaviors, such as physical exercise (Buchan et al., 2012; Gourlan et al., 2016; Hilliard et al., 2018). Conversely, exploring how fire service leaders' perceived leadership behaviors affect followers' workplace aerobic exercise activities required a theoretical lens to explore leadership linked to performance. Therefore, Bass and Riggio's (2006) transformational leadership theory served as a theoretical framework to assess how fire service leaders' perceived leadership behaviors influenced followers' performance of workplace aerobic exercise activities.

Transformational Leadership Theory

Downton (1973) was one of the first leadership theorists to advance transactional and charismatic leader-follower concepts that James McGregor Burns (1978) later extended as the transactional and transforming leadership theory's foundational components. Complementary to Downtown's (1973) rebel leadership research was Burns' (1978) theoretical bifurcation of leadership concepts within political contexts that comprised transactional and transformative leader-follower relationships, respectively. Burns conceptualized top-down exchanges among followers in response to leaders' specified needs or wants as transactional leadership. In contrast

to transactional leadership, Burns conceptualized the fulfilments of followers recognized wants and needs that ultimately spurred the merging of leader-inspired motivational and morality improvements towards effecting envisioned changes as transforming leadership. In 1985, the most widely known champion of Burns' transactional and transformational leadership concepts, Bernard Morris Bass (1985), initially extended Burns' original transformational theoretical leadership framework into three factors: Charisma-inspirational leadership, intellectual stimulation, and individualized consideration. In 1994, Bass and Avolio further refined the transformational leadership theory's components to describe four behaviors or four I's leaders exhibit to improve follower performance: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration.

Through continued research, Bass and Avolio (1994) determined transformational leadership theory's four components consisted of idealized influence (attributed/behavioral), inspirational motivation, intellectual stimulation, and individual consideration. Bass and Avolio's research indicated that followers perceived transformational leaders' behaviors linked to the idealized influence component entailed two different aspects: attributed and idealized behavioral influences. Following further investigation, in 2006, Bass and Riggio's conceptualization of the idealized influence (II) factor specified that transformational leaders motivate and inspire followers through perceived characteristic attributes and by serving as a behavioral role model (Bass & Riggio, 2006; Northouse, 2016; Verma et al., 2019). Additionally, the inspirational motivation (IM) factor described leaders who provide a shared inspiring vision of attaining higher goals or growth (Bass & Riggio, 2006; Northouse, 2016; Verma et al., 2019). Moreover, the intellectual stimulation (IS) factor illustrated a leader's behavior that solicits followers' creative input to overcome challenges, such as declining performance outcomes (Bass & Riggio,

2006; Northouse, 2016; Verma et al., 2019). Finally, the individualized consideration (IC) factor exemplified leaders' behaviors that signal genuine concern and support for individual followers' needs through behaviors, such as coaching and mentoring (Bass & Riggio, 2006; Northouse, 2016; Verma et al., 2019).

Problem Statement

The problem to be addressed through this research study is the underperformed leadership support for aerobic fitness among those working within the firefighting population. Studies on the importance of aerobic exercise have reported individuals participating in firefighting tasks who have inadequate aerobic fitness levels are at risk of experiencing an SCE (Andrews et al., 2019) or unfavorable cardiovascular disease-related emergency (Sen et al., 2016; Smith et al., 2020). In addition, studies of firefighter fitness linked to fire department physical and aerobic exercise programs showed the importance of ensuring individuals working in the firefighting domain participate in aerobic exercise activities (Gendron et al., 2018a; Smith, 2016). For example, Gendron (2020) reported that inactive firefighters participating in a study had markers indicating more inadequate cardiovascular health than those who completed moderate to high physical activity levels.

Most studies regarding inadequate levels of aerobic exercise within fire departments had focused on examining participants' cardiovascular risks (Gendron et al., 2018a) and upshots of health-related fitness programs (Cornell et al., 2017; Stone et al., 2020). In contrast, Jahnke et al.'s (2014) research identified fire service leaders' critical role in promoting workplace health and fitness by engaging in health-related behaviors based on focus group data provided by firefighters and fire service administrators. However, even though hierarchal leadership is essential to supporting health and fitness activities within the firefighting domain (Harrington,

2018; Jahnke et al., 2014), the current research body does not specifically address the perceived leadership behaviors that affect followers' workplace aerobic exercise from the fire service leaders' viewpoint. Therefore, unless fire service leaders better understand the leadership phenomenon connected to influencing followers' inadequate levels of workplace aerobic exercise activity, SCE or cardiovascular disease-related risk factors may continue to impact the firefighting population adversely.

Purpose Statement

The purpose of this qualitative study was to explore fire service leaders' perceived leadership behaviors that aided in followers' performances of workplace aerobic exercise activities (Creswell & Poth, 2018). Inadequate aerobic fitness levels have been shown to increase cardiovascular disease-related risks among those performing fire suppression activities in the firefighting domain (Gendron et al., 2018a; Gendron et al., 2020). In this study, fire service leaders with at least one year of leadership experience working within contemporary public-sector fire departments throughout Florida between June and July 2021 participated in web-based interviews. The participating interviewees answered nine questions from a semi-structured interview guide framed around the 4 I's of Bass and Riggio's (2006) transformational leadership theory. Bass and Riggio's transformational leadership theory provided a theoretical lens to study fire service leaders' perceived leadership behaviors that influenced followers' performances of workplace aerobic exercise activities. The term aerobic exercise activities utilized throughout this study refers to sustained periods of physical movements, such as walking or running, intended to increase an individual's heart rate and breathing, which makes "the cardiorespiratory system stronger and more fit" (U.S. Department of Health and Human Services, 2018, p.57). This study was completed using an instrumental case study approach that included web-based

interviews, including within-case and cross-case analyses of sampled populations qualitative data elicited during interviews regarding the studied phenomenon.

Overview of Methodology

Several research studies concerning fire service members' health-related behaviors have focused on quantitative analyses (Cameron et al., 2018; Gendron et al., 2020; Sell et al., 2018). The use of quantitative research methods, such as survey research, correlational research, and experimental research approaches permits researchers to test offered hypotheses, establish relationships between variables, and manipulate independent or controlled research variables having to do with health-related behaviors among different research populations (Mills & Gay, 2016). In contrast, bounded qualitative case study research that offers descriptions of sampled populations' perceived experiences with leadership phenomena linked to followers' performance of workplace aerobic exercise activities are significantly lower in number. This section briefly outlines the research design, research questions, data collection, and vital qualitative research procedures used to explore fire service leaders perceived leadership behaviors affecting followers' performances of workplace aerobic exercise activities.

Research Questions

The central research questions (RQs) guiding this instrumental case study aided in eliciting fire service leaders' perceived leadership behaviors that influenced workplace aerobic exercise activities among followers within contemporary Florida fire departments. To examine interviewees' data concerning a perceived leadership phenomenon, Bass and Riggio's (2006) transformational leadership model served as the theoretical framework to inform researchers about what was being studied and operationalize research questions (Creswell & Poth, 2018; Mills & Gay, 2016). More concretely, linking this qualitative research study's central questions to

an established theoretical framework supported the researchers' discernment of participants' elicited data through a lens that explained the explored phenomenon. Therefore, the central research questions that contributed to exploring fire service leaders' perceived leadership behaviors influencing followers' performances of workplace aerobic exercise activities for this qualitative research study comprised:

1. What are fire service leaders' leadership behaviors that help followers be successful at performing workplace aerobic exercise?
2. How does a fire service leaders influence change followers' performance of workplace aerobic exercise?

Research Design

The completion of this study required employing an instrumental case study method to explore perceived leadership phenomena affecting followers' workplace aerobic exercise activities among a bounded sample of contemporary fire service leaders working within Florida fire departments. According to Creswell and Poth (2018), the single instrumental case study approach involves examining an issue or concern relating to a real-life phenomenon bounded by one specific case. However, Luck et al. (2006) pointed out that, regardless of the paradigmatic distinctions defining single instrumental versus multiple case study approaches, the importance of understanding the phenomenon of interest sometimes requires selecting multiple cases from a sampled population when using an instrumental case study method. Therefore, when outlining this instrumental case study's bounded system in June 2021, 235 individual fire departments existed throughout Florida (Division of State Fire Marshal Florida Department of Financial Services, 2019). Lastly, all research participants attested to a minimum of one year of leadership experience within a Florida fire department.

Data Collection and Procedures

When designing this instrumental case study, the researcher considered several fundamental data collection strategies, such as locating individuals or cases who have experienced the explored phenomena (Creswell & Poth, 2018; Stake, 1995). Using Creswell and Poth's (2018) data collection strategies before accessing any interviewees, the investigator developed an informed consent form (Appendix D) and secured Southeastern University's Institutional Review Board approval (Appendix E). After gaining Southeastern University's Institutional Review Board approval, the researcher employed purposeful sampling to recruit cases that experienced the specific phenomenon under study. Interviewees within the sampled population were recruited via email through two listservs maintained by the Bureau of Fire Standards and Training /Florida State Fire College and the Florida Fire Chiefs' Association.

Using the statewide listservs permitted ten cases working in the Florida fire service for a minimum of one year with leadership experiences relevant to the phenomenon explored in this qualitative instrumental case study to volunteer as interviewees. Equally important, in the context of a worldwide pandemic, the utilization of Zoom's web-based video conferencing and Otter.ai's audio transcription application provided secure methods to conduct interviews and compile text transcripts among the purposively selected research participants. Although concerns may arise concerning the use of web-based technology, research has indicated that the required rigors and validity of qualitative research data collection are maintained even when completed virtually (Creswell & Poth, 2018; Vindrola-Padros et al., 2020). Therefore, once interviewees were scheduled, the investigator conducted virtual interviews employing a semi-structured interview guide and using the Zoom video conferencing platform in this instrumental case study.

Strictly adhering to the proposed interview timelines and respecting interviewees' schedules, interviews, on average, lasted between 10 to 33 minutes in duration. After each web-based meeting, the interviewees' digitally recorded interviews were uploaded into Otter.ai to produce a transcript for the investigator's and interviewees' review within one to two days post-interview. Following Creswell and Poth's (2018) data collection strategy, the investigator reviewed each video using QuickTime media player while reading the transcribed interviews line-by-line to ensure all collected data was accurate. Interviewees were emailed a copy of the interview transcription and asked to review the interview transcript for correctness and accuracy. This member checking strategy ensured all elicited data was accurate and reviewed for validation before beginning data analyses. Employing this approach, only three interviewees requested minor changes to typed errors in the transcripts compiled using the Otter.ai application. As previously mentioned, even though a sample of no more than four to five cases is required to increase an instrumental case study data's reliability and validity (Creswell & Creswell, 2018; Creswell & Poth, 2018), ten interviewees volunteered to participate in this research study. As a result, data saturation occurred after no interviewees mentioned any new ideas or explanations, and interviews concluded with ten participants. Finally, given that interviewees' privacy was of the utmost importance, all collected research data was downloaded onto a universal serial bus thumb drive and securely stored in the researcher's locked home office.

Overview of Analyses

Data analysis was conducted following several of Creswell and Poth's (2018) recommendations to ensure the data sets reliability and validity. First, to address any concerns about bias, written vignettes regarding the investigator's 30-year fire service background and experience with the studied phenomenon appeared throughout this study. Second, before

becoming immersed in data analysis, the investigator examined interviewees' transcripts for accuracy and utilized member checking of all digitally transcribed data obtained during data collection. Third, the investigator reviewed transcripts for emerging themes by reading and re-reading each transcript fully before using open coding to identify and reduce statements into manageable data chunks shared by interviewees relevant to the studied phenomenon. Five themes emerged after several iterations of open-coding using within-case and cross-case analyses followed by debriefings to review thematic analyses with this study's methodologist. Finally, a completed codebook outlining data associated with the studied phenomena was compiled.

Limitations

This study has distinctive limiters and delimiters. One limitation in this instrumental case study was locating interviewees with experiences involving the leadership behaviors that influenced followers' workplace aerobic exercise activities. Another limitation of this research study entailed interviewees' recalling past incidents involving the perceived leadership behaviors exhibited to influence followers' performance of workplace aerobic exercise activities. Consequently, the investigator assumed that any self-reported interviewee data collected represented factual accounts for this study. Furthermore, even though assertions within this study may not generalize to all vocational contexts, experiential learning (naturalistic generalizations) acquired from the study's results could appeal to readers interested in influencing followers' performances of workplace aerobic exercise activities (Stake, 1995). Finally, the investigator bracketed latent biases involving 30 years of fire service experience before each data collection and analysis phase by taking an interpretive approach towards learning from subjects' interview data when completing this instrumental case study (Creswell & Poth, 2018).

As mentioned earlier, some concomitant delimiters coexist within this qualitative research study. First, unlike cross-sectional quantitative research studies predicting fire service members physical activity intentions (Amodeo & Nickelson, 2020) or longitudinal trends in firefighters aerobic exercise behavior (Cameron et al., 2018), this study examined a purposively sampled population of fire service leaders' perceived leadership behaviors that influenced followers' performances of workplace aerobic exercise activities within Florida public-sector fire departments. Moreover, the purposively sampled population needed one year of leadership experience working with followers within a Florida fire department to qualify for the study. As a final point, this instrumental case study was designed to explore perceived fire service leaders' influence on followers' workplace aerobic exercise activities using Bass and Riggio's (2006) defined elemental components of the transformational leadership theory.

Definition of Key Terms

The following words and phrases are key terms for the study.

- **Aerobic exercise activities**: sustained periods of physical activity that increase an individuals' heart and respiratory rates to attain improved cardiorespiratory endurance and fitness (U.S. Department of Health and Human Services, 2018).
- **Sudden cardiac events**: illustrative of myocardial infarctions, which can be caused by the blockage of coronary arteries supplying oxygen-enriched blood to an individual's heart, or electrophysiological fluctuations in the human heart known as dysrhythmias that can result in one's increased risk of mortality (Amin et al., 2019).
- **Working out**: in the context of this study refers to performing cardiorespiratory (aerobic) exercises or practical training activities that increase an individual's heart rate.

Significance

Research regarding fire suppression and other fire ground operations indicated SCEs among fire service members continued to significantly impact the number of on-duty, line of duty, deaths among those employed in American fire departments annually (Kales & Smith, 2017; Smith et al., 2019a; Smith et al., 2019b). However, the health benefits gained from just 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic exercise weekly can lessen an individual's cardiovascular risk profile (Rhodes et al., 2017; U.S. Department of Human and Health Services, 2018; World Health Organization, 2020). Exploring fire service leaders' influence on followers' workplace aerobic exercise activities through research conducted in this study holds implications for enhancing individuals' cardiovascular health improvements within a fire department context. Research data in this study contributed to fire service leadership research, by indicating that leaders' behaviors aligned with the transformational leadership theory influenced followers' performances of workplace aerobic exercise activities. Finally, this study's findings directly benefit fire service leaders and administrators by providing invaluable insights needed to develop organizational policies or implement leadership practices that aid followers in performing workplace aerobic exercise activities.

Summary

The primary focus of this research study involved exploring fire service leaders' perceptions of the leadership behaviors that influenced followers' performance of workplace aerobic exercise. This research subject emerged from literature illustrating how physically demanding fire ground tasks and cardiovascular-related health risks contributed to a significant number of on-duty fire service members' line of duty deaths (Sen et al., 2016; Smith et al., 2019a). In addition, utilizing Bass and Riggio's (2006) theory of transformational leadership as a

theoretical lens aided in exploring fire service leaders' perceived leadership behaviors influencing followers' performance of workplace aerobic exercise activities. The results of this instrumental case study added to the larger body of leadership research by indicating that interviewees' leadership behaviors influenced followers' workplace aerobic exercise activities, which could help to reduce cardiovascular disease-related risks among those working in the American fire service domain. To conclude, including this introductory chapter, the study's overall format is composed of five chapters. Chapter Two presents relevant literature to provide insight into the concepts and theoretical underpinning of the study. Chapter Three is concerned with the methodology used for this instrumental case study approach. Chapter Four presents five themes distilled from the research findings. Finally, Chapter Five draws on data from the entire study to discuss the results, limitations, and implications for current practice and future studies relevant to the phenomenon under study.

II. REVIEW OF LITERATURE

The purpose of this qualitative study was to explore fire service leaders' perceived leadership behaviors that aided in followers' performances of workplace aerobic exercise activities (Creswell & Poth, 2018). Inadequate aerobic fitness levels have been shown to increase cardiovascular disease-related risks among those performing fire suppression activities in the firefighting domain (Gendron et al., 2018a; Gendron et al., 2020). In this study, fire service leaders with at least one year of leadership experience working within contemporary public-sector fire departments throughout Florida between June and July 2021 participated in web-based interviews. The participating interviewees answered nine questions from a semi-structured interview guide framed around the 4 I's of Bass and Riggio's (2006) transformational leadership theory. Bass and Riggio's transformational leadership theory provided a theoretical lens to study fire service leaders' perceived leadership behaviors that influenced followers' performances of workplace aerobic exercise activities. The term *aerobic exercise activities* utilized throughout this study refers to sustained periods of physical movements, such as walking or running, intended to increase an individual's heart rate and breathing, which makes "the cardiorespiratory system stronger and more fit" (U.S. Department of Health and Human Services, 2018, p.57). This study was completed using an instrumental case study approach that included web-based interviews, and within-case and cross-case analyses of sampled populations qualitative data elicited during interviews regarding the studied phenomenon.

Firefighting Populations Link to Aerobic and Physical Fitness

Fire service researchers and administrators have used the term *sudden cardiac event* over the last 50 years to describe a phenomenon that has resulted in nearly half of all on-duty firefighter line-of-duty deaths. Sudden cardiac events are malfunctions of the human heart's electrical system, which precipitate lethal arrhythmias that can cause cardiac arrest (American Heart Association, 2015). Although sudden cardiac events occur within the general population, existing evidence showed the physically demanding work associated with firefighting caused approximately 45% of on-duty firefighters' work-related line of duty deaths (Hales, 2016). Therefore, extant research has focused on fire service members' aerobic capacities, body compositions, and firefighters' experiences related to performing simulated fireground tasks or physical fitness training in a fire department context over the past few decades.

Perroni et al. (2008) evaluated the endurance of Italian novice (n = 51) and seasoned volunteer firefighters (n = 29) while wearing personal protective firefighting equipment. In addition, Perroni et al. examined participants' activity levels, education, diet, tobacco use, alcohol consumption, medications, and physical activity history using a quantitative exercise and medical history questionnaire. Perroni et al. also had participants undergo aerobic, strength, and anaerobic evaluations in a single experimental session. First, participants completed physical fitness testing centered on grip strength and timed bench press with free weights equivalent to an individual's one-repetition maximum. Perroni et al. then used a counter movement jump and 20-meter sprint to record participants' best anaerobic performances. Finally, to assess participants' maximal aerobic power with and without wearing personal protective firefighting equipment, Perroni et al. used a test that involved participants stepping up and down a 40-centimeter step at

24 steps per minute for three minutes total. As soon as the step test concluded, participants' heart rates were assessed and used to estimate individuals' exercise-related maximal aerobic capacity.

Perroni et al. (2008) calculated participants physical fitness profiles using descriptive statistics and an ANOVA test to assess grip strength, bench press, counter movement jump, 20-meter sprint, and anaerobic step-test differences between the novice and volunteer groups. The anthropometric data of participants showed higher age (F (1, 78) = 74.8; $p < 0.0001$; ES = 0.7) and body mass index (BMI; F (1, 78) = 4.1; $p = 0.04$; ES = 0.2) differences among novice firefighters in contrast to seasoned volunteer firefighters. Differences involving the study groups' anaerobic evaluations showed volunteer firefighters' performance outcomes were better than those of individuals comprising the novice firefighters' population. Equally important, when assessing the aerobic performance outcomes between groups while wearing personal protective firefighting equipment, which included self-contained breathing apparatus, eight novice firefighters, compared to one volunteer firefighter, did not complete the aerobic power step test. However, novice firefighters had better performance outcomes when completing the aerobic power step test while wearing personal protective firefighting equipment without self-contained breathing apparatus. Although numerous novice and seasoned firefighters passed the aerobic evaluation, Perroni et al.'s study established that further research into specific aspects of strength training programming within the firefighting population was warranted. In summary, an implication drawn from Perroni et al.'s study demonstrated that aerobic and physical fitness are essential to the firefighting population's aerobic, anaerobic, and strength performance outcomes while wearing personal protective equipment.

Durand et al. (2011) investigated the cardiovascular health-related benefits of aerobic exercise activity among a population of professional firefighters. In order to collect quantifiable

data, Durand et al. used a cross-sectional study consisting of a self-reporting sports and exercise activity questionnaire, cardiorespiratory fitness (Bruce treadmill tests) assessment, and cardiovascular risk factor (body weight, BMI, resting heart rate, blood pressure, and venous blood samples assessments from an all-male (n = 527) firefighting population. To distinguish differences in participants' physical activity frequency, duration, and intensity totals (in minutes), an analysis of variance method was used (Durand et al., 2011). To determine the effects of participants' cardiorespiratory (Bruce treadmill test) and cardiovascular risk factor assessment outcomes relative to individuals' BMI, age, and smoking covariate data, Durand et al. used general linear modeling.

Durand et al. (2011) found that half (51.2%) and 35.7% of the study participants were categorized as overweight and obese, respectively. The results of Durand et al.'s study also indicated that 12% of participants smoked. Equally important, Durand et al. found that 47% and 20% of participants reported performing 90 minutes or exceeding 150 minutes of physical activity weekly, respectively. However, another important finding was that Durand et al.'s analysis of participants' physical activity frequency, duration, and intensity outcomes, after adjusting for covariate variables, showed beneficial heart rate recovery effects (p = 0.003) among firefighters that reportedly exercised ≥30 minutes. Comparatively, improved cardiovascular risk factors, high-density lipid proteins (p = 0.02), total glucose (p = 0.04), and total cholesterol (p = 0.04) markers, were associated with participants' that reported 30-minute exercise sessions. In short, Durand et al. found that, along with improving cardiorespiratory fitness levels, frequent incidences of aerobic exercise lasting ≥30 minutes increased beneficial health-related cardiovascular heart disease risk factors among individuals within the firefighting population.

Eastlake et al. (2015) studied the impacts of occupational exposures, lifestyle factors, and demographic characteristics related to cardiovascular risk factors among a Midwest firefighting population comprised of 1,431 active full-time, part-time, and volunteer firefighters. Eastlake et al. obtained quantitative survey research data from participants (n = 154) representing 15 different fire departments. In addition, Eastlake et al. elicited responses about firefighting PPE and hearing protection usage, environmental firefighting exposures, personal health issues, eating, drinking, smoking, exercise, and video gaming behaviors from participants using an online survey. Moreover, Eastlake et al.'s online survey included questions that garnered participants' lineal cardiovascular disease-related risks and demographical information.

Following a categorical analysis of the collected survey data, only 13% of Eastlake et al.'s (2015) participants met an identified average body mass index (BMI) range between "18.5 < BMI < 24.9" (p. 288). Moreover, Eastlake et al. determined, after completing logistic regression analyses, the remaining 53% and 33% of participants were classified as overweight "(25< BMI < 29.9)" or obese "(BMI > 30)" respectively (p. 288). Furthermore, together with variations in hearing protection and PPE usage dependent upon individuals' level of activity or specific job task on a fire scene, over 90% of participants reported toxic skin exposure, and 33% experienced heat stress symptoms (dizziness, fainting) while actively engaged in firefighting tasks or upon returning from an emergency incident. Above all, high cholesterol and high blood pressure were the most reported personal health issues among participants.

Relative to lifestyle factors, Eastlake et al. (2015) found participants' diets centered on red meats (83%) "1 – 5 times per week" and fast food (90%) "1 – 3 times per week" (p. 288). However, many participants reported consuming fish (57%) once a week, vegetables (73%) "1 – 5 times per week," and whole-grain products (92%) "1 – 7 times per week" (p. 288).

Comparatively, amassed survey data indicated that 54% and 37% of participants consumed alcohol less than once per week and 1 to 3 times per week, respectively. Equally important, approximately 141 participants denied using any tobacco products daily. Still of particular interest, 71 survey responses specified participants performed physical exercise 1 to 3 times per week, as well as 25 participants reportedly exercised "less than once per week" (p. 288). Moreover, only 21% of research participants reported playing video games daily or weekly. In short, a regression analysis of participants' lifestyle and safety practices in Eastlake et al.'s study revealed that consuming alcohol and whole-grain products (0.27 ± 0.59) reduced firefighters' cardiovascular health risks. Still, Eastlake et al. found higher odds ratios for age-related cardiovascular disease risks, such as high blood sugar (1.24 ± 0.17), high blood pressure (1.06 ± 0.05), and high cholesterol levels (1.09 ± 0.08) linked to participants abovementioned higher BMI scores. Whereas environmental exposure variants occurred due to individuals' PPE and hearing protection use during firefighting activities, Eastlake et al. found lifestyle factors, such as BMI and age, significantly contributed to firefighters' adverse cardiovascular health risks. Thus, Eastlake et al. concluded that focusing on modifiable cardiovascular risk factors, such as diet and exercise, may improve cardiovascular health-related outcomes among individuals within the fire service domain.

Seyedmehdi et al. (2016) examined the relationship between cardiovascular risk factors and aerobic fitness in a firefighting population. Seyedmehdi et al. employed a quantitative cross-sectional design that used a survey questionnaire to evaluate participants' (n = 157) anthropometric, education level, work history, cigarette smoking, drug usage, shift work, personal and first-degree family cardiovascular disease history data. In addition, participants' cardiovascular (CVD) risk factors (BMI, resting blood pressure, resting heart rate, total

cholesterol, triglycerides, and glucose) and aerobic fitness (base and submaximal) assessments were also obtained before commencing the study. Given the array of analyzed variables, Seyedmehdi et al. used *t*-tests, or ANOVA and chi-square testing, to compare the groups and qualitative variables, respectively. In addition, logistic regression models were used to assess the effects of aerobic fitness associated with individuals' CVD risk factor data expressed as specific odds ratios for participants.

Seyedmehdi et al. (2016) found that 35% of participants regularly performed physical activity. Participants' mean resting systolic and diastolic blood pressure readings were 116.93 mmHg and 76.03 mmHg, respectively. Participants' mean aerobic fitness (VO_2max) was 33.76 mL/kg/min, which allowed researchers to categorize individuals into low, moderate, or high aerobic fitness classifications. After further analyses, significant differences were identified between individuals in the low, medium, and high AF groups. Seyedmehdi et al. found that younger firefighters with high AF classifications had significantly lower BMI, cholesterol, triglycerides, diastolic blood pressures, and increased high-density lipoprotein values. Also, post hoc analyses revealed that low aerobic fitness group participants had higher frequencies of CVD risk factors ($p < 0.05$) than individuals classified in the moderate physical activity group. Moreover, regarding the relationship between CVD risk factors and aerobic fitness, Seyedmehdi et al. found that participants with low aerobic classifications were cigarette smokers, physically inactive, and had higher low-density lipoproteins in contrast to those individuals with higher aerobic fitness classifications. Although this study's research design did not support evaluating for causation, Seyedmehdi et al.'s study offered some evidence that decreasing firefighters' cardiovascular disease-related risks could be completed by increasing individuals' health-related aerobic fitness activities.

Amodeo and Nickelson's (2020) cross-sectional quantitative study assessed the factors and outcomes of individuals' intentional physical activity performance within a North Carolina (n = 123) volunteer firefighting cohort. Amodeo and Nickelson, using an online survey, recorded demographic (age, gender, race, BMI, rank, education, fire station presence) information, perceived risk of heart disease (PRHD) scores, Ajzen's theory of planned behavior construct measurements, the American College of Health Association-National College Health Assessment point values, and a four-item intention to be physically active evaluation's scores in order to collect individuals' measurable quantitative data. Following data collection, Amodeo and Nickelson employed descriptive analyses, an ANOVA test, and a forward stepwise regression analysis to evaluate participants' physical activity intention scores.

Amodeo and Nickelson's (2020) descriptive analyses determined, based on BMI, a majority of participants were overweight (35.9%) or obese (44.4%). Moreover, only 16% and 32% of study participants met the moderate-intensity or vigorous-intensity weekly physical activity requirements outlined in the American College of Health Association-National College Health Assessment, respectively. Amodeo and Nickelson also found that just over half (53%) of participants reported attaining the American College of Sports Medicine's weekly physical activity requirements through a combination of both moderate-intensity and vigorous-intensity cardiovascular exercise. Equally important, only 29% of participants met the American College of Sports Medicine's recommended two days a week strength training standard. Overall, Amodeo and Nickelson found that 14.4% of participants reported no moderate-intensity physical activity, whereas 40.8% reported no vigorous-intensity physical activity, and no strength training (45.2%) among individuals in the study population.

Interestingly, further analysis showed participants associated positive results to physical activity described by the theory of planned behavior's attitude ($r = .527$; $p < .001$) and perceived behavioral control (PBC; ($r = .494$; $p < .001$) constructs (Amodeo & Nickelson, 2020). Another key finding was that participants reported positive results regarding past physical activity overall ($r = .618$; $p < .001$), past moderate-intensity and vigorous-intensity cardiovascular exercise activities ($r = .556$; $p < .001$); ($r = .576$; $p < .001$), and past physical strength training activities ($r = .514$; $p < .001$). Still, physical activity intentions among participants in Amodeo and Nickelson's study were negatively associated with age ($r = -.201$; $p = .032$). As a final point, Amodeo and Nickelson found analyses of the theory of planned behavior's attitude ($\beta = .315$ $p < .001$) and PBC ($\beta = .274$ $p < .001$) constructs, past physical activity moderate-intensity ($\beta = .096$ $p < .012$), and past physical activity vigorous-intensity cardiovascular exercises ($\beta = .087$ $p < .031$) better predicted participants' intentions to be physically active.

Several implications drawn from Amodeo and Nickelson's (2020) study indicated that the theory of planned behavior's (TPB) subjective norm, which measures one's thoughts about the perceived importance of performing physical activity, was not associated with participants' exercise intentions. Furthermore, given that cardiovascular heart disease-related incidents are prevalent in the fire service, descriptive analyses revealed that just over half of Amodeo and Nickelson's study participants reported meeting the American College of Sports Medicine's weekly guidelines for physical activity. Finally, Amodeo and Nickelson found that participants' physical activity intentions related to cardiovascular heart disease-related incidents appeared to be of little concern, especially among older individuals in this study's volunteer firefighting population.

Cardiovascular Risks Linked to Fire Service Members

Researchers' interest in the underlying factors linked to cardiovascular-related deaths among the U.S. workforce has recently grown. From a population of approximately 91.5 million U.S. workers, MacDonald et al.'s (2017) study was one of the first to identify how workplace environmental and social factors influenced at-risk U.S. workers' cardiovascular disease. MacDonald et al., using a telephone survey method, collected quantitative research data based on clinical (e.g., blood pressure, total cholesterol, and fasting blood glucose) and behavioral (e.g., smoking, body mass index, diet quality, and physical activity) risk factors to obtain measurable composite scores for defining research participants (n = 6,282) ideal, intermediate, or poor cardiovascular health profiles using the American Heart Association's Life's Simple 7 framework. MacDonald et al. analyzed American Heart Association's *Life's Simple 7* framework participant data and determined individuals employed in the U.S. workforce, based on the "healthy worker effect," appeared to be healthier than others in the general population (p.156). However, based on MacDonald et al.'s study participants' American Heart Association's *Life's Simple 7* framework composite scores, the prevalence of cardiovascular heart disease that increases cardiovascular risk factors was evident among workers 45 years of age working in sedentary vocations, such as protective services, food preparation and serving, sales, administrative support, and office work.

Similar to MacDonald et al.'s (2017) study, firefighters' sudden cardiac death risks resulting from work-related duties have remained relevant to fire service researchers. Kales et al. (2003) used a case-control method to observe differing on-duty mortality outcomes between male firefighters (n = 52) who died of coronary heart disease, two control groups comprising 51 male firefighter trauma death investigations, and a cohort of 310 male active firefighters' medical

examination results from National Institute for Occupational Safety and Health Firefighter Fatality Investigation Reports. To compare research data differences, Kales et al. employed independent *t*-tests, chi-square values, and risk ratios to calculate event relationships and binary logistic regression analysis for odds ratios involving firefighters on-duty mortalities.

Kales et al. (2003) found coronary heart disease mortalities related to ischemic heart disease in older (51.6 ± 6.9) professional firefighters (67%) performing fire suppression activities in contrast to younger (37.9 ± 13.2) traumatic fatality (41%) control cases. Regarding cardiovascular risk factor relationships between the coronary heart disease group and active professional control cohort, statistical modeling consistently found increased risk ratios linked to smokers ≥ 45 years old with prior metabolic disorders (diabetes) and heart-related occlusive or blood pressure maladies. Thus, although on-duty firefighter coronary heart disease deaths are associated with fire suppression activities, an implication of Kales et al.'s study supported the possibility of decreasing fire service members' coronary heart disease risks through lifestyle modifications centered on health screening, physical training, and smoking cessation programs.

Yan et al. (2012) evaluated what effects live firefighting activities had on the human heart's mechanical and electrical performance. Using an experimental research method, firefighters ($n = 39$) aged 18-64 years participated in a 3-hour simulated firefighting drill that required participants to perform fire ground operations while wearing National Fire Protection Association 1971 standard personal protective equipment, which included a self-contained breathing apparatus containing compressed air for breathing. Yan et al. used a non-invasive quantitative research design to collect measurable heart rate, core temperature, blood pressure (BP), carotid artery BP, central pulse wave velocity, carotid artery stiffness, carotid artery wave

intensity measurements, and blood plasma volumes of participants undergoing pre- and post-simulated firefighting testing.

The collected pre- and post-simulated firefighting participant data were compared using paired samples *t*-tests, including Pearson's correlation coefficients, to analyze changes in individuals' blood plasma volumes (Yan et al., 2012). Yan et al. found arterial and ventricular functioning of individuals' hearts engaged in vigorous, albeit simulated, firefighting activities caused cardiovascular decrements that might increase fire service personnel's risks of suffering an untoward cardiac event. In sum, since healthy participants experienced cardiovascular changes after three hours of simulated firefighting training, Yan et al.'s findings highlighted the increasing importance of further research to reduce cardiovascular risks among fire service members.

Yang et al. (2013) employed a case-control study to compare outcome differences regarding the specific causes of on-duty deaths among U.S. firefighters, including two control groups aged 45 years or less, experiencing sudden cardiac death and trauma-related fatalities using data from the National Institute for Occupational Safety and Health (NIOSH) between 1996 to 2012. After examining NIOSH fire service mortality data containing autopsy reports for (n = 87) firefighters aged 45 years or less, in contrast to matched-age, medically cleared active fire service controls (n = 915) and firefighters' job-related trauma cases (n = 56) from existing research databases (e.g., National Fallen Firefighters Foundation), Yang et al. found, using Fisher's exact test, a *t*-test, and multivariate logistic regression that adiposity, cardiovascular heart disease (CHD), left ventricular hypertrophy, and cardiomegaly were the most common pathologic forms of sudden cardiac death in younger members of the American firefighting population. One implication that emerged from Yang et al.'s study centered on the possibility of

reducing fire service members' sudden cardiac death risks through preventable lifestyle factors, such as wellness programs or adiposity-related entry standards for individuals entering the firefighting domain.

Sen et al.'s (2016) examination of firefighter deaths, using the United States Fire Administration's firefighter fatalities and statistics data, revealed 1,153 career and volunteer fire service members mortalities between January 2002 to December 2012 occurred in older firefighters (52±11.4), which was followed by traumatic injuries (40±16) among individuals in the firefighting population. To analyze differences between career and volunteer firefighters' duty-type and fatal cardiac events, Sen et al. used a two-sample Student's *t*-test, an ANOVA test to compare group data, and a chi-square test to find associations between identified categorical variables. Following several statistical analyses, Sen et al. found cardiac fatalities (47%) frequently occurred in older (> 50 years) and volunteer firefighters overexerted on a fire scene or "other nonfire event" (p. 193). Based on Sen et al.'s findings, while age and overexertion increased firefighter cardiac fatality risks, further research into improved fitness interventions and medical guidelines may help to reduce fire service members' cardiovascular-related events.

More research indicated that cardiovascular-related deaths among on-duty firefighters continued to adversely affect the American fire service (Smith et al., 2020). Smith et al.'s longitudinal study focused on the cardiovascular health-related differences between male and female career fire service members (n = 672) at two distinctive temporal periods. After measuring participants' blood pressure, anthropometric (adiposity and BMI), lipid and glucose blood tests, and self-reported medication and smoking questionnaire data, Smith et al.'s baseline descriptive statistics, paired *t*-tests, Fisher exact tests, linear and logistical regression modeling,

and McNemar's difference testing spanning five years, demonstrated cardiovascular risk factor changes existed between male and female participants.

Smith et al. (2020) found during baseline measurements significantly higher BMI ($p <$ 0.001), low density lipoprotein cholesterol (LDL); ($p < 0.01$), blood glucose (94.9 $mg.dL^{-1}$, SD = 12.8), higher blood pressures (systolic and diastolic), and hypertension medication use ($p < 0.05$) among males (12%) compared to females (3%) in the studied fire service cohort. Follow-up measurements after the 5-year period, Smith et al. found body weight and BMI (2.5± 0.2kg; p <0.001), LDL cholesterol levels (4.9±1.2 $mg.dL^{-1}$; $p < 0.001$), and blood glucose levels (2.6± 0.6 $mg.dL^{-1}$; p <0.001) increased significantly in male participants. However, Smith et al. found no significant changes in female participants' blood glucose measurements. Further analysis found comparable decreases in male (−2.4±0.4 mm Hg; $p < 0.001$) and female (−2.7±0.9 mm Hg; $p < 0.01$) participants' diastolic blood pressures, respectively. The most relevant finding in Smith et al.'s study was that female firefighters' more favorable blood pressure control changes resulted from lifestyle modifications. Therefore, based on Smith et al.'s findings, the development of lifestyle modification strategies (healthier diets, physical activity, smoking abstention) may be an important factor in lessening cardiovascular health risks among individuals working in the fire service.

Sudden Cardiac Events Linked to Fire Suppression Activities

Firefighting tasks require fire service members to have a suitable cardiorespiratory endurance to complete specific job-relevant duties without becoming ineffectual on the fire ground. In the last decade, Fernhall et al. (2012) identified the physiological strains of firefighting that firefighters experience during fire suppression activities. Fernhall et al.'s study, which included male career and volunteer firefighters ($n = 40$) aged 18 to 64, examined

participants' cardiovascular responses before and during a simulated 3-hour firefighting drill. Fernhall et al. obtained participants' body weight, venous blood samples, heart rate measurements, core temperatures, cardiovascular measurements, self-reported physical activity, and blood pressures pre- and post-firefighting training to measure cardiac responses for quantitative analyses. Comparisons of participants' cardiac responses were completed using a dependent *t*-test and correlative analyses between individuals' BMI, self-reported physical activity, and cardiac function changes.

Fernhall et al. (2012) found strong evidence of elevated core temperatures (37.1 ± 0.5 to 38.9 ± 0.6°C; $p < 0.05$), dehydration (1.1%), increased heart rates (72.1 ± 11 bpm to $90. \pm 13$ bpm; $p < 0.05$), blood plasma variations (-3.3 ± 6.2%), but no significant changes in blood pressures among participants who developed cardiac fatigue after performing simulated high-intensity firefighting activities. Even though alternating bouts of strenuous physical activity associated with firefighting tasks resulted in participants' cardiac fatigue, Fernhall et al. also found improved fitness levels may have increased individuals' cardiovascular capacities during simulated firefighting drills. In contrast, while the absence of physical conditioning and training may have contributed to individuals' cardiac fatigue, a major drawback to Fernhall et al.'s argument centered on the absence of participants' preliminary physical activity data collection. Still, Fernhall et al.'s findings determined that reducing heat-related cardiac fatigue triggers and enhancing firefighter fitness may reduce sudden cardiac event risks among individuals in the firefighting population.

Fire service-oriented health and wellness literature supported fire suppression's physical activities strain on individual's cardiorespiratory capacity, even during brief intervals of simulated firefighting drills (Yan et al., 2012). Some preliminary work carried out by Smith et al.

(2019a) examined if fire suppression tasks were responsible for sudden cardiac events that resulted in a large percentage of all on-duty firefighter line-of-duty. Smith et al. questioned whether individuals undergoing simulated firefighting tasks followed by a separate control period involving routine daily duties would demonstrate electrocardiographic (ECG) abnormalities that trigger sudden cardiac events. Thirty-two experienced firefighters (n = 32) from six different states in the U.S. were recruited for Smith et al.'s study. Researchers conducted participants' baseline ECG tracings to collect measurable quantitative data for the 12 hours of post-firefighting and the 12-hour control day of station duties.

The participants' ECG data were examined for differences using the McNemar test as matched pairs to determine if any lethal arrhythmias associated with sudden cardiac events were exhibited between individuals' firefighting and control periods. A comparison of the results showed sudden cardiac events promoting ventricular arrhythmias in six firefighters and ECG changes indicative of myocardial ischemia in four firefighters after the simulated firefighting drills (Smith et al., 2019a). Conversely, no participants exhibited any ECG changes during the post-control period. Smith et al. found job-related sudden cardiac events typically occur during the physically demanding tasks associated with fire suppression, compared to other day-to-day duties that involved working around a fire station. Therefore, Smith et al.'s study highlighted that physically taxing fire ground tasks could trigger untoward cardiac-related emergencies in firefighters with underlying CHD maladies.

Overview of Fire Service Members Physical Fitness Program Research

Decreased aerobic fitness levels affect fire service members' ability to safely and effectively carry out fire ground tasks. Many researchers have argued that reduced aerobic fitness levels, due to increased age, adiposity, metabolic, cardiac anatomical maladies, physical

inactivity, environmental, and occupational factors increase sudden cardiac events among fire service workers (Fernhall et al., 2012; Gendron et al., 2018; Gendron et al., 2020; Kahn et al., 2019; Sen et al., 2016). Examining fire service-related literature showed the cardiovascular health benefits of firefighter physical fitness were studied by Rhea et al. in 2004 and Staley et al. in 2011.

Rhea et al. (2004) conducted one of the earliest experimental studies on physical fitness and firefighters' job performance by examining a fire service-oriented physical training and job-relevant workout program. Rhea et al., using a battery of simulated fire ground tasks and physical fitness tests, enlisted career firefighters (n = 20) to complete fitness tests that measured participants' aerobic fitness, anaerobic power and endurance, muscular strength, local muscular endurance, and body compositions. Rhea et al. collected body composition, cardiovascular and anaerobic endurance, muscular strength, and muscular endurance data to measure participants' (n = 20) physical fitness levels. Following that, participants dressed in personal protective ensembles with a self-contained breathing apparatus (minus the facemask) and completed four firefighting job-related tasks (hose pull, stair climb, simulated victim rescue, and equipment hoist) for a timed performance score. After Rhea et al.'s study concluded, fitness and timed performance measurement variations were assessed using descriptive statistics, followed by Pearson correlation coefficients representing physical fitness and strength demands associated with research participants' job-related firefighting task performances. The correlative scores for flat bench press (upper body muscular strength); (r = −0.66), grip strength (r = −0.71), muscular endurance (bent-over row); (r = − 0.61); bench press (r = −0.73); shoulder press (r = −0.73); bicep (r = −0.69), and anaerobic endurance (400-m sprint; r = 0.79) in Rhea et al.'s study represented the significant fitness demands of performing job-related firefighting tasks among

firefighters. Interestingly, Rhea et al. found that participants' aerobic endurance levels were not correlated significantly with simulated firefighting task computations. However, a key problem with Rhea et al.'s study design was that participants designated minimum rest period of 10 minutes between each simulated fireground task affected the collection of useable job performance data related to the aerobic fitness demands of firefighting. The implications of Rhea et al.'s study highlighted the need for further research regarding the aerobic endurance and job performance improvements firefighters gain from participating in physical fitness training programs (Staley et al., 2011).

Staley et al. (2011) questioned firefighters about workplace socio-cultural aspects related to physical fitness, coronary heart disease (CHD), and sudden cardiac death (SCD) risks among individuals within the firefighting population. For this study, Staley et al. employed qualitative research methods and the social ecological framework to examine cultural and organizational factors influencing physical fitness modifications needed to reduce firefighters' CHD and SCD risks. The selected participants (n = 64), comprising six focus groups of firefighters, provided Staley et al. insight into the socio-cultural perspectives regarding physical fitness interventions in a fire department context.

Prior to focus group discussions, Staley et al. (2011) conducted audio-recorded interviews with six key informants (n = 16 respondents) to develop descriptive, structural, and contrasting questions regarding cultural descriptions of physical fitness within the firefighting population. After developing a semi-structured interview guide based on fire service informants' perceptions of physical fitness and exercise differences, high rates of CHD, and SCD risks, Staley et al. elicited qualitative data from participants (n = 64) using six focus groups. Moreover, focus group participants completed a survey comprised of questions that collected individuals' "socio-

demographics, health, smoking, and self-reported fitness status" data (p. 607). Following data collection from the six focus groups, Staley et al. used the Atlas.ti qualitative data-analysis software to systematically analyze participant data for culturally influenced themes relevant to physical fitness, CHD, and SCD within the study population.

Five themes emerged from Staley et al.'s (2011) analysis of the six focus groups' interview data. First, participants' cultural interpretations of physical fitness were not associated with the performance aspects of aerobic or physical fitness activities. Instead, a common view concerning physical fitness among participants centered on one's ability to complete fire ground tasks effectively. Even though research participants recognized SCE stem from firefighting's physically taxing nature, younger participants self-identified with less concern about cardiovascular health-related risks. In contrast, older firefighters accepted fitness as a "long-term commitment" (Staley et al., 2011, p. 610) to healthier cardiovascular outcomes. Second, a lack of leadership influence and organizational factors (vocational training and station duties) reduced participants' adherence and personal motivation to perform worksite physical training. Third, notwithstanding firefighters' awareness of the CHD and SCD risks linked to firefighting, a perceived overall need to improve cardiovascular health and fitness held little importance among younger participants. Fourth, while some participants felt that enlisting newer fit members into a fire department might influence improved fitness trends within the workplace, others considered fire service managers "perceived level of support" (Staley et al., 2011, p. 612) for fitness as the impetus for firefighters' adherence or non-adherence to health-related worksite physical fitness. Finally, Staley et al. found personal motivation (intra-personal), being a reliable team member (interpersonal), and worksite participation strategies (organizational), were the main factors that influenced participants' adherence to fitness interventions intended to reduce CHD and SCD

risks within the fire department setting. Overall, Staley et al.'s findings provided an important implication that, despite participants' acknowledging firefighting's physical demands, several participants' reported firefighters culturally related barriers hindered individuals' workplace physical fitness activities.

Jahnke et al. (2014) examined fire service leaders' perceived roles in improving firefighters' health and fitness. In addition, Jahnke et al.'s research study contributed toward discovering useful motivators of change among participants working within the fire service. Janke et al. utilized purposeful sampling to recruit ($N = 423$) full-time, volunteer, and combination firefighters from 34 fire departments within the United States. The sampled population included both line and administrator-level participants with an average of 15 years of fire service experience.

Jahnke et al. (2014) utilized a qualitative approach towards eliciting fire service personnel's' beliefs and perceptions about psychological and physical health issues. First, interviewees participated in focus groups that the researchers arranged into front-line and leadership cohorts, respectively. Then, after sorting all participants collected interview data by geographic region and fire service hierarchical rank, researchers utilized the qualitative data analysis application *NVivo* to begin data analysis. Following numerous iterations of reviewing the transcript data, a single researcher identified several emergent themes. Lastly, a peer review process among all three researchers addressed divergence in the collected data set.

Fire service leaders' importance in establishing the tone and expectations of promoting health within the fire service domain emerged as the first theme from interviewees' data (Jahnke et al., 2014). Collectively, participants indicated administrators' wellness expectations, setting the example, and enlisting peer fitness trainers, positively influenced the culture of health present

within several fire departments. Moreover, participants mentioned mid-level supervisors responsible for scheduling daily tasks and engaging in fitness or training with personnel enhanced the cohesiveness of fire service crews.

Participants mentioned resource allocation particularized administrators' importance of fitness (Jahnke et al., 2014). The allocation of budgetary resources towards fitness equipment and physical examinations signaled administrators' priority concerning department members' health. Furthermore, according to participants, establishing organizational policies regarding health symbolized administrators' orientation towards promoting health and fitness (Jahnke et al., 2014). A final theme to emerge focused on leaders' promotion of wellness by emphasizing a shared responsibility for health. Participants in Jahnke et al.'s study also shared that the use of camaraderie and competition to encourage healthy practices between line-level members and administrators served as a motivator, respectively. Jahnke et al.'s research indicated that, although organizational factors promoted a healthy culture, organizational leaders' perceived role modeling of desired fitness behaviors, setting daily fitness priorities, and motivating personnel served as key health promoters in the fire service domain.

Poplin et al.'s (2014) longitudinal study assessed the relationship between fitness status and injury risk among career firefighters employed over five years in a southwestern United States fire department. Annual medical exams and injury surveillance reports containing participants' anthropometric measures, aerobic capacity, muscular endurance, muscular strength, and flexibility were collected for quantitative analysis. Even though cardiac-related emergencies are common among individuals within the firefighting population, Poplin et al. did not collect data relevant to reported medical issues or cardiac events among the research population. After merging the collected data for comparison between individuals injured and without injury, Poplin

et al. designed time-to-event regression models to assess participants' aerobic fitness and injury relationships.

Poplin et al. (2014) found that improving one's aerobic capacity reduced an individual's injury risk by 14%. In fact, Poplin et al. found that individuals with lower or decreasing aerobic fitness levels also had increased incidences of injury compared to individuals with high aerobic fitness levels. Most important of all, Poplin et al. determined that age and aerobic fitness contributed to individuals' injury outcomes. More specifically, study data involving participants younger than age 30 with decreased aerobic fitness levels exhibited higher injury rates than individuals aged 30 years or older (Poplin et al., 2014). In either case, while arduous fire ground tasks increase the likelihood of firefighter injuries, Poplin et al. concluded that enhanced aerobic fitness levels might reduce injury risks among individuals in the firefighting population.

Nogueria et al. (2016) examined the link between cardiorespiratory fitness (CRF) and body composition (BC) within a cohort of 50-years old or younger Brazilian military (n = 4,237) firefighters. Nogueira et al. used an experimental cross-sectional method to collect physical evaluation results, which included body composition measurements (e.g., body mass index, waistline circumference, Guedes' body fat percentage measurements, and body adiposity index), Cooper cardiorespiratory fitness test scores, and anthropometric data to examine the cardiovascular health-related effects of a mandated physical fitness training program. In addition, since a quantitative approach was employed, Nogueria et al. performed correlation analyses, odds ratios, general linear modeling (age), and chi-square tests to assess participants' CRF and BC variables.

From the collected data, Nogueria et al. (2016) found that, according to the World Health Organization's BMI indices, 54.3% of study participants were classified as overweight,

whereas 14.7% were classified as obese. Another important finding from Nogueria et al.'s study indicated the median CRF (VO_2max) of participants was 42.4 mL/kg/min; however, further analyses showed participants' VO_2max negatively correlated to age ($r_s = -0.21$, $p < 0.001$), waist circumference ($r_s = -0.50$, $p < 0.001$), body mass index ($r_s = -0.45$, $p < 0.001$), and body adiposity index ($r_s = -0.35$, $p < 0.001$). Nogueria et al.'s findings showed increased BC levels were associated with decreases in participants' CRF. Nogueira et al.'s findings provided further support for developing health-related training programs designed to improve the CRF and obesity profiles of individuals working within the firefighting population.

Harrington (2018) explored barriers to career fire departments' implementation of workplace wellness programs. Harrington examined implementation barriers and any associated difficulties implementing workplace wellness programs using in-person and telephone interviews. In addition, Harrington examined what barriers had prevented or remained present in implementing workplace wellness programs. After petitioning 100 United States fire departments through email and telephone calls, Harrington recruited a nationwide convenience sample of 18 male fire service leaders from eight geographically diverse fire departments.

Harrington (2018) utilized qualitative research methods to conduct one-on-one, in-person and telephone interviews using a semi-structured interview protocol with 18 participants. Using one-on-one interviews, instead of focus groups, minimized participants' apprehension about speaking freely around peers serving within the same organization (Harrington, 2018). In addition, Harrington piloted-tested the study's interview guide with three volunteers not included in the sampled population before beginning any interviews. As a result, two of the interview questions required adjustment before conducting any interviews within the sampled population (Harrington, 2018). Harrington, after 18 interviews, achieved data saturation and, following

participants' confirmation of each transcript's validity, concluded the study's interview phase. Harrington utilized the Quirkos qualitative data analysis application to analyze all amassed interview data. Finally, after several coding and thematic analysis iterations, four themes emerged: buy-in, financial matters, leadership support, and labor management.

Harrington (2018) indicated that leaders experienced various barriers to implementing workplace wellness programs across all eight departments. One of the first thematic barriers to emerge from Harrington's data analysis centered on programmatic buy-in among those working within the firefighting domain. Interviewees described positive and negative aspects of the buy-in theme centered on accepting or engaging in workplace wellness programs. Concerning the positive aspects, interviewees explained that a cultural shift related to wellness and fitness occurred despite any formally established wellness programs. Another positive element of buy-in interviewees shared focused on involving individuals from every level within an organization was central to developing workplace wellness programs. In contrast, interviewees shared that the negative aspects of buy-in concerning the implementation of workplace wellness programs were hindered by confidentiality concerns regarding individuals' "fitness for duty," (p. 44) fear of termination from employment, and lack of interest among those serving within the fire service domain (Harrington, 2018).

Interviewees indicated the theme of financial matters focused on appropriate funding barring and potential savings gained from implementing workplace wellness programs in the fire service domain (Harrington, 2018). For example, several fire service leaders explained that a central barrier to implementing wellness programs involved obtaining the funding to purchase and maintain fitness equipment. Moreover, another barrier centered on inadequate funding to financially incentivize participants' involvement in workplace wellness programs. Conversely,

some interviewees mentioned that implementing workplace wellness programs produced notable cost savings, which could decrease many departments' needs for supplemental funding over time.

Interviewees in Harrington's (2018) study illustrated that the leadership support theme's elements were essential for implementing wellness programs within the fire service domain. Interviewees conveyed inadequate levels of administrative support, and chief officers' performances of "leading by example" (p. 46) were reportedly barriers and promoters of wellness programs in fire department contexts, respectively. More concretely, several fire service leaders reported that a lack of senior administrative level support prohibited the implementation of workplace wellness programs. Contrastingly, interviewees indicated that positive support from senior-level administrators helped promote the benefits of a wellness culture among participants, including internal and external stakeholders. Comparable to leadership support, interviewees in Harrington's study explained that senior-level organizational leaders setting an example among subordinate members by participating in fitness activities helped promote the importance of workplace wellness programs.

The labor management theme that emerged from Harrington's (2018) analysis of interviewee data illuminated fire department leaders' positive and negative aspects of promoting workplace wellness programs within the fire service domain. Interviewees explained that positive aspects of the labor management theme in unionized fire department environments involved organizational and union leaders working together to promote workplace wellness programs collectively. Conversely, according to several interviewees, the negative aspects of including union leaders in developing and implementing workplace wellness programs served as impediments, due to confidentiality concerns or possible job loss among union membership members. Through thematic analysis, Harrington concluded that the barriers to implementing

workplace wellness programs were inadequate buy-in of organizational leaders, lack of funding, and overcoming cultural aspects of collective bargaining within unionized fire department contexts. However, utilizing cultural policies, financial incentives to motivate individuals, leaders' active participation in fitness activities, and uniting union and fire department leaders' support of health-related initiatives can positively promote workplace wellness programs within the fire service domain (Harrington, 2018).

Wooding et al.'s (2018) study explored the contextual factors affecting West Virginia firefighters' health and wellness. Using purposive and snowball sampling, Wooding et al. recruited career and volunteer (n = 58) firefighters from eight separate fire departments in West Virginia. In addition, Wooding et al. used qualitative research methods involving eight focus groups, workplace observations, and research participants' insight, through a Photovoice data-collection method. Upon completing the study, the eight focus groups' interview data and participants' Photovoice data were transcribed and inductively analyzed, respectively. From the analysis, Wooding et al. found the central factors affecting participants' health involved stress, nutrition, physical activity, sleep, motivation, and time. Equally important, in response to researchers' questions, participants discussed individual factors and potential solutions to firefighter health issues.

Further analysis of participants' individual factors data identified three distinct thematic relationships that influenced firefighters' health (Wooding et al., 2018). First, participants expressed that time constraints influenced lifestyle choices, such as consuming unhealthy meals and less exercise. Furthermore, issues related to time constraints centered on achieving work-life balance combined with vocational stress. Second, the confounding effects of stress and time constraints reportedly perpetuated a cycle of exhaustion that influenced participants' diets,

motivation, and sleep patterns. Finally, the third theme highlighted how participants' disrupted sleep patterns produced further issues of stress, nutrition, irritability, and exhaustion. Wooding et al. discovered various individual factors frequently impacted firefighters' health-related behaviors; however, to address individual health barriers affecting firefighters, participants discussed interventions involving monetary incentives, stress, nutrition education, and physical fitness standards. Still, a divergent discourse among participants regarding mandatory fitness standards negatively affecting fire department staffing exposed an underlying cultural barrier present among career and volunteer fire departments. Therefore, an implication of the themes that emerged from Wooding et al.'s study reinforced a need for further research centered on changes to firefighters' health-related behaviors at the individual and organizational levels.

Melton et al. (2019) assessed rural firefighters' perceived ideas about physical and psychosocial barriers to health and wellness programming. The non-probability, purposefully sampled population included all hierarchal ranks within the fire service, from recruit to senior administrators recruited through the investigators prior research affiliation with the department. More accurately, Melton et al. completed a study one year earlier that focused on promoting health and wellness through programmatic changes, such as functional movement protocols, job-specific exercise movement education, and circuit training focused on improving strength and cardiovascular fitness. Following the investigators' recruitment initiatives, 40 firefighters, 91% (n = 37) male and 9% (n = 3) females, agreed to participate in Melton et al.'s qualitative phenomenological study.

Utilizing a semi-structured interview guide, investigators explored research participants' "work challenges, barriers to health, ideal wellness programming, and personal short- and long-term health goals" (Melton et al., 2019, p. e267). Administrators from the selected fire

department vetted the interview guide for clarity and accuracy before investigators' conducted interviews with study participants. Moreover, investigators held the interviews in a private setting based on participants' availability. In addition, one investigator moderated the tape-recorded interviews during the interview period, while another investigator took notes to ensure the accuracy of participants' transcripts before data analysis (Melton et al., 2019). Finally, investigators employed a constant comparative analysis and open coding approach to independently analyze participants' interview transcripts. After coding the participants' transcripts, investigators verified the developed categories from the original data sets for accuracy.

In response to the interview questions regarding perceived challenges associated with the physical aspects of firefighting, participants indicated themes centered on "cardiovascular demands, occupation-specific tasks, and environmental conditions" (Melton et al., 2019, p. e267). In contrast, participants' reported themes focused on "repeated trauma exposure, interpersonal dynamics, and controlled task-focused thinking regarding the mental aspects of being a firefighter" (p. e267). Furthermore, when analyzing data focused on participants' reported impediments to health acquisition, three themes emerged: nutrition, time management, and uncertainty regarding health pursuits. Consequently, several participants commented that the ideal wellness program within a fire department context includes "fitness and nutrition focus, occupational specific exercise, and social-emotional support" (p. e267). Fittingly, participants indicated that, regarding short- and long-term goals, nutritional planning, exercise routines, cardiovascular health improvements, and longevity of physical health for oneself and one's family, respectively. In sum, Melton et al.'s findings highlighted themes focused on including fitness and mental health professionals in developing and implementing workplace health and

wellness interventions to address firefighters' cardiovascular health, psychosocial challenges, occupation-specific exercises, and overcoming nutritional difficulties prevalent among those serving in the fire service.

Cardiorespiratory Fitness Levels Linked to Individuals Performing Firefighting Tasks

Previous research regarding aerobic activity's health-related benefits resulting from fitness programs within a fire department context determined firefighters' cardiorespiratory fitness levels could affect job-related performance (Adams et al., 1986; Barnard & Anthony, 1980; Lemon and Hermiston, 1977). Lemon and Herminston (1977) conducted one of the first experimental studies to assess the pre- and post-human energy costs associated with completing firefighting tasks. In particular, Lemon and Herminston examined aerobic, anaerobic, kilocalorie equivalents, respiratory exchange, and heart rate variables among a population of professional firefighters performing four specific firefighting tasks. The study population was split into four distinct test groups composed of five subjects through random selection.

Prior to commencing the simulated firefighting work tasks, participants' baseline pre-test heart rate, aerobic oxygen consumption, caloric cost, anthropometric, functional strength, and respiratory exchange (RE) measurements were collected. Upon completing the simulated firefighting testing situations, the collection of participants' heart rate, aerobic oxygen consumption, caloric cost, anaerobic, and RE measurements were repeated (Lemon & Hermiston, 1977). To establish the relationship between participants' physical capacities, physiological changes, and energy costs of completing firefighting tasks, an ANOVA and paired *t*-test were used for data analyses. Lemon and Hermiston found significant differences in participants' pre- and post-test total mean oxygen and caloric costs for each of the four simulated firefighting work tasks. Similarly, there was a significant difference in participants' pre- and post-

testing aerobic capacities, especially involving increased oxygen consumption (VO_2) needs among individuals performing the aerial ladder climb portion of the testing. Finally, Lemon and Hermiston determined no significant differences existed between the arm and lower leg strength, BMI, or aerobic and anaerobic contributions to total oxygen costs ($p < 0.10 > 0.05$) based on participants' physical capacities and firefighting work task measurements. Thus, an important finding of Lemon and Hermiston's study centered explicitly on the maximum aerobic capacity (40 mL/kg/min) firefighters need to meet firefighting's energy costs or other arduous job-relevant fireground tasks.

Recently, Nazari et al.'s (2018) study examined firefighters' physiological, anthropometric, aerobic, and muscle strength ($n = 49$) relative to predicting simulated but functional firefighting tasks. Before undertaking the study, participants completed a self-reported physical activity questionnaire and health screening protocol comprised of resting heart rate, height, and body weight measurements. To better understand the physiological demands and physical fitness needed to complete firefighting tasks, participants in Nazari et al.'s experimental quantitative study were outfitted with electronic technology (Zephyr BioHarness), which measured participants' heart rates and respiratory rates during testing. After the Zephyr BioHarness was fitted, participants completed the Modified Canadian Aerobic Fitness Test (mCAFT), which provided individuals estimated maximal oxygen consumption, along with upper and lower body strength testing using a J-Tech dynamometer and National Institute for Occupational Safety and Health protocol (measured static weight lifting), respectively. Finally, participants rated perceived physical exertion of the simulated fire ground tasks using a 0-10 Borg scale where "0 was like nothing at all" and "10 was the most difficulty" (p. 2).

Nazari et al. (2018) used descriptive (means, standard deviations, and max/min scores) statistical analyses to present participants' anthropometric, fitness, and physiological outcomes involving the simulated firefighting tasks. In addition, Nazari et al. analyzed the correlation between participants' timed physical fitness and functional simulated firefighting task results using Pearson's correlation coefficients. Finally, to analyze and model all predictive data relative to the completion times of participants simulated firefighting tasks, Nazari et al. employed multivariate regression analyses. Overall comparison of the collected data revealed a relationship between participants' fitness and completion of the simulated firefighting tasks. Specifically, higher oxygen consumption ($r = -0.30$ hose task and $r = -0.31$ stair climb) and hand strength ($r = -0.25$ hose task) levels were linked to faster and better firefighting task performance among study participants (Nazari et al., 2018). In this study, age and right grip strength ($p < 0.05$) were statistically significant in the hose drag regression analysis model. Another important finding was that age and National Institute for Occupational Safety and Health score ($p < 0.05$) were statistically significant for the stair climb regression analysis model. An implication of Nazari et al.'s findings is that aerobic and strength training exercises may improve fire service members' performance of fire ground tasks.

Bycura et al. (2019) analyzed the effectiveness of a goal setting and implementation planning intervention expected to improve the cardiorespiratory fitness of participants performing job-specific firefighting tasks. Following quantitative experimental methods, Bycura et al.'s initial all-male fire department cohort ($n = 20$) were randomly divided into two groups of subjects. The first sample of subjects ($n = 12$) was placed into the goal setting and implementation intervention, and the second group served as controls for a 14-week experimental study. Subjects were instructed to prepare individual plans meeting the American

College of Sports Medicine's guidelines for improving one's cardiovascular fitness using the goal setting and implementation planning intervention. Specifically, goal setting and implementation planning intervention study participants committed to partaking in a self-selected type of moderate-vigorous physical activity for at least 20-60 minutes three times a week. Additionally, in order to assist with identifying physical activity barriers, subjects completed the *Godin Leisure Time Exercise Questionnaire* at weeks 1, 6, and 14. To measure the goal setting and planning intervention on subjects' cardiorespiratory demands, the researchers collected physiological data comprised of individuals' somatic aerobic oxygen consumption (VO_2), heart rate, and respiratory exchange rates (Bycura et al., 2019). Furthermore, to measure the oxygen demands of completing firefighting tasks relative to subjects' physiological variables, as well as heart rate, Bycura et al. used a Cosmed K4b portable pulmonary gas exchange system, including a Polar heart rate monitor synched to the Cosmed K4b unit for continuous data collection.

After obtaining all subjects' written consent and medical clearance, the researchers used a modified version of the International Association of Fire Fighter's Candidate Physical Ability Test at weeks 1, 6, and 14 to collect participants' physiologic data utilizing the Cosmed K4b gas analyzer and Polar heart rate monitor. The subjects in the intervention and control groups completed the *Godin Leisure Time Exercise Questionnaire* three times during the 14-week study, which provided researchers with measurable moderate-vigorous physical activity data. To assess subjects' VO_2 and respiratory exchange variables, Bycura et al. (2019) used Shapiro-Wilk tests. Additionally, to examine subjects' physiological changes (VO_2, heart rate, and respiratory rates) stemming from the goal setting and implementation planning intervention, Bycura et al. relied on hierarchal linear modeling. Bycura et al. found statistically significant improvements ($p < 0.01$) in all subjects' physiological variables, except heart rate. However, further analysis showed that,

compared with goal setting and implementation planning, intervention subjects, the control subjects', cardiovascular health outcomes were not significantly different. Regardless, Bycura et al.'s study supported following the American College of Sports Medicine's moderate-vigorous physical activity guidelines to improve firefighters' cardiorespiratory fitness.

Firefighter Fitness Linked to Fire Department Physical and Aerobic Exercise Programs

Evidence in the health-related literature outlined above identified some chief structural and personal factors that support or deter physical activity and cardiorespiratory fitness training connected to firefighters' job-related performance. Still, extant literature offered other relevant understandings about the health-related benefits associated with physical training and aerobic exercise in and outside of fire service contexts (Gendron et al., 2020; Perroni et al., 2014; Poston et al., 2013; Storer et al., 2014; U.S. Department of Health and Human Services, 2018). For example, Barnard and Anthony (1980) examined the effects of mandated physical fitness training that involved stretching, cardiovascular exercises, and muscle conditioning exercises among fire department personnel. Barnard and Anthony's experimental study used randomly selected medical evaluations of firefighters (n = 300) and police officers' (n = 258) for comparison using a matched pairs t-test to evaluate a mandated physical fitness program's effectiveness. In addition, before commencing the study, Barnard and Anthony separated the firefighting study participants into specific age classifications, such as < 40 years old, 40 to 49 years old, and ≥ 50 years old.

Participants' historical fitness scores and documented blood pressure, cholesterol, and body weight data were analyzed for observed changes within the specified groups to determine the mandated physical fitness program's effects. Upon completing the study, between 1971 and 1978, the firefighting participants' fitness scores improved, average heart rates decreased, and diastolic blood pressure reductions occurred in all three firefighter age groups (Barnard &

Anthony, 1980). Further analysis showed that even though the mandated physical fitness program did not affect firefighting participants' systolic blood pressure or body weight, researchers noted significant reductions in individuals' serum cholesterol levels (Barnard & Anthony, 1980). Thus, a strong distinction that the implemented fitness program improved firefighters' fitness levels was drawn, because no significant differences were noted in the sampled police officers' blood pressure and cholesterol levels. Above all, Barnard and Anthony's study had implications for developing physical fitness programs to reduce modifiable cardiovascular risks among individuals in the firefighting population.

Storer et al. (2014) conducted an experimental study to examine if participants' working in a fire department with no formalized exercise program had similar cardiovascular risk factors and fitness levels of individuals (age and gender-matched) in the American population. Even though the chosen fire department lacked a formalized exercise program, all firefighting personnel were permitted to participate in one and a half hours of on-duty exercise. Storer et al., using an experimental design, quantified participants' (n = 48) aerobic performance, body composition (weight, height, limb girths, and skinfold measurements), muscle strength, lung spirometry, and cardiovascular risk factors (cholesterol, lipids, age, heart rate, blood pressure, and physical activity) data. After data collection, Storer et al. used descriptive means and standard deviations to compare participants' results against age and gender-matched healthy individuals in the American population. Moreover, gathered participant data from this study was contrasted with "weighted means from published fire-fighter fitness profiles" (p. 663).

The results obtained from Storer et al.'s (2014) analyses showed that, in contrast to healthy individuals in the American population, only 36% of study participants performed 30 minutes of aerobic exercise three times per week. Equally important, only 50% of study

participants met the recommended two or greater days per week of resistance training. Furthermore, based on the mean scores for body composition, 72% of participants were classified as overweight, 30% had low aerobic capacities, and 9% had hypertensive systolic and diastolic blood pressure readings > 140/90. Comparatively, Storer et al.'s study identified that 46% of participants had normotensive blood pressures (systolic and diastolic readings ≤120/80), and 50% were classified as pre-hypertensive (systolic 120-139 and diastolic 80-89). More interestingly, participants' muscular endurance (push-ups) and flexibility scores were higher compared to individuals characterized in previous firefighter reports, including the American population. Despite participants' higher musculoskeletal fitness scores, the prevalence of cardiovascular risk factors, such as physical inactivity, adiposity, and blood pressure aberrations in Storer et al.'s study supported further research focused on improving fire service health and fitness programs is needed.

Cornell et al. (2017) examined the health-related outcomes of male firefighters (n = 27) from recruit candidacy to actively working fire department employees. The utilization of a longitudinal observation method offered Cornell et al. an effective way to quantify body composition, body mass, BMI, waist and hip circumferences, skinfold assessments, aerobic capacity, heart rate, muscular power and strength, handgrip strength, and muscular endurance measurements among participants at three different time points (Week 1, Week 14, and Week 38). Cornell et al. used descriptive statistics to calculate the variables mentioned above during participants' pre-academy training (week 1), probationary period (week 14), and full-time assignment (week 38) time points. Changes in participants' body composition, aerobic capacity, muscular power and strength, and muscular endurance were compared using multivariate analysis of variance and repeated-measures ANOVA tests.

Cornell et al. (2017) found following fitness programming comprised of aerobic exercise and resistance activity 2 to 3 times a week, as well as functional job-relevant training 1 to 2 hours a day, participants levels of physical and cardiovascular fitness improved between weeks 1 and 14 of individuals attending the preparatory recruit firefighting academy. In particular, significant longitudinal changes in participants' body composition ($F_{2,52} = 13.229$, $p < .001$, $\eta^2_p = 0.337$), estimated absolute aerobic fitness ($F_{2,52} = 35.461$, $p < .001$, $\eta^2_p = 0.577$), heart rate ($F_{2,52} = 124.570$, $p < .001$, $\eta^2_p = 0.827$), bench press strength ($F_{2,50} = 17.868$, $p < .001$, $\eta^2_p = 0.417$), squat strength ($F_{2,40.1} = 144.212$, $p < .001$, $\eta^2_p = 0.852$), push-up endurance ($F_{2,52} = 27.005$, $p < .001$, $\eta^2_p = 0.509$), and plank endurance ($F_{2,52} = 22.423$, $p < .001$, $\eta^2_p = 0.463$) occurred during week 1 and week 14 of the recruit training academy.

However, after graduating and reporting to a regular worksite, while independently maintaining required fitness standards, Cornell et al.'s (2017) study participants, between weeks 16 and 38 of fire station placement, exhibited increased body composition and heart rate measurements. Also, participants' aerobic capacities, muscular power, muscular strength (handgrip and bench press), and muscular endurance (push-ups and plank) decreased significantly between weeks 14 and 38. To sum up, a combination of Cornell et al.'s findings matched those in many studies mentioned earlier, implying that fire service members' positive exercise adaptions cannot be effectively maintained without physical fitness training programs within fire departments.

Gendron et al. (2020) compared the physical activity and cardiovascular health risk indicators of firefighters that performed, or did not perform, moderate-vigorous physical activity in a fire department context weekly. Gendron et al.'s cross-sectional quantitative research design aided in collecting measurable cardiovascular health risks (heart rate, blood pressure, physical

activity, body weight, waist circumference [WC], BMI, diabetes history, smoking status, nutrition, as well as total and high-density cholesterol), demographical (age and gender), and job-related (rank, physiological stress, and overtime information) data from participants (n = 105) using an online survey questionnaire. The online questionnaire design compared the abovementioned variables with participants who performed, or did not perform, moderate-vigorous physical activity weekly. Quantitative data for Gendron et al.'s study was collected, and comparisons between groups were completed using chi-square tests. Following the group comparison testing, Gendron et al. used independent t-tests of participants' age, length of service, rank, outside employment hours more than one hour, and overtime exceeding at least one hour in a fire department context. Moreover, to compare the continuous variables outlined above in a two-model format, an analysis of covariance test was used.

The results of Gendron et al.'s (2020) study identified that over half of all participants had outside employment or worked at least one hour of overtime in the fire department. Further analysis determined that a significant difference ($p < 0.001$) in physical activity between individuals that exercised compared to inactive participants (27%) existed. However, the most striking findings centered on the fact that participants (78%) active in physical activity compared to ($p < 0.001$) physically inactive participants (27%) had limited access to aerobic or resistance training equipment and consumed ($p = 0.002$, $d = 0.56$) more servings of nutritious foods daily. Finally, a comparison of cardiovascular health indicators found no significant differences in WC, BMI, smoking, blood lipids, psychological stress, or hypertension between the exercising or non-exercising groups. Comparing the findings from Gendron et al.'s study indicated that reducing health promotion barriers, such as a lack of exercising equipment and encouraging workplace physical activity, has important implications for improving firefighter's cardiovascular health.

Transformational Leadership Theory

There has been continued interest in transformational leaders' influence on individual followers' performance for nearly the last fifty years. Although Downton (1973) first introduced the elemental components of transformational leadership, contemporary theorists are responsible for extending Downton's initial work on leadership. Relevant leadership literature showed Burns (1978) is credited with the earliest research that compared transformational and transactional leadership's component elements in various political strata. Even though Burns viewed the leader-follower interaction as consisting of two distinct modes, nearly a decade later, Bass' (1985) research extended Burn's (1978) original conceptualizations of the transforming leadership theory.

Bass' (1985) transformational and transactional leadership theory expounded upon Burn's (1978) transforming leadership theory by specifically detailing the transformational leadership theory's components as charisma, inspirational leadership, individualized consideration, and intellectual stimulation. Even though Bass' (1985) transformational and transactional leadership model permitted theorists to assess and measure individuals' leadership behaviors, the transformational leadership theory's concepts underwent further refinement in the 1990s. Originally, Bass' (1985) initial transformational leadership framework included the charismatic/inspiration, individual consideration, and intellectual stimulation factors. However, Bass and Avolio's (1994) refinements of Bass' (1985) original leadership theory extended the charismatic/inspiration factors into two separate components (Bass & Riggio, 2006), which was crucial to conceiving the four behaviors of transformational leaders used to influence followers' improved performance. In brief, Bass and Avolio's (1994) idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration factors, or Four I's,

represented the behaviors transformational leaders utilize to influence progressive changes in followers' performance outcomes. In 2006 leadership theorists Bass and Riggio presented researchers updated insight toward applying transformational leadership theory to increase work groups' and organizations' productivity and performance. More concretely, Bass and Riggio's research provided updated refinements to "the conceptualization and measurement of transformational leadership" (p. 5). Therefore, drawing on Bass and Riggio's (2006) updated research, "the elements of a transformational leader" (p. 228) are conceptualized as idealized influence-attributional, idealized influence-behavior, inspirational motivation, intellectual stimulation, and individualized consideration.

The Four I's of Transformational Leadership

Even though previous research indicated that Bass and Avolio's (1994) Four I's could serve as a theoretical lens to examine leaders' transformational behaviors, Yukl (2013) noted that Bass and Avolio's transformational leadership paradigm had undergone further conceptual refinement within the past two decades. Specifically, Bass and Riggio (2006) explained the Four I's of transformational leadership were extended by splitting the idealized influence factor into attributed and behavioral components. Thus, an important implication drawn from reviewing recent research indicated Bass and Riggio's Four I's constituted the factors needed to examine leaders' behaviors linked to transformational leadership.

Idealized influence (II). Bass and Riggio (2006) described the II factor as a leader's behavior that entails being a role model for followers. The II factor involves individual leaders' attributional and behavioral aspects of transformational leadership. Northouse (2016) explained the attributional element of transformational leadership involving followers' perceived characterizations of a leader, whereas the behavioral element centers on followers' perceived

view of leaders' behaviors. More evidence indicated that transformational leadership theory's II factor in sports domains links a charismatic leader's role modeling to earning followers' respect and expectation of achieving specific missions or goals (Kao & Watson, 2017).

Inspirational motivation (IM). Bass and Riggio (2006) reported the transformational leadership theory's IM factor centered on leaders' behavior that inspired and motivated followers' work outcomes using a shared vision. According to Yukl (2013), the differences between transformational leadership theory's charisma and IM factors were extended by leadership theorists in 1997. In another study, transformational leadership theory's IM factor was linked with leaders' pivotal role in inspiring and motivating followers to reach once conceived unattainable goals (Kao & Watson, 2017).

Intellectual stimulation (IS). Bass and Riggio (2006) characterized the IS factor as a leaders' stimulation and support of followers' innovative and creative approaches to new or existing problems. Moreover, transformational leadership theory's IS factor signifies leaders' exhibited behavior towards supporting followers' attempts to develop novel approaches towards addressing organizational problems or issues (Northouse, 2016). Thus, transformational leaders' displaying IS (factor) behaviors encourage followers, when faced with difficulties, to challenge organizational and even leaders' beliefs or values (Bass & Riggio, 2006). Research involving sports coaches' transformational leadership theory's IS (factor) behavior was linked to leaders supporting followers reframing and solving recognized problems or issues through innovative approaches (Kao & Watson, 2017).

Individualized consideration (IC). Bass and Riggio (2006) defined the IC factor as leaders' mentorship or coaching of a follower. Therefore, transformational leaders exhibiting IC behaviors permit followers to experience new learning opportunities in non-threatening and

supportive environments (Bass & Riggio, 2006). Utilizing the IC factor, leaders serving in coaching capacities allow followers to experience personal growth by overcoming challenging difficulties (Northouse, 2016). According to Northhouse, the transformational leadership theory's IC factor involves leaders' recognition and consideration of followers' individual differences, which is "indicative of strong transformational leadership" (p. 190).

In this section, leadership literature relevant to the transformational leadership theory's four I's provided essential insights into transformational leaders' behavior. For instance, while the transformational leadership theory initially centered on three behaviors (Yukl, 2013), Bass and Avolio's (1990) inclusion of the IM factor uncovered transformational leaders' shared visioning and inspirational behaviors that influence followers' performance outcomes. However, a significant enhancement to the multifactor leadership questionnaire (MLQ) established the existence of attributional (charisma) and behavioral subfactors linked to transformational leadership theory's II behavior (Bass & Riggio, 2006). Thus, in the present study, the Four I's provided an acceptable theoretical framework for studying leaders' behaviors related to transforming followers' health-related changes in workplace aerobic exercise activity.

Transformational Leaders Behaviors Linked to Followers' Physical Activity

Rowold (2006) used the transformational and transactional leadership theories to study how coaches' specific leadership styles helped enhance athletes' satisfaction, motivation, and performance outcomes in the martial arts sport domain. Accordingly, using random sampling, Rowold amassed participant (n = 186) survey data from 20 different German martial arts sports clubs. To study the leadership phenomena, Rowold used the Multiple Leadership Questionnaire-5X (MLQ-5X), which allowed athletes to judge how often coaches displayed specific leadership behaviors, using a five-point scale "ranging from 1 (*strongly disagree*) to 5 (*strongly agree*)" (p.

317). Additionally, to measure the perceived effectiveness of coaches' behaviors, satisfaction with respective coaches, and extra effort outcomes, athletes rated coaches, using the MLQ-5X's standardized "3-item scales ranged from 1 (*very low*) to 5 (*very high*)" (p. 318). Finally, to measure athletes' training effort based on a monthly frequency, Rowold used a scale that ranged from "one (*up to two times a month*) to five (*more than eight times a month*)" (p. 318).

Rowold (2006), using quantitative confirmatory factor analyses, confirmed good fit and factorial validity of the MLQ-5X before conducting further analyses of collected data. Following confirmation of the nine-factor MLQ-5X's good fit and factorial validity, Rowold performed hierarchical regression analyses on participants' data, finding that transactional and non-leadership were unrelated to or negatively influenced athletes rated effectiveness of coaches behaviors, athletes satisfaction with respective coaches, athletes extra efforts, and monthly training frequencies. Conversely, the assessed transformational leadership scales, such as IM, Idealized Influence-Attributed, Idealized Influence-Behavior, and IC, indicated positive influences among participants, which permitted a valid prediction of transformational coaches' effectiveness. Overall, the implications of Rowold's study demonstrated that a leaders use of transformational leadership behaviors was likely to help influence followers' satisfaction, extra effort, and monthly training frequencies within different sport-related domains.

Morton et al.'s (2010) two-part study examined participants' perceptions of teachers' transformational leadership behaviors concerning physical education. The second part of Morton et al.’s study assessed how participants' cognitive, emotional, and behavioral outcomes related to educators displaying transformational leadership (TFL) teaching behaviors within a school-based context. Morton et al.'s qualitative research study, composed of Lower Mainland British Columbia, Canada secondary school students from 15 classes (N = 330 students), provided a

broad perspective concerning students' attitudes about physical education. Through purposeful sampling, in Study 1, Morton et al. assessed eight focus group participants' (N = 62) perceptions of the characteristics, behaviors, and methods among physical education teachers using transformational teaching strategies.

Morton et al.'s (2010) results, concerning the TFL theory's IM factor, determined research participants recounted instances whereby teachers exhibited leadership behaviors that encouraged (current behaviors = 14 citations) and inspired (preferred behaviors = 39 citations) students' physical activity. Furthermore, participants' descriptions of the behaviors involving physical education teachers serving as role models (current behaviors = 19 citations), as well as the preferred characteristics of physical education teachers (preferred behaviors = 103 citations), indicated the TFL Theory's II factor compared more frequently in contrast to teachers' other three transformational teaching behaviors. Moreover, regarding transformational teachers' demonstrated IC for students' well-being (current behaviors = 19 citations), participants' desired greater (preferred behavior = 88 citations) IC behaviors from teachers. Finally, the transformational leadership theory's IS factor, in terms of students' perceptions of current (current behaviors = 2 citations) and preferred (preferred behavior = 13 citations) teaching behaviors of physical education teachers, were cited less frequently (Morton et al., 2010).

Morton et al.'s (2010) qualitative two-part study involved selecting students from Study 1 to participate in Study 2 (N = 18), which used semi-structured interviews with questions that elicited data regarding participants' physical education experiences. Furthermore, Morton et al.'s research protocol in Study 2 allowed students to describe the specific behaviors and the impact of physical education teachers' teaching behaviors. Following a constant comparative data analysis method using open coding, Morton et al. developed categories from students' semi-

structured interview data. As a result, analysis of the data elicited from students in Study 2 indicated that participants discussed several cognitive, affective, and behavioral outcomes influenced by teachers' transformational teaching behaviors.

Students from Morton et al.'s (2010) Study 2 indicated that, concerning cognitive outcomes, participating coaches use of transformational leadership's four factors linked to teaching, such as IM, influenced positive attitudes and beliefs towards physical education and physical activity in students. In contrast, in the absence of teachers use of the transformational leadership theory's IS factor, students reported negative beliefs, or low importance, to physical education. Moreover, concerning teachers use of the transformational leadership theory's IM, IC, and II factors helped enhance students' motivation and increased participants' efforts vis-à-vis physical education. However, teachers not exhibiting behaviors linked to II, IC, or IS negatively impacted students' physical education outcomes.

Regarding the described affective outcomes of participants in Morton et al.'s (2010) study, students reported teachers' behaviors linked to each of the transformational leadership's II, IM, IS, and IC factors experienced greater enjoyment of physical education. Similarly, students recounted increased levels of satisfaction with physical education teachers, that demonstrated behaviors aligned with the transformational leadership theory's IM, II, and IC factors. Conversely, teachers demonstrating behaviors involving transformational leadership theory's IS factor had higher satisfaction ratings among students; however, teachers who failed to engage students' innovativeness or creativity regarding novel approaches to physical education using IS were not popular among participants (Morton et al., 2010).

Central to students' behavioral outcomes in Morton et al.'s (2010) study, increased in-class physical activity levels and skill development stemmed from teachers' behaviors attributed

to transformational leadership theory's II, IM, and IC factors. In contrast, teachers lacking transformational leadership theory's II behavior factor detracted from students' involvement with in-class physical activity. However, in an opposing view, teachers that affected students' leisure-time physical activity reportedly demonstrated behaviors linked to transformational leadership theory's IM and II factors. Thus, the implications drawn from Morton et al.'s findings demonstrated that teachers' behaviors aligned with transformational leadership theory's IM, II, IC, and IS factors could adequately influence students' in-class and leisure-time physical activities.

Price and Weiss (2013) replicated a study about peer leadership behaviors in relation to individual and team outcomes among soccer athletes using the transformational, transactional, and laissez-faire leadership theories. Price and Weiss's study sampled a population of female soccer players (n = 412) and female and male (n = 34) soccer coaches, respectively. The MLQ-5X's 5-point scale ranging from "0 (*not at all*) to 4 (*frequently, if not always*)" (Price & Weiss, 2013, p. 268) was used to assess the frequency leaders displayed leadership behaviors. Accordingly, participants completed the MLQ-5X two times, first to assess coaches' behaviors. After that, participants assessed peer team leaders' perceived leadership behaviors. Additionally, quantitative-focused research instruments were employed to evaluate athletes' soccer enjoyment, perceived soccer competence, intrinsic motivation, team cohesion, and collective efficacy (Price & Weiss, 2013). Price and Weiss found peer leaders' transformational leadership behaviors were positively related to athletes’ soccer enjoyment and intrinsic motivation. Furthermore, concerning team outcomes, athletes, with team leaders viewed as using more transformational leadership behaviors, reported better cohesiveness and cooperation among those within teams. In contrast, athletes who assessed peer leaders as displaying corrective behaviors, or exhibiting

infrequent decision-making, reported lowered team cohesion, which is generally needed to achieve goals (Price & Weiss, 2013).

Price and Weiss's (2013) further analysis of perceived participant data concerning the combined influence of peer and coach leadership on individual athletes and team outcomes revealed coaches who displayed frequent motivational and inspirational behaviors felt more confident and prepared to succeed in upcoming team performances (Price & Weiss, 2013). Moreover, perceived transformational peer leaders were associated with harmonious and unified teams (Price & Weiss, 2013). Overall, Price and Weiss's research model determined that transformational leadership was more influential than peer leadership for team efficacy and athlete outcomes (Price & Weiss, 2013). An implication obtained from Price and Weiss's examination of peer and coaches' leadership effectiveness revealed transformational leadership behaviors influenced positive psychosocial and behavioral outcomes in followers at the individual and collective team level.

Beauchamp et al. (2014) examined adolescent participants' physical activity behaviors linked to physical education teachers' transformational teaching methods in two different settings. A secondary purpose of Beauchamp et al.'s study examined the extent that transformational teaching, which comprises the transformational leadership theory's Four I's, mediated participants' physical activity behaviors in and outside of school settings. After constructing an observational design using quantitative research methods, Beauchamp et al. (Time 1) evaluated eighth, ninth, and tenth-grade British Columbia (Canada) students (n = 2,948) perceptions of the influence teachers' transformational teaching behaviors had on participants' physical activity. Two months later (Time 2), Beauchamp et al. repeated the study by assessing

students' (n = 2,948) affective attitudes regarding inside and outside of school-based physical education activity.

Beauchamp et al.'s (2014) nonexperimental design employed the Transformational Teaching Questionnaire (TTQ) to measure students' perceptions of teachers' transformational teaching (Four I's) using questions, such as "My physical education teacher…" rated on a five-point rating scale ranging from "0 (*not at all*) to 4 (*frequently*)" (p. 539). In addition, the adolescent participants' affective attitudes regarding physical education were assessed using the Intrinsic Motivation Inventory (IMI), which utilized a Likert-type scale ranging from "1 (*strongly disagree*) to 7 (*strongly agree*)" (Beauchamp et al., 2014, p. 540). Finally, researchers used the Physical Activity Questionnaire for Adolescents (PAQ-A) to assess participants' physical activity behaviors. The PAQ-A utilized a five-point scale to assess participants' in-class and leisure-time physical activity.

Beauchamp et al.'s (2014) quantitative path analyses of Time 1 and Time 2 data revealed significant effects on students' affective attitudes (b =0.409, p <0.001), which included in-class (b = 0.391, p <0.001) and leisure time (b = 0.391, p <0.001) physical activity as a result of teachers' transformational teaching. Furthermore, Beauchamp et al.'s findings revealed transformational teaching mediated students' affective attitudes, making the in-class and leisure-time physical activity enjoyable for participants. An important implication drawn from Beauchamp et al.'s findings indicated the effects of teachers' transformational teaching behaviors resulted in adolescent participants' enjoyment of health-related in-class and leisure-time physical activity.

Summary

Over the past decade, much of the health-related literature reported firefighters demonstrating low aerobic fitness levels were linked to cardiovascular-related events in individuals performing strenuous firefighting operations (Fernhall et al., 2012; Gendron et al., 2018a; Gendron et al., 2020; Sen et al., 2016). However, other research indicated increased amounts of physical activity improved the aerobic capacity among those in the firefighting population (Bycura et al., 2019; Durand et al., 2011; Eastlake et al., 2015; Nazari et al., 2018). Furthermore, a consensus among various researchers indicated that individual and organizational cultural factors present within the firefighting population negatively impacted fire service members' physical fitness activities (Cornell et al., 2017; Gendron et al., 2020; Staley et al., 2011; Wooding et al., 2018). Specifically, a review of extant literature revealed a lack of cultural support affected individuals' worksite physical fitness (Staley et al., 2011).

While much of the fire service-related health and wellness literature indicated various factors negatively impacted firefighters' physical fitness outcomes, very few studies described fire department leaders' influence on individuals' health-related aerobic and physical fitness activities. However, during the past two decades, relevant leadership literature indicated teachers' (leaders') transformational leadership behaviors influenced followers' school-based and leisure-time physical activities (Beauchamp et al., 2014; Morton et al., 2010). In fact, the evidence presented in previous research studies highlighted leaders' (coaches or teachers) transformational leadership behaviors influenced followers' (students or athletes) physical activity outcomes (Beauchamp et al., 2014; Morton et al., 2010; Price & Weiss, 2013; Rowold, 2006). Collectively, the studies presented highlighted the relevance of using transformational leadership theory's Four

I's to examine whether fire service leaders influence followers' performance of health-related workplace aerobic exercise.

Although quantitative cross-sectional and experimental research added to researchers' understanding of the perceived factors influencing firefighters' physical activities, a noticeable research gap concerning leaders' influence on followers' health-related exercise behaviors existed in extant literature. Therefore, understanding how fire service leaders influence followers' aerobic exercise activity in fire department contexts involves further research using a qualitative case study method. In summation, the next section of this study outlines how a qualitative case study method framed around transformational leadership's Four I's can be used to elicit an understanding of a leaders' role in influencing changes in fire service followers' workplace aerobic exercise activities.

III. METHODOLOGY

The purpose of this qualitative study was to explore fire service leaders' perceived leadership behaviors that aided in followers' performances of workplace aerobic exercise activities (Creswell & Poth, 2018). Inadequate aerobic fitness levels have been shown to increase cardiovascular disease-related risks among those performing fire suppression activities in the firefighting domain (Gendron et al., 2018a; Gendron et al., 2020). In this study, fire service leaders with at least one year of leadership experience working within contemporary public-sector fire departments throughout Florida between June and July 2021 participated in web-based interviews. The participating interviewees answered nine questions from a semi-structured interview guide framed around the 4 I's of Bass and Riggio's (2006) transformational leadership theory. Bass and Riggio's transformational leadership theory provided a theoretical lens to study fire service leaders' perceived leadership behaviors that influenced followers' performances of workplace aerobic exercise activities. The term *aerobic exercise activities* utilized throughout this study refers to sustained periods of physical movements, such as walking or running, intended to increase an individual's heart rate and breathing, which makes "the cardiorespiratory system stronger and more fit" (U.S. Department of Health and Human Services, 2018, p.57). This study was completed using an instrumental case study approach that included web-based interviews, and within-case and cross-case analyses of sampled populations qualitative data elicited during interviews regarding the studied phenomenon.

Description of Research Design

Qualitative research methodologies offer researchers an effective way to gather written and observed data regarding individuals' experiences or explanations of phenomena in distinct contexts. For instance, Creswell and Poth (2018) defined the qualitative exploration of a phenomenon involving specific individuals' lives as the narrative research method. Research that comprises understanding individuals' lived experiences regarding a specific phenomenon is described as the phenomenological research method (Creswell & Poth, 2018). Similar to narrative research, the grounded theory research method entails researchers developing a theory grounded in multiple participants' descriptive data (Creswell & Poth, 2018). An ethnographic study method involves researchers' interpretation of research participants' shared cultural-related qualitative research data (Creswell & Poth, 2018). Finally, the case study method involves single case or multiple cases, bounded by time and contexts that provide researchers' insights into a phenomenon of interest using interviews, observations, and archival records (Creswell & Poth, 2018). Therefore, the instrumental case study method was the most appropriate qualitative approach to understand fire service leaders' leadership phenomenon influencing followers' aerobic exercise activities within Florida fire departments.

Instrumental Case Study

Since this study examined fire service leaders' leadership behaviors that influenced followers' workplace aerobic exercise activities in a system bounded by time and place, an instrumental case study was selected. According to Stake (1995), the qualitative research method used to understand events or issues involving individual and collective cases within bounded systems comprised an instrumental case study. Creswell and Poth (2018) described qualitative researchers' study of purposefully selected informants' differing perspectives concerning

particular events or issues as a collective or multiple case study. Therefore, an interpretive approach was utilized to assess fire service leaders' behaviors influencing followers' workplace aerobic exercise outcomes elicited from multiple case studies within a bounded system in this instrumental case study. Augmenting the interpretive approach of this instrumental case study was Bass and Riggio's (2006) Transformational Leadership Theory's four factors, which provided an inductive insight into the perceived leadership behaviors obtained from multiple cases assisting in this study.

Participants

Participants for this instrumental case study were drawn from a population of fire service leaders with at least one year of leadership experience. Each of the participants worked full-time within a fire department context, and there were no age or fire officer rank limitations. The Bureau of Fire Standards and Training/Florida State Fire College's A-List and Florida Fire Chiefs' Association listserv administrators were emailed to garner approval regarding the notification of eligible fire service officers about this instrumental case study. Following the listserv administrators' approval, a follow-up email with the study's recruitment script (Appendix B) and flyer (Appendix C) was distributed among the Bureau of Fire Standards and Training/Florida State Fire College A-List's and Florida Fire Chiefs Association's subscribers to recruit participants. Regarding the recruiting of interviewees, a maximum variation sampling strategy was used to recruit multiple case studies capable of informing researchers about the explored leadership phenomenon (Creswell & Poth, 2018). Creswell and Poth maintained maximum variation sampling strategies provide researchers with diverse perspectives from multiple case studies based on specific criteria in a qualitative case study. Fittingly, the

subsequent employment of a maximum variation sampling strategy permitted interviewing 10 eligible cases from the bounded systems research population.

Study Setting and the Researchers Role

The study was conducted between June and July 2021 among fire service leaders working in fire departments throughout Florida. Predominantly, this bounded research site was selected based on the availability of fire service leaders (cases) within the sampled population, such as fire chiefs, assistant chiefs, deputy fire chiefs, division chiefs, district chiefs, battalion chiefs, captains, and lieutenants. Although the designated research site met an instrumental case study's bounded time and context prerequisites, one crucial point to highlight involved the investigator’s 30-year career within the fire service exposed this study to possible bias or partiality concerns. Because the researcher played an essential role in data collection, including the following vignette, illustrates the investigators' view of the phenomenon under study in this instrumental case study (Creswell & Poth, 2018).

Creswell and Poth (2018) highlighted a common strategy qualitative researchers utilize to decrease concerns regarding data validity involves reflexivity. According to Creswell and Creswell (2018), reflexive thinking takes the form of highlighting how a researcher's past experiences may bias interpretations made during a qualitative research study. In comparison, Stake (1995) suggested that researchers include stories or vignettes to illustrate what occurred in a qualitative research study. Whereas case study research is more than just providing narrative accounts, vignettes employed in the present study allowed the investigator to reflectively share past experiences and knowledge concerning the studied phenomenon. Therefore, as outlined below, employing written vignettes clarified the researcher's role and minimized bias which aided in data collection and analyses validity.

First and foremost, the investigator recognized that transformational leaders' behaviors could theoretically influence followers' workplace aerobic or physical fitness performances, being a veteran fire service leader and organizational leadership doctoral candidate. Second, after recalling earlier experiences involving fire service leaders' interactions to influence firefighters' aerobic and physical fitness behaviors, explicitly focusing on learning from participants' knowledge and understanding about the phenomenon under investigation was a priority in this instrumental case study. Lastly, given that the investigator engaged in meaningful discourse with real-life leaders' working within contemporary fire departments, particular attention to the rigors of qualitative data collection, data analysis, and ethical considerations remained a primary focus throughout this study.

Measures for Ethical Protection

The instrumental case study method effectively allows qualitative researchers to gather multiple in-depth explanations of a specific phenomenon. However, several conventional qualitative research strategies were instituted to avoid any ethical issues during each phase of this instrumental case study. Most importantly, approval was secured from the Southeastern University Institutional Review Board before conducting any digitally recorded interviews of participants during this case study. Furthermore, the case study's purpose was shared during the recruitment of eligible cases for this study and before data collection, utilizing digitally recorded videos, commenced, eligible case studies acknowledged voluntary participation by reading and electronically signing an informed consent form (Creswell & Poth, 2018). Another essential point was that pseudonyms were used during this case study's data collection, analysis, and reporting phases to safeguard participants' confidentiality. In addition, researchers offered to share the results with participants once this case study concluded. Finally, every participant's

digital interview, transcripts, and reflexive notes containing any identifiable information were stored on a universal serial bus thumb drive in the investigator's locked home office for 5-years following Southeastern University's Institutional Review Board data security procedures.

Research Questions

The central research questions (RQs) guiding this instrumental case study aided in eliciting fire service leaders' perceived leadership behaviors that influenced workplace aerobic exercise activities among followers within contemporary Florida fire departments. To examine interviewees' data concerning a perceived leadership phenomenon, Bass and Riggio's (2006) transformational leadership model served as the theoretical framework to inform researchers about what was being studied, including operationalizing research questions (Creswell & Poth, 2018; Mills & Gay, 2016). More concretely, linking this qualitative research study's central questions to an established theoretical framework supported the researchers' discernment of participants' elicited data through a lens that explained the explored phenomenon. Therefore, the central research questions that contributed to exploring fire service leaders' perceived leadership behaviors influencing followers' performances of workplace aerobic exercise activities for this qualitative research study comprised:

1. What are fire service leaders' leadership behaviors that help followers be successful at performing workplace aerobic exercise?
2. How does a fire service leaders' influence change followers' performance of workplace aerobic exercise?

Study Procedures

Before commencing this study, the investigator petitioned and was granted Southeastern University's Institutional Review Board approval. Eligible fire service officers for this case study were required to currently have followers and at least one year of fire department leadership experience. Once eligible cases volunteered, those individuals were scheduled to participate in a virtual interview using Zoom video conferencing. Although face-to-face meetings permit researchers to annotate participants' nonverbal movements and gestures, the utilization of web-based applications provided several advantages to managing and organizing cases' elicited responses in this study. As a matter of fact, Stake's (1995) data gathering strategy emphasized the use of digital audiovisual recording applications to compile participating cases' ideas, meanings, and perspectives into a transcribed document. Specifically, the utilization of web-based interview platforms let the researcher take notes for clarifying participants' responses to interview questions and compose reflexive memos about what was experienced during participating cases' interviews (Creswell & Poth, 2018). Whereas qualitative case studies are typically centered on face-to-face discussions amid the worldwide pandemic, a web-based interview procedure was used to protect the investigator and participants. In fact, recording multiple case studies interviews using the Zoom video conferencing application played a crucial role in providing transcripts required for synthesis and conducting cross-case data analyses. Moreover, the use of web-based platforms supported collecting multiple case studies' richer perspectives regarding the issues surrounding leader' influencing followers' aerobic exercise outcomes in a non-threatening environment. Thus, Zoom's web-based recording interviewing platform, supplemented by Otter.ai's voice-to-text application, allowed participants' transcripts to be tendered for verification and accuracy of the collected qualitative research data within one to two days post-interview.

Data Collection

Fire service leaders meeting the eligibility criteria, and offered to participate in this instrumental case study, scheduled an interview as part of the data collection process. Immediately after scheduling the case studies interview, an informed consent form (Appendix D) was emailed to individuals participating in the case study. Due to Southeastern University's Institutional Review Board's human research study requirements, only participants who returned consent forms were interviewed utilizing the Zoom digital recording application. Additionally, interviewees' withdrawal rights from the case study were acknowledged through participants' review and acceptance confirmed by submitting an electronically signed consent form before starting each digitally recorded interview. After that, digitally recorded interviews were conducted informally using an interview guide composed of nine open-ended questions (Appendix A). Most of the interviews lasted between 10 - 33 minutes, and interviewees were thanked for participating in the study before concluding every web-based meeting.

Researcher As Instrument

According to Stake (2010), the main instrument used to address the collection of interpretive research is human researchers. Complementary to Stake, the research of Creswell and Poth (2018) highlighted how particular approaches to qualitative research require researchers to design studies using methods that support the collection of research data. Whereas various approaches to qualitative data collection exist, one common strategy used in the instrumental case study method entails interviewing participants to garner an in-depth understanding of a studied phenomenon. Following Creswell and Poth's data collection strategy, to ensure instrumentation validity, an interview script with nine questions, framed around transformational leadership theory, was developed with the assistance of this study's methodologist. Finally, to

ensure the reliability of elicited qualitative data before data analyses, participants checked and verified emailed copies of electronic transcripts for factual accuracy. Immediately following the receipt of interviewees' verifications via email, the returned transcripts were securely cataloged in a universal serial bus thumb drive for follow-up data analyses.

Data Analysis

Adhering to Creswell and Poth's (2018) qualitative data analysis strategies, the investigator first organized and cataloged all participants' transcripts in a portable universal serial bus thumb drive for ease of review and security. After obtaining confirmation regarding each participating case studies' transcript accuracy, individuals' names were exchanged with pseudonyms (e.g., Leader 1, Leader 2). Once the participating case studies' identities were protected, the investigator read interviewees' transcripts several times and began making notes about any concepts that emerged relative to the studied phenomenon. Next, following an iterative approach, adhering to Creswell and Poth's data-analysis strategy, allowed the coding of revelatory within-case patterns that emerged from the continual rereading of participants' transcripts. Then a cross-case synthesis procedure was implemented to examine whether within-case theoretical patterns were similar or different between the multiple case studies (Creswell & Poth, 2018). Subsequently, replicative patterns that emerged and reflected participants' perceptions regarding the studied phenomenon were entered into a tabular arrangement to begin developing generalizations of the insights interpreted from multiple case studies data (Miles & Huberman, 1994, as cited in Yin, 2018). Finally, a collaborative cross-checking feedback process involving the investigator and methodologist ensured the analyzed data accurately reflected participants' perceptions of the studied phenomenon (Baxter & Jack, 2008).

Validity Strategies

The investigator followed several data authenticity strategies recommended by Creswell and Poth (2018) to increase the accuracy of case studies data collection and analyses. Given the key investigator's past experiences involving the studied leadership phenomenon, one of the initial strategies necessitated embedding vignettes within this case study. Furthermore, strengthening this study's data analysis processes involved participating case studies viewing and confirming the compiled transcript data from participants' interviews were portrayed accurately. Moreover, performing data source triangulation by recruiting multiple cases (Carter et al., 2014) provided a deeper understanding and validation of participants' perspectives relevant to the phenomenon under study (Creswell & Poth, 2018). The final validation step of this study centered on the co-investigating methodologist peer-reviewing, auditing, and ensuring all the data analysis procedures aligned with orthodox qualitative case study research methods.

Reliability Strategies

Creswell and Poth (2018) highlighted that a crucial component of the qualitative case study method involves several data reliability strategies. For that reason, Creswell and Poth's case study research approach was used to ensure the qualitative data's reliability in this case study. First, all participating case studies interviews were digitally recorded utilizing the secure web-based Zoom audiovisual recording platform. Second, using a consistent set of questions aligned with the transformational leadership theory's conceptual factors garnered essential qualitative responses from multiple case studies participating in the recorded interview process. In addition, the development of a codebook that underwent several iterations of review by this present study's methodologist confirmed that the codes and transcript text aligned, which helped to increase data reliability. Finally, completion of the codebook occurred following

methodologist and researcher agreement regarding the consistent use of codes related to themes emerging from collected qualitative data sets in this instrumental case study.

Summary

This section has described several crucial qualitative methodological procedures needed to conduct an instrumental multiple case study. In short, an essential aspect of this case study's research design involved incorporating a vignette that illuminated the investigator's past experiences or understanding of the leadership phenomenon under study. Moreover, this section outlined the operationalization of all qualitative procedures required to interview human subjects and conduct data collection and analyses involving confidential information, such as the informed consent procedures, safeguarding case studies identities, and distinct qualitative data reliability and validity strategies. Finally, this section underscored the ethical considerations revelatory to deducing multiple interviewees' descriptions of the studied phenomenon occurring within a contemporary workplace context.

IV. RESULTS

The purpose of this qualitative study was to explore fire service leaders' perceived leadership behaviors that aided in followers' performances of workplace aerobic exercise activities (Creswell & Poth, 2018). Inadequate aerobic fitness levels have been shown to increase cardiovascular disease-related risks among those performing fire suppression activities in the firefighting domain (Gendron et al., 2018a; Gendron et al., 2020). In this study, fire service leaders with at least one year of leadership experience working within contemporary public-sector fire departments throughout Florida between June and July 2021 participated in web-based interviews. The participating interviewees answered nine questions from a semi-structured interview guide framed around the 4 I's of Bass and Riggio's (2006) transformational leadership theory. Bass and Riggio's transformational leadership theory provided a theoretical lens to study fire service leaders' perceived leadership behaviors that influenced followers' performances of workplace aerobic exercise activities. The term *aerobic exercise activities* utilized throughout this study refers to sustained periods of physical movements, such as walking or running, intended to increase an individual's heart rate and breathing, which makes "the cardiorespiratory system stronger and more fit" (U.S. Department of Health and Human Services, 2018, p.57). This study was completed using an instrumental case study approach that included web-based interviews, and within-case and cross-case analyses of sampled populations qualitative data elicited during interviews regarding the studied phenomenon.

Sample Characteristics

This instrumental case study's sampled population comprised ten interviewees with at least one year of leadership experience working within the Florida fire service. Interviewees' gender characteristics were seven male and three female, which corresponds to most local and municipal career fire service agencies' demographical milieus within the United States (Everts & Stein, 2020). Table 1 shows the bounded sample's total years of fire service experience that participated in this instrumental case study. From the sampled population, seven interviewees stated between 2 and 5 years of leadership experience, and 3 remaining interviewees affirmed between 10 and 22 years of leadership experience when questioned about leading followers within a Florida fire department, respectively. Summing up this section, as illustrated by Table 1, the hierarchal ranks within Florida's fire service organizations are presented in the sampled population.

Table 1.

Demographic Characteristics of Bounded Sample

Case(s)	Gender	Fire Service Experience	Leadership Experience	Hierarchal Rank
Leader 1	Female	20 years	5 years	Battalion Chief
Leader 2	Female	20 years	10 years	Lieutenant
Leader 3	Female	11 years	3 years	Captain
Leader 4	Male	45 years	3 years	Fire Chief
Leader 5	Male	16 years	2 years	Lieutenant
Leader 6	Male	14 years	3 years	Lieutenant
Leader 7	Male	51 years	14 years	District Chief
Leader 8	Male	16 years	2.5 years	Battalion Chief

Leader 9	Male	31 years	4.5 years	Deputy Fire Chief
Leader 10	Male	36 years	22 years	Lieutenant

Data Collection and Management

After securing SEU's IRB approval, the interviewer conducted web-based interviews using a nine-item interview guide (Appendix A) among interviewees that returned digitally signed informed consent forms (Appendix D). During the data collection phase of this study, interviewees predominately spoke while the interviewer intently listened and clarified any interview guide phrasing requests that arose during interviews. Furthermore, considering the interviewer's insight into this study's theoretical framework, and 30-year fire service background, an essential part of data collection involved bracketing. Creswell and Poth (2018) described bracketing as qualitative investigators' deliberate approach to placing their experiences or knowledge with a phenomenon aside during the research process. As a result, the interviewer did not share any personal knowledge or experiences with the phenomenon under study throughout data collection. However, to maintain transparency with interviewees when asked, the interviewer acknowledged a functional understanding of the fire service.

Immediately following each web-based interview, participating interviewees' digitally recorded videos were uploaded into the Otter ai. application to create text-based transcripts for storage on a portable universal serial bus drive. Subsequently, the interviewer used QuickTime media player to view each interviewee's digital interview, while reading participants' typed transcripts, to perform an initial line-by-line validation. Utilizing the abovementioned data collection process allowed interviewees to receive, review, and attest via email to each transcript's accuracy within one- or two days post-interview. Three transcripts required minor

corrections by following the above-listed systematic data collection and verification procedures. Interviewee data collection concluded after achieving data saturation and validating all transcripts for accuracy.

Data Analysis Strategies

This instrumental case study's purpose centered on research that examined fire service leaders' perceived behaviors and influences on followers' workplace aerobic exercise activities. Following a semi-structured interview format, Florida fire service leaders answered questions on a nine-item interview guide framed around the transformational leadership theory. Interviewees elicited interview data aimed at addressing the following questions: *(RQ1) What are fire service leaders' perceived leadership behaviors that can help followers be successful at performing workplace aerobic exercise?* Moreover, *(RQ2) How does a fire service leaders influence change followers' performance of workplace aerobic exercise?* After concluding this study's data collection component, within-case and cross-case analyses were performed by following Creswell and Poth's (2018) data analysis processes. Creswell and Poth described the within-case analysis as uncovering themes that emerged from single or multiple cases during a data analysis coding process. Adhering to Creswell and Poth's recommended data analysis process, the investigator, employing a researcher perspective, read through the amassed interview data several times before conducting an initial iteration of open-coding. More importantly, drawing on 30 years of fire service experience, a crucial feature of this study included the investigator consciously setting aside any experiences or views about the phenomenon under study during data analysis. Consequently, the investigator's first iteration of open-coding resulted in 39 codes from 295 chunks of compiled interviewee data.

Following a meeting with the methodologist assisting with this study, another iteration of open-coding the interview data resulted in 135 additional codes bringing the total number to 174 based on within-case analyses. Continual within-in case analyses, combined with the winnowing of key interviewee words and phrases, resulted in 15 codes and 12 themes from the third iteration of open-coding. Subsequently, nine codes with five themes emerged from the within-case analyses following the fourth iteration of open-coding interviewees' data. Next, the investigator conducted cross-case analyses of interviewees' accounts related to the phenomena of interest in this study. Creswell and Poth (2018) described a cross-case analysis as examining thematic differences and similarities that emerge between multiple cases in collective case studies. Following Creswell and Poth's cross-case analyses strategy, the investigator analyzed interview data for similar and dissimilar patterns related to interviewees' accounts regarding the phenomena under study. In sum, interviewees' data yielded five themes representing the phenomena of interest that emerged from within-case and cross-case analyses conducted during this instrumental case study.

Themes

According to Creswell and Poth (2018), themes are amalgamations of codes that assist researchers in establishing concepts or ideas from raw qualitative data. The themes in this study emerged after the investigator examined codes derived from keywords and patterns consistently identified within interviewees' transcripts. Even though interviewees offered rich, detailed accounts concerning this study's phenomena of interest, grammatical edits were made to interviewee transcript extracts for readability and clarity when introducing the thematic findings (Creswell & Poth, 2018). Furthermore, the term *working out* was utilized frequently by interviewees in this study's sampled population. *Working out* refers to performing

cardiopulmonary exercises or practical training sessions that increased the heart rate of interviewees or followers in this study. Therefore, following several within-case and cross-case analyses of interviewees' data, five leadership themes emerged comprising four behaviors and one influence (Table 2) related to followers' workplace aerobic exercise activities: role model, supportive, cooperative, visionary, and planned exercise regimen.

Table 2.

Descriptions of Themes

Theme	Description
Role Model	Leader role models conduct emphasizing the importance of performing aerobic exercise for followers.
Supportive	Leader supports aerobic exercise through interactive exchanges, job-related training, and team building.
Cooperative	Leader promotes aerobic exercise through follower guidance, scaled workouts, and providing needed fitness equipment.
Visionary	Leader, through resourceful actions, facilitates alternatives for followers to perform aerobic exercise.
Planned Exercise Regimen	Leader prescribed regimen to schedule followers' performance of workplace aerobic exercise.

Theme 1. Role Model

The role model theme emerged from data illustrating seven out of 10 interviewees' behavior towards affecting followers' workplace aerobic exercise activities. Interviewees described role-modeling behavior as a representative example and personal performances of desired aerobic exercise activities among followers. Role modeling through "leading by example" behavior, Leader 3 felt, reinforced the importance of aerobic exercise activities among followers in the fire service domain. For example, Leader 3 stated, "As far as the field personnel, I think just leading by example and showing them that I am exercising. They know I do not go out to lunch for two hours; they know I go to the gym." Another interviewee's behavior toward

working out centered on being an excellent example for his followers. As Leader 10 said, "I always work from the inside out. So, I start with myself, making sure that I am working out. I am putting forth a good example." In addition, another interviewee revealed that his role modeling behavior also aligned with increasing followers understanding about the physical necessities of aerobic exercise activities relevant to the fire service domain. As Leader 5 said: "Well, first off, you have got to lead by example. And after that, I need to instill that we have a job that is pretty demanding physically. Therefore, we are going to need to be in some sort of shape to do this. So, it is kind of part of our job in the fire industry."

Several interviewees utilized a common strategy that involved personally role modeling desired workplace aerobic exercise outcomes among followers. Synthesis of the interview data revealed that role modeling active participation in exercise activities was essential to affecting followers' workplace aerobic exercise activities. For example, Leader 3 said, "I try to lead by example; I take part and exercise regularly myself. And so, I will come by the station after and visit and say, I was working out, and now I am coming to visit here." Another interviewee felt that role modeling behavior towards working out allowed followers to observe and discuss concerns about performing workplace aerobic exercise activities. As Leader 10 said, "The first thing is by example, I always try to let my crews or my fellow firefighters watch me workout or get ready to work out or talking about working out." Data analysis further demonstrated that another interviewee felt exemplifying role-modeling behavior illustrated the importance of performing workplace aerobic exercise among followers. As Leader 9 said, "I think the biggest thing is [to] show how important it is to you. I mean, you have to do it yourself, lead by example."

Data indicated that three out of 10 interviewees felt that working out alongside followers aided in role modeling desired workplace aerobic exercise activities. As Leader 2 said, "I try to get them to get into a position of working out with me, a kind of lead by example, kind of thing." In contrast, another interviewee conveyed that, even though sometimes working out with followers is impractical, a great way to increase followers' interests involved stressing the importance of performing workplace aerobic exercise activities through role modeling behavior. As Leader 1 stated:

> Even if I cannot get it in with one of my crews that I am working out with, they still see me out there pushing hard. And that motivates them to say, hey, if my chief is out there working hard and sweating in the bay, then I can get out there and do the same. So, I think not thinking that just because we tell them they should do this, we should be showing them: One, how to do it; Two, that we are willing to do it too; and Three, how important it is to keep them healthy for the rest of their career and then after their career.

Another interviewee felt exhibiting behavior toward role modeling workplace fitness helped followers perform desired aerobic exercise activities. As Leader 8 said, "But I think the real thing that you have to do is they have to see, you participating in the exercise. They want to know that [for] every path that you are going to ask them to go; you are willing to go too."

Analyzed data highlighted another notable aspect of the role modeling theme centered on interviewees' implied abilities to perform desired aerobic exercise activities amongst followers. Further data analysis deduced that interviewees possessed the cardiopulmonary capacities needed to exhibit role-modeling behavior towards performing desired aerobic exercise activities with followers. For instance, Leader 1 said:

> I think that the biggest thing that we can do as leaders in the fire service is lead through example. And I mean, you can tell your guys all day long to work out, and fitness [is] important, but if you are not out there doing it with them, then they are not going to see the importance in it, or they are going to try to take it as like a, "yeah, right after you chief".

Additionally, another interviewee felt improving one's fitness insufficiencies was an essential leadership characteristic required to demonstrate role-modeling behavior towards desired workplace aerobic exercise activities among followers. As Leader 9 said:

> When I started working here, I was 44 and probably in the best shape of my life, because two years prior, I focused on more functional fitness, which got me in better shape. I say that, because leading by example is very important to get buy-in from your line personnel as a leader.

Rich data that described the quintessence of interviewees' exhibited role-modeling behavior toward helping followers to perform workplace aerobic exercise activities were best explained by Leader 8 as:

> We have had a couple [of] times when we had an officers' meeting or a shift meeting where we have said alright at the end of this; we are going to do a 20-minute functional workout just to kind of give you guys an idea, some things you could do with crews. But by far, the best way that I found is to remove all those barriers and then show up and be willing to work out, because they [followers] get excited. They like to spend time with you if you are going to sweat with them; It helps them [and] it helps you in every other part of your job for them to be willing to follow you. And they will say things that you would not have known, because you are spending a little time with them, management by

> walking around a little bit. But then you are also accomplishing this purpose of setting the example to say, hey, this is an important part of who we are.

Interestingly, one interviewee expressed that his physical condition brought about perceived difficulties involving role-modeling behavior representative of performing workplace aerobic exercise activities among followers and public members. However, data revealed in talking to a greater extent regarding role modeling desired workplace aerobic exercise activities among followers, Leader 8 explicitly said:

> And I realized, if I wanted to be the kind of leader I really want to be, I could not let that continue. So even though I am still working on getting down to my plan[ned] weight and height like everybody sees me running around the station, they see me sweating and taking a shower, getting dressed before my shift, I have worked out with more than half of the firefighters, probably more than three quarters.

Theme 2. Supportive

Nine out of 10 interviewees offered significant insight into this study's supportive theme, which emerged from data analysis as a particular set of behaviors to foster desirable aerobic exercise activities among followers. In this study, interviewees' behavior towards interactive exchanges, job-related training, and team building to help followers perform workplace aerobic exercise described the supportive theme. Furthermore, data indicated interviewees described behavior towards supporting followers' workplace aerobic exercise activities through two-way exchanges required subtlety and tact. For example, Leader 10 said, “Well, I found that if people are dead set against working out, you cannot do a hard sell. They are just going to push back more. So, I try a very soft-sell approach.”

Interviewees' behavior towards supporting follower exercise through collaborative exchanges occurred in several distinct ways. For example, one interviewee portrayed behavior that involved sharing with followers envisioned changes related to health and fitness within the workplace environment. As Leader 9 said:

> So, I think it is very important to keep that at least in a 6- or 12-month mindset of vision. You know, when you do your budget every year, think about alright, what can we do differently with health and fitness that we are not doing? Talk to the guys and see what is out there. Do not just put it aside until you have an issue.

Analyzed data highlighted another interviewee envisioned using followers' perceptible fitness complications to support the implementation of workplace aerobic exercise activities. As Leader 6 stated:

> So, if you could demonstrate that, through training or even talking to guys after an incident, you know, a fire or something, [where] we had our gear on and guys are going man, I am really getting out of shape and [then] addressing that with even just basic levels of fitness stuff at the station, it gets guys engaged again, it is no longer this abstract thing of yeah, I should probably get in shape.

More concretely but complementary to Leader 6's account, one interviewee felt actively linking retirement-based reasonings into interactive exchanges with followers helped instill the importance of performing workplace aerobic exercise activities. As Leader 5 said:

> If they are not understanding, you just got to tell him you want to live to see retirement, don't you? Or you want to make it past your retirement and try to at least live out some years afterward. So, there is where your exercise would be important.

Similarly, data showed another interviewee's behavior towards communicating the importance of workplace aerobic exercise among followers centered on family-based reasonings. As Leader 9 said:

> So, I think the tough thing is understanding who you are talking to. And how you can send a different message to them [followers], and [how] they can understand the importance of aerobic exercise. Explain to them, this is what you can do to make your life better, to be around longer for your family, be around longer for your kids.

Related patterns emerged in the data that characterized several strategies employed by interviewees to support followers' desired execution of workplace aerobic exercise activities. For example, take the illustrative case of a supportive exchange between several fire service actors that Leader 3 shared:

> We have had instances where you are required to go to the gym for an hour, we have one person on the crew who wants to participate in the exercise, and the other two will sit and hang out while the [one] person is working out. And fortunately, the officer with that crew typically will address the issue and say, listen, we are at the gym, go ahead and walk on the treadmill while I am doing my weightlifting or whatever.

Another interviewee's supportive behavior towards helping followers perform desired workplace aerobic exercise activities centered on peer pressure. As an illustration, Leader 2 stated in her interview:

> We also like to use [a] kind of peer pressure. Like hey, come on, Firefighter A is going out on the treadmill or the rower and putting in some work. Just throw on some sneakers, hop on the treadmill, just walk for 10 minutes, just little baby steps in the ac [air conditioning], all you are doing is walking. It is only 10 minutes and then next shift, let's

> see if we can up the level of speed on the treadmill, and maybe we can go, 14 to 15 minutes.

Consistent with the account mentioned above, another interviewee's account described behavior towards utilizing peer pressure to support followers' performances of workplace aerobic exercise. To be precise, further data analysis identified Leader 7 describing his behavior towards supporting followers as: "A lot of it is peer pressure, I think you talk to the guys that are doing it [exercising], and you get them to encourage the guys that are not." Unexpectedly, data indicated another interviewee portrayed behavior towards supporting a follower's workplace aerobic exercise performance through humiliation. As Leader 1 stated:

> And that is where I think almost sham[ing] him a little bit into like, why are you sitting on the couch, and the rest of us are out here? Doing that goes a long way in the fire department. It [is] not always going to work, but trying to build that crew integrity. So, you cannot necessarily make them work out, but you can make them go out there and at least put their gear on and walk around with a hose load or something like that.

Furthermore, several interviewees indicated that followers could get the benefits of aerobic exercise through job-related training. For example, as Leader 2 stated: "Just putting in more work raising ladders, moving ladders around, you are getting that cardio in there, and you are getting them in gear, you are getting used to heat, which is something that we are having to deal with." More precisely, data illustrated that interviewees' behavior towards job-related training introduced followers to the advantages of performing workplace aerobic exercise activities. As Leader 1 said: "So, I do not think that forcing the fitness thing is the way to go as a leader, I think encouraging it, and not just encouraging it, but showing them [followers] the benefits of it." Along with Leader 1, another interviewee posited that job-related training

galvanized followers' interest in reassessing the aerobic fitness levels needed to perform vital tasks within the firefighting domain. As Leader 6 said, "Showing how physically demanding using our gear is and essentially pushing that aerobic exercise makes it better and easier, and safer for people to do." Moreover, data highlighted while talking further about the supportive theme's physical orientation, Leader 6 explicitly stated:

> You know, people do not realize that in any profession, you can tend to forget about at times how physically demanding or mentally demanding something is until you know, especially [in] the fire service, where you may go days, months, even years without a fire, using those scenarios that are physically taxing kind of remind you of how, essentially, the fitness level you need to be able to perform in the fire service.

However, only one interviewee mentioned changing the locality where followers performed job-related training activities. Notably, while portraying the execution of hands-on training in an outdoor context to support followers' aerobic exercise activities, Leader 2 expressly stated:

> So, the small little things to get them to maybe walk on a treadmill instead of run[ning], they might not want to do that or just some outdoor activities. We try to do some [hands-on] training outside [to] tire them out a little bit more, things that we are not going to do [in] a gym setting you would do [in] an outdoor practical setting.

Interview data yielded several rich descriptions that exemplified interviewees' behavior toward supporting followers' workplace aerobic exercise performance through job-related training. For example, one interviewee ended a follower's period of inactivity by employing job-related training. As Leader 1 cited:

> So, this is where it comes back to the lieutenant aspect, if you as a lieutenant realize this firefighter has not done anything for the last three weeks, you [have] got to stop it before

> it starts [by] keep[ing] them continually involved whether that is just through air pack drills, to get that aerobic capacity up if you cannot make them actually hit the gym.

Another interviewee mentioned supporting the management of followers' workplace aerobic exercise activities by employing job-related training at a group level. As Leader 2 stated:

> And it might be something hard, like pulling around a two and a half-inch [fire hose] by themselves or moving around this and that, I try to make it more work-based training is your cardio, per se, search and rescue kind of things that'll get the whole group going at [the] same time.

Subsequently, one interviewee conveyed demonstrating behavior towards executing job-related training highlighted a distinctive aspect of counteracting followers' obstinance to completing workplace aerobic exercise. In this case, Leader 4 mentioned:

> Well, you do have people [that] come in [and] just do not want to [perform workplace aerobic exercise]. But once you get them out there and you start training, just normal training on pulling hoses, advancing the lines [fire hoses], hooking up lines [fire hoses], shuttling water here to there, they quickly realize that they need to increase their cardiovascular output and recovery times and all that needs to be a lot quicker.

Almost identical to other interviewees' descriptions, a synthesis of the interview data indicated the ideal behavior towards supporting followers' performances of workplace aerobic exercise activities comprised one interviewee's portrayed management of job-related training. As Leader 6 stated:

> If you have a bunch of guys that simply want to stay in shape or get in shape and want to be good at their job, I would generally move that more into practical exercises, maybe working out in gear, using tools that are definitely more geared towards the fire service so

> that they can see practical use immediately versus guys who are [going to] work out either way. I am simply trying to challenge them to make them better at their job and keep them motivated.

Interviewees indicated that combining fitness training and job-related training also supported followers' workplace aerobic exercise activities. As Leader 7 stated:

> We tie some of the stuff that we do for physical fitness into training, like air consumption drills, which is obviously a pretty high level of physical fitness training or aerobic training, because they are going up and down steps, lifting tires, pulling [fire] hose, dragging [fire] hose or whatever.

Analyzed supportive theme data indicated that, beyond enticing followers' interest in performing workplace aerobic exercise, a pattern emerged regarding interviewees' use of job-related training activities to support team-building. Data highlighted that three out of 10 interviewees' execution of job-related training fostered group-level workouts amongst followers. As Leader 1 said: "So even people that are not interested, really in fitness, and when you are out there doing it [working out] as a crew, and they see their lieutenant out there, and they do not come out there, they are just not looking like a very good, fireman or team member." Comparison of the analyzed interview data uncovered that one interviewee felt the execution of an organized workout period fostered a collective fitness interest among followers. According to Leader 8: "We have probably had 25 of our 60 employees come through, to work out [at] the main station and then go to their actual station." Similarly, another interviewee's exhibited behavior towards workplace fitness supported team building, as well as spurred interest and participation among higher-ranked followers. As Leader 6 said:

So, I think it is really important for crew cohesion and building good crews and good teams. I have noticed that, especially at the larger stations, where large groups of guys come to work out, there is a certain energy that just kind of sucks everybody into it, even our administration gets involved, and some of the higher up chiefs will come down and check out what we are doing or come work out with us.

Theme 3. Cooperative

Seven out of the ten interviewees conveyed cooperative behaviors towards promoting followers' workplace aerobic exercise activities. Data analysis indicated that interviewees explained the cooperative theme as working out with followers, scaling exercises, and procuring fitness equipment to promote workplace aerobic exercise activities. For instance, as Leader 10 said: “Once you can get them, even if it is just walking with them or just getting them, I think it helps.” In another case, one interviewee felt that fostering the importance of aerobic exercise amongst followers was facilitating by line-level leadership. As Leader 1 said, "So, I think for me personally, at the lieutenant level is really where it starts, as far as leadership goes to build that importance [of] fitness and aerobic work." Another interviewee felt that cooperative behavior towards workplace aerobic exercise occurs by informing followers about colleagues' implementations of workplace aerobic exercise activities. As Leader 10 conveyed, “Maybe I share with them that Firefighter Smith (pseudonym) has started a workout program, and really all they are doing is walking around the station at a fast pace for 30 minutes a shift while listening to a book on tape.” Data indicated another interviewee felt that exhibiting cooperative behavior towards instructing followers about initiating aerobic exercise activities could help to reduce inactivity. As Leader 3 avidly emphasized, “I would be able to guide them maybe in a good

direction or give them access to resources so that they would be able to improve from a sedentary lifestyle to maybe movement more."

Data illustrated that some interviewees described cooperative behavior towards scaling workouts furthered followers' completion of desired workplace aerobic exercise activities. For example, Leader 3 stated, "It is very important for me to establish inclusivity for the personnel, and they are able to work at their pace, and we wait until everyone has finished if we are jogging laps or running sprints." In addition, analyzed data highlighted that one interviewee portrayed cooperative behavior towards recognizing followers' fitness differences to promote working out in the workplace. As Leader 6 stated: "I guess a better answer to that is, because there are so many varying levels of age, physical ability, and fitness in the fire service, you essentially have to be able to scale your workouts and what you are doing to the needs of your entire crew."

Additionally, several interviewees felt that exhibiting cooperative behavior towards advising, coaching, and acknowledging followers' fitness efforts helped promote exercise activities in the workplace. For example, Leader 3 stated, "I share information as a training captain with personnel on the benefits of maintaining your health and wellness at the fire station and show positive reinforcement when I see personnel participating in exercise." Another interviewee shared exhibiting cooperative behavior towards building rapport helped promote followers' performance of workplace aerobic exercise. As Leader 1 said, "So, I try to have a personal relationship with them to kind of see where they are at with it and kind of get a feel for where they are at in their fitness level and how they can perform, and then just kind of coach them." Furthermore, another interviewee felt promoting workplace aerobic exercise through cooperative behavior was best exhibited through personally acknowledging followers' fitness efforts. As a case in point, regarding the recognition of followers' efforts to perform workplace

aerobic exercise, Leader 9 said: “And I think that [it] is important when you see that to actually go out there and say, hey, I see what you are doing. I appreciate it. What you are doing not only are you helping us, you are doing such a great thing for yourself and longevity of life.”

Analyzed data explained that some interviewees equipped contemporary workplaces with fitness equipment to promote followers' aerobic exercise activities. For example, one interviewee mentioned furthering followers' performances of workplace aerobic exercise by purchasing cardiorespiratory-related fitness equipment. As Leader 9 said, “We purchased aerobic and functional fitness equipment, rowers, stand-up skiers, bikes, and nothing that is going to hurt people.” Another interviewee felt that cooperative behavior towards promoting workplace aerobic exercise activities comprised securing fitness equipment for followers. As Leader 8 stated: “So, we brought workout equipment to the people, so it is there, we made an investment, we got a grant.” However, data comparison revealed that another interviewees’ behavior towards affording followers opportunities to access fitness resources involved promoting desired aerobic exercise activities with higher-ranking supervisors. As Leader 7 said:

> I was working with the chief at the time about allowing our folks and negotiating with him (the chief) for certain things, but allowing our folks to go to a gym while on duty, as long as their response was not delayed.

Finally, another interviewee’s cooperative behavior towards procuring up-to-date aerobic fitness equipment aided in furthering followers' performances of workplace aerobic exercise activities. As Leader 10 said:

> If we have aerobic equipment or workout equipment that is outdated or maybe broken, where there is something new out there that is safer, I always try to prioritize that in the

> budget; I think it is just as important to spend a little bit of that budgetary money to keep our firefighters healthy.

Theme 4. Visionary

Two of this study's ten interviewees portrayed exhibiting visionary behavior towards promoting followers' performance of workplace aerobic exercise activities. Interviewees described the visionary theme as "thinking outside the box" and eliciting followers' solutions when addressing barriers to workplace aerobic exercise activities. As a result, the visionary theme emerged after synthesizing data detailing interviewees' creative approaches that aided followers in performing workplace aerobic exercise activities. For instance, as Leader 9 stated: "Recently, what we did here was we sat down with the union at one point, and we looked at ways to encourage fitness." In addition, data indicated that one interviewee displayed a "thinking outside the box" solution to further followers' physical training outcomes while remaining observant of an administrator's views regarding workplace exercise activities. As Leader 7 said:

> Because he [the chief] did not want two people sitting in the parking lot while one person was in the gym, we had to even arrange it thinking outside the box if I had two people on the engine that wanted to do physical training and one person on the [rescue] unit was answering medical calls, and the third person on the engine did not want to do physical training that day, we would switch people around.

Most importantly, interviewees exemplified behavior towards working together with followers to address deterrents impeding the performance of workplace exercise activities. As Leader 9 said:

I think the first important thing is just asking them what is it that stops you from being able to work out? [So] entertaining anything they say is important. I mean, if there is a specific time? If they need different equipment? And if it is possible to do it, we should.

Another interviewee offered a similar account about working with followers to overcome interpersonal barriers through exhibited visionary behavior. As Leader 7 stated:

Well, you know, everybody has their days. Like I said, we are [a] small department there [are] only six of us on shift. I have got a captain, [a]driver engineer, and three firefighters. So, there would be some days when somebody was not up for going to the gym. They would rather just stay at the firehouse to work out. Or maybe it was their day that they [said], oh, it is Monday, I had a hard weekend, and I do not want to work out today, you know, everybody has those days. But my captain and I talked about it, and I talked about it with the chief, and we just decided that we were going to let them do this. We would support the need by saying, okay, one person on the engine wants to workout. We [have] one person on the rescue wants to work out, so let us take that other person off the rescue and put them on [the] engine, let the rescue guys go work out. And then the engine would answer the calls while they are working out.

Finally, one interviewee's described behavior highlighted leaders' central role in creatively addressing workplace hindrances and identifying critical benefits of exercise activities adherence amongst followers, respectively. As Leader 9 stated:

Well, some of it, if I am answering this right for you, we are so spread out, it could be at stations that impact their ability to work out or makes it harder, they are running, they are busier, they are slower, maybe working out some type of rotation. Like I said, go and ask them [followers]: What is it that stopping you from being a part of this? [Also] I think

showing them the benefit to us [and] the benefit to them, but try to remove the obstacles that [keep]them from wanting to be a part of it [working out] and making themselves healthier.

Theme 5. Planned Exercise Regimen

A synthesis of the data indicated that five out of 10 interviewees recounted behavior tied to followers' workplace aerobic exercise activities through planned workout periods. In addition, all five interviewees mentioned establishing a prescribed regimen to promote followers' workplace aerobic exercise activities. For instance, as Leader 10 stated:

> Again, I try to prioritize it with our shift schedule. So, when we come into work in the morning, we do a shift exchange meeting with the [off-going] crew. And then, I will sit down with my crew and tell them what our goals are for the day, whether we have to do training or go to classes or get things done. And then, after that, I always try to make sure that we have ample time in the day for aerobic workouts.

Interviewees also alluded to lessening culture-related interferences by scheduling followers' workout periods. For example, one interviewee felt that instituting regularly scheduled workout periods aided in fostering follower participation. As Leader 6 stated:

> The biggest thing is having that routine. Because that way, regardless of how busy and chaotic your day is, or how stale and slow your day is, you have that set time, and people will start from what I have seen migrate out into the workout area at that same time.

Further data synthesis illustrated that another interviewee's adherence to a structured exercise routine aided in changing followers' workplace fitness outcomes. As Leader 7 said:

> Every shift that we work, they are [followers] allowed to, I guess it may differ from department to department, to do whatever type of physical fitness training they want most of them walk, run, lift weights, get on a treadmill, or whatever.

Moreover, one interviewee felt that ensuring no temporal interruptions interfered with followers' workplace exercise periods through structural policy change was reasonably practicable. As Leader 3 stated:

> In policy, I have the ability to influence changes if I see it necessary that policy change needs to occur. Currently, there is dedicated time or assumed time that personnel will complete at least an hour of exercise each shift.

An interesting observation that emerged from data comparison was that only one interviewee alluded to the importance of incorporating aerobic exercise activities into followers' leisure time. As Leader 9 cited:

> I think if you could get them to buy in on their days off and make it a part of their life, you can get them to do it when they are on shift. You could offer all kinds [of] benefits and say, we will give you an hour a day to do this, but it is getting them to buy-in. So that is what I try to do a lot with new hires; I sit with them and explain how important it [aerobic exercise] is.

Evidence of Quality

When engaging in qualitative research, Creswell and Poth (2018) advocate using two validation strategies to ensure an investigator's explanations of a studied phenomenon are nonbiased and represented accurately from the data collected. For this project, the investigator consciously engaged in reflexivity and bracketing by incorporating vignettes to highlight past and current insights into interviewees' vocational experiences. Moreover, multiple interviewees

communicated richly detailed and validated descriptions of the phenomenon under investigation in this study. In summary, following the qualitative principles of data collection, data analysis, and routine debriefings with this study's methodologist provided further insight and validation of the investigated phenomenon.

Summary

This chapter provided valuable insights into ten contemporary fire service leaders' perceived leadership behaviors and influence affecting fire service members' workplace aerobic exercise activities within Florida fire departments between June and July 2021. In this study, interviewees recounted perceptions, during web-based interviews, that led to the emergence of five distinctive themes following data analyses. The specific themes that emerged from interviewees' data comprised four behaviors and one influence portrayed during interviews: role model, supportive, cooperative, visionary, and planned exercise regimen, respectively. Finally, in Chapter Five, this study's findings will be compared with previous relevant literature to highlight future research considerations and implications for practice or policy within the firefighting domain.

V. DISCUSSION

The purpose of this qualitative study was to explore fire service leaders' perceived leadership behaviors that aided in followers' performances of workplace aerobic exercise activities (Creswell & Poth, 2018). Inadequate aerobic fitness levels have been shown to increase cardiovascular disease-related risks among those performing fire suppression activities in the firefighting domain (Gendron et al., 2018a; Gendron et al., 2020). In this study, fire service leaders with at least one year of leadership experience working within contemporary public-sector fire departments throughout Florida between June and July 2021 participated in web-based interviews. The participating interviewees answered nine questions from a semi-structured interview guide framed around the 4 I's of Bass and Riggio's (2006) transformational leadership theory. Bass and Riggio's transformational leadership theory provided a theoretical lens to study fire service leaders' perceived leadership behaviors that influenced followers' performances of workplace aerobic exercise activities. The term *aerobic exercise activities* utilized throughout this study refers to sustained periods of physical movements, such as walking or running, intended to increase an individual's heart rate and breathing, which makes "the cardiorespiratory system stronger and more fit" (U.S. Department of Health and Human Services, 2018, p.57). This study was completed using an instrumental case study approach that included web-based interviews, and within-case and cross-case analyses of sampled populations' qualitative data elicited during interviews regarding the studied phenomenon.

Methods of Data Collection

Following qualitative research strategies advocated by Creswell and Poth (2018), this study was conducted utilizing web-based technology offered by the Zoom video recording and Otter.ai voice-to-text applications to perform data collection. After obtaining the approval of Southeastern University's (SEU) Institutional Review Board (IRB), participants were purposively recruited via email using listservs maintained by the Florida State Fire College/Bureau of Fire Standards and Training and Florida Fire Chiefs' Association. Once interested interviewees scheduled meetings, conducting 10 web-based interviews helped elicit answers to this instrumental case study's research questions using a nine-item interview guide underpinned by Bass and Riggio's (2006) transformational leadership theory. Data collection concluded once saturation from the sampled populations' accounts did not illuminate any new details relevant to the phenomenon under study. Interviewees were emailed a text version of the recorded transcript for accuracy verification within one to two days post-interview to ensure data validity. Once interviews concluded, all interviewee videos, transcripts, and data analysis memos were stored on a portable universal serial bus drive for safekeeping. Following Southeastern University's Institutional Review Board's protocols, all data from this study will be destroyed five years after completion.

Summary of Results

In this instrumental case study, five themes emerged from analyses of interviewees' qualitative interviews about leadership phenomenon focused on followers performing workplace aerobic exercise activities: role model, supportive, cooperative, visionary, and planned exercise regimen. Seven interviewees described role-modeling behavior as a representative example and personal performances of aerobic exercise activities among followers. Three interviewees

reported that leading by example behaviors increased followers' understanding of aerobic exercise's physical necessities in the fire service domain. Additionally, three interviewees referred to *working out* alongside followers as a great way to increase interest and emphasize the importance of performing workplace aerobic exercise activities through role modeling behavior. More interestingly, three interviewees explained how an essential element of the role modeling theme centered on leaders having the physical and aerobic capacities to role model desired workplace aerobic exercise activities among followers.

Nine interviewees perceived supportive behaviors prompted desirable workplace aerobic exercise activities among followers through interactive exchanges, job-related training, and team-building. For example, five interviewees conveyed behaviors towards the supportive theme that involved collaborative exchanges, focusing on envisioned health and fitness changes, perceptible fitness complications, retirement, and family-based reasonings, which helped instill the importance of performing workplace aerobic exercise activities among followers. Interestingly, two interviewees felt peer pressure helped increase followers' performances of workplace aerobic exercise.

Interviewees also perceived that followers obtain the benefits of aerobic exercise through job-related training. For example, five interviewees described behavior towards encouraging followers' performances of job-related tasks, such as raising and moving ladders, pulling water-filled hose lines, and donning firefighting ensembles weighing over 100 pounds, while actively moving around, reinforced the advantage of performing aerobic exercise activities. Furthermore, three interviewees' behavior towards the execution of job-related training supported followers' aerobic exercise performances and team-building through group-based exercise activities. In particular, interviewees noted the importance of exhibiting supportive behaviors to spur interest,

overcome physical activity obstinance, and increase followers' participation in workplace aerobic exercise activities.

Seven interviewees described cooperative behaviors, such as getting followers to start exercising, providing fitness advice, scaling exercises, and procuring fitness equipment, helped promote workplace aerobic exercise activities. Two interviewees felt that informing followers about colleagues' implementation of workout programs or guidance about improving sedentary lifestyles was essential for promoting workplace aerobic exercise activities. Additionally, two interviewees reported scaling workouts based on followers' fitness differences promoted *working out* in the workplace. Three interviewees expressed that exhibiting cooperative behaviors towards advising, coaching, and personally recognizing followers' fitness efforts promoted aerobic exercise activities. Finally, three interviewees portrayed behaviors towards procuring aerobic fitness equipment or allowing personnel to access alternate workout equipment resources for furthering followers' performances of workplace aerobic exercise activities.

Two interviewees' portrayals of visionary behaviors described "thinking outside of the box" and eliciting followers' solutions about addressing barriers to workplace aerobic exercise activity. More importantly, the two interviewees agreed that enlisting assistance in developing solutions to overcoming various barriers furthered followers' performances of workplace aerobic exercise activities. Interviewees felt eliciting creative solutions towards overcoming interpersonal or organizational hindrances through discussions with collective bargaining members and administrators was essential to increasing followers' performances of workplace aerobic exercise activities.

Interviewees also recounted behavior towards promoting followers' performances of workplace aerobic exercise using a planned exercise regimen. Five interviewees indicated

behaviors tied to establishing a prescribed regimen planned around a specific temporal period influenced desired changes in followers' performance of workplace aerobic exercise activities. All five interviewees acknowledged the importance of establishing a prescribed regimen to promote followers' workplace aerobic exercise activities in this study. Interestingly, only one interviewee alluded to the importance of incorporating aerobic exercise activities performances in followers' leisure time.

Discussion by Research Question

This instrumental case study was framed around the transformational leadership theory to garner an interpretive understanding of the phenomenon under study. Creswell and Poth (2018) defined this interpretive understanding as social constructivism. A social constructivist, or interpretative framework, provides qualitative researchers a lens through which to view and understand the meanings of real-life experiences within various qualitative research contexts from participants' perspectives (Creswell & Poth, 2018). Ten contemporary fire service leaders with at least one year of experience working within Florida fire departments provided perceptual understandings into the studied phenomenon during web-based interviews in this instrumental case study.

As mentioned in the literature review, much of the fire service health and wellness research has been focused on anthropometric and programmatic investigations into inadequate aerobic capacities linked to cardiorespiratory fitness among those working in the firefighting domain. While a literature review determined that few studies mentioned fire service leaders' role in followers' aerobic exercise activities, transformational leadership literature tied to coaching or teaching professions provided theoretical insight into followers' physical activity outcomes. The following section draws from relevant extant literature to distill this instrumental case study's

findings and five themes into naturalistic generalizations (Creswell & Poth, 2018) for outlining potential insights in pursuance of promoting fire service members' workplace aerobic exercise activities.

Research Question 1

What are fire service leaders' leadership behaviors that help followers be successful at performing workplace aerobic exercise?

Interviewees in the present study expressed perceived behaviors towards successfully helping followers perform workplace aerobic exercise activities focused on: role models, supportive, cooperative, and visionary themes. In addition, five interviewees described how prescribing planned exercise regimens influenced changes in followers' performance of workplace aerobic exercise. Drawing from thematic findings that arose from within-case and cross-case analyses, the following themes emerged.

Theme 1: Role Model

Interviewees emphasized the importance of exhibiting specific behaviors that furthered followers' performances of workplace aerobic exercise activities. Seven interviewees actively role-modeling exercise and fitness behaviors exemplified the importance of maintaining physical fitness among followers. Leader 3 felt role modeling through leading by example behavior reinforced the importance of performing workplace aerobic exercise among followers within the fire service domain. Leader 10 described putting forth a good example for followers to model regarding *working out* in the workplace. Leader 5 shared that staying in shape exemplified to followers the physically demanding aspects of the firefighting industry. Interviewees also conveyed accounts focused on avidly engaging in desired aerobic exercise activities within the workplace. A common strategy shared by Leader 3 involved interviewees personally role

modeling desired workplace aerobic exercise activities among followers. For example, Leader 10 described behaviors centered on talking about or allowing others to witness activities that involved *working out* among followers. Leaders 1, 2, 8, and 9 felt that working out with followers and role modeling desired behaviors stressed the importance of performing workplace aerobic exercise activities. Three interviewees highlighted that leaders who demonstrated the desired aerobic exercise activities best exemplified the role modeling theme.

Bass and Riggio's (2006) descriptions of leaders' idealized influence behaviors presented an applicable theoretical lens for explaining attributional and behavioral leadership factors linked to the transformational leadership theory. In this study, the interviewees perceived behaviors focused on actively role modeling and maintaining personal fitness levels among followers to demonstrate the importance of performing workplace aerobic exercise activities paralleled transformational leadership theory's idealized influence factors. Furthermore, Rowold (2006) confirmed, within the sports and teaching domains, that coaches and teachers exhibiting role modeling behaviors attributed to the idealized influence factor aided in students' and athletes' extra efforts in monthly training frequencies, with other researchers confirming involvement in in-class and leisure-time physical activities (Beauchamp et al., 2014; Morton et al., 2010). Specifically, the results of Morton et al.'s (2010) study underscored that teachers utilizing role modeling strategies increased students' motivation, enjoyment, and instructor satisfaction regarding physical education and in-class physical activity levels, respectively. In the present study, seven interviewees portrayed role modeling behaviors aligned with the idealized influence attribution and behavior factors that helped followers perform workplace aerobic exercise activities (Bass & Riggio, 2006).

In contrast, within the firefighting domain, researchers confirmed organizational leaders perceived role modeling desired fitness behaviors, setting daily fitness priorities, and motivating personnel served as key health promoters among followers (Jahnke et al., 2014). Additionally, Harrington (2018) highlighted that senior-level organizational leaders exhibited behavior toward leading by example and participating in fitness activities helped promote workplace wellness programs' importance among followers within the firefighting domain. In this instrumental case study, Leaders 1, 2, 8, and 9 described behaviors towards working out among followers supports the importance of leaders' role modeling, leading by example behaviors and performing workplace aerobic exercise activities (Harrington, 2018; Jahnke et al., 2014). However, neither the idealized influence factor nor extant leadership literature comprising sports, teaching, or firefighting domains explained interviewees' descriptions of implied capacities or physical difficulties related to the role modeling theme in the present study.

Theme 2: Supportive

Nine interviewees emphasized the importance of exhibiting and utilizing specific supportive behaviors to promote followers' workplace aerobic exercise activities. Interviewees described supportive behaviors that focused on interactive exchanges, job-related training, and team-building helped followers perform workplace aerobic exercise activities. Leaders 3 and 10 described using two-way exchanges that required subtlety and tact to support followers' performances of workplace aerobic exercise activities. Leader 9 recounted exhibiting behavior towards sharing envisioned health and fitness changes to support followers' exercise in the workplace. Leader 6 described behavior focused on utilizing followers' perceptible fitness complications to spur engagement and participation in basic levels of workplace aerobic exercise activities. Leaders 2's and 7's behaviors towards supporting followers' performances of

workplace aerobic exercise involved using peer pressure. As a final point, Leaders 5's and 9's behavior towards leading supportive exchanges with followers comprised retirement-based and family-based reasonings to perform workplace aerobic exercise activities.

Bass and Riggio's (2006) inspirational motivation factor provided a theoretical lens for examining leaders' behavior towards motivating and challenging followers to attain envisioned and desired performances of workplace aerobic exercise. Prior research established that teachers' exhibition of behaviors linked to transformational leadership's inspiration motivation factor enhanced students' positive attitude towards physical education (Morton et al., 2010). Morton et al.'s study established that teachers' reflecting inspirational motivation behaviors intensified students' efforts, enjoyment, and increased levels of in-class physical activity. Interviewees' findings in the present study supported Morton et al.'s conclusions that transformational coaches (leaders) exhibiting inspirational motivation behaviors increased students' cognitive beliefs and attitudes towards physical activity.

Jahnke et al. (2014) explored the critical role of leaders modeling and promoting health and safety practices within fire departments. In the Jahnke et al. study, researchers concluded that camaraderie and competition exhibited through leaders' positive peer pressure served as a relevant motivator among followers within the fire service domain. In the present study, Leaders 2's and 7's conveyed behaviors towards supporting followers' workplace aerobic exercise activities affirmed Jahnke et al.'s conclusions regarding the motivational aspects of positive peer pressure among those serving in the fire service. Furthermore, Melton et al.'s (2019) study assessed the perceived physical and psychosocial barriers to rural firefighters' ideal health and wellness programming. Through semi-structured interviews, researchers in the Melton et al. study established that participants' thematic long-term goals focused on health longevity and

health acquisition for family. In the present study, Leaders 6’s and 9's portrayed supportive behaviors aligned with Melton et al.'s study findings regarding participants' long-term goals towards overcoming perceived barriers to improved health and wellness programs in a rural fire department context.

Interviewees also conveyed using job-related training supported followers' performances of workplace aerobic exercise activities. In the present study, Leaders 2 and 6 expressed behaviors towards incorporating physically oriented job-related training helped support followers' performance of workplace aerobic exercise. In addition, Leader 1 emphasized that encouraging and showing followers the benefits of participating in job-related training refocused followers' interests in reassessing the aerobic fitness levels needed to perform vital tasks within the firefighting domain. Leader 2 described that job-related training could also occur in outdoor settings outside of traditional gym or exercise facilities contexts. Interestingly, the rich descriptions of Leaders 1 and 2 exemplified supportive behaviors towards lessening followers' periods of inactivity and obstinance with performing workplace aerobic exercise through the utilization of job-related training. Ideally, Leaders 6 and 7 felt that supporting followers' workplace aerobic exercise entailed implementing and executing an amalgamation of fitness- and job-related training activities. In comparison to interviewees findings in the present study, Bass and Riggio (2006) determined that a transformational leader's use of inspirational motivation arouses physical and emotional excitation towards goal accomplishments by moving followers to consider one's moral values as team members within an organization or profession. Fire service leaders’ supportive behaviors in the present study aligned with Bass and Riggio's described transformational leaders' effective building of followers' commitments towards performing workplace aerobic exercise activities.

Three interviewees highlighted exhibiting behaviors towards supporting the performances of workplace aerobic exercise resulted in team-building among followers. Leader 1 explained how leaders' behavior towards job-related training drew even those not interested in fitness to perform workplace aerobic exercise activities. Leaders 6 and 8 felt exhibiting behaviors towards workplace fitness spurred a collective interest in *working out* within a fire department context among lower-ranking and higher-ranking followers. Price and Weiss (2013) examined transformational peer and coaches' relationships concerning sports athletes' individual and team outcomes. The researchers concluded that individual players and coaches exhibiting transformational behaviors motivate and inspire "athletes' psychological responses and team outcomes" (Price & Weiss, 2013, p. 277). Interviewees in the present study recognized how perceived leadership behaviors could also help to improve followers' performances of workplace aerobic exercise activities. Accordingly, Bass and Riggio (2006) concluded that transformational leadership theory's inspirational motivation elements produced positive performance changes in groups and organizations. Finally, examining portrayed behaviors of Leaders 1, 6, and 8 through an inspirational motivation lens draws attention to previous research indicating leaders' supportive behaviors in the present study, regardless of hierarchal rank, affected followers' performances of workplace fitness. Essentially, Bass and Riggio described a fundamental component of the inspirational motivation factor comprised arousing team spirit among followers of transformational leaders. Further, Northouse (2016) highlighted that the inspirational motivation factor "is descriptive of leaders who communicate high expectations to followers, inspiring them through motivation to become committed to and a part of the shared vision in the organization" (p. 169).

Theme 3: Cooperative

Seven interviewees communicated cooperative behaviors towards *working out* with followers, scaling exercises, and procuring fitness equipment promoted workplace aerobic exercise activities. Leaders 1 and 10 provided considerable insight about developing relationships with followers to build the importance of fitness and aerobic exercise. Leader 10 emphasized the importance of demonstrating behaviors linked to communicating with followers about peers or coworkers' workout programs. In comparison, Leader 3 emphasized providing followers' guidance or direction towards transitioning from sedentary to physically active lifestyles. Bass and Riggio's (2006) individualized consideration factor provided a lens for examining the creation of non-threatening and supportive environments to improve followers' potentials through transformational leaders' coaching or mentorship behaviors. In the present study, fire service leaders described cooperative behaviors towards expanding and improving followers' commitment to performing the desired workplace aerobic exercise activities paralleled transformational leadership's individualized consideration factor (Bass & Avolio, 2004; Bass & Riggio, 2006). Specifically, transformational leaders' behaviors often center on advising or mentoring roles to help followers overcome individual challenges when engaging in challenging job activities or attaining established organizational goals (Bass & Riggio, 2006).

Interviewees also explained how displaying cooperative behaviors towards scaling workouts, coaching, and acknowledging followers' fitness efforts helped to further individuals' performances of workplace aerobic exercise. Leader 3 emphasized the importance of recognizing followers' differences to establish inclusivity among followers regarding the performance of workplace aerobic exercise. Leader 6 also stressed recognizing differences in followers' ages, physical abilities, and respective fitness levels by scaling workouts within the fire department

setting. Leaders 1, 3, and 9 explained how cooperative behaviors towards coaching and acknowledging followers' fitness efforts helped promote workplace aerobic exercise activities. Fire service leaders' recognition and acceptance of an individual's differences learned through personalized interactions among followers is conceptualized by the transformational leadership theory's individual consideration factor (Bass & Riggio, 2006). In the present study, interviewees' portrayals of cooperative behaviors supported research, outlining individually considerate transformational leaders' personalized acceptance of followers' differences in a team and organizational leadership context.

Four out of the 10 interviewees discussed how equipping contemporary fire department workplaces with fitness equipment promoted followers' aerobic exercise activities. Leader 9 described buying aerobic and functional fitness equipment, such as rowers, stand-up skiers, and exercise bicycles for followers to use in the workplace. Leaders 7, 8, and 10 emphasized that purchasing up-to-date workout equipment through grant funding helped promote followers' performances of workplace aerobic exercise activities. However, Leader 7 offered insight into allowing followers to access offsite fitness resources through negotiations with higher-ranking supervisors within the fire department hierarchy. In the present study, although interviewees' described behaviors towards buying fitness equipment did not align with transformational leadership's individual consideration factor, Gendron et al.'s (2020) and Jahnke et al.'s (2014) research supported the importance of purchasing workplace fitness equipment or providing alternative exercise resources to further followers' workplace aerobic exercise activities in the firefighting domain.

Theme 4: Visionary

Two interviewees described the use of visionary behavior toward promoting followers' performance of workplace aerobic exercise activities. Fire service leaders reported visionary behaviors focused on "thinking outside of the box" and eliciting followers' solutions to address barriers limiting performance outcomes of workplace aerobic exercise activities. Leader 9 described setting up a meeting and working with followers to devise ways of encouraging fitness. Leader 7 reported that remaining observant of administrative policies required employing visionary behaviors that incorporated "outside of the box" thinking to support followers' performances of workplace aerobic exercise. Leaders 7 and 9 perceived visionary behaviors centered on eliciting followers' creative solutions to interpersonal and organizational barriers that hindered workplace aerobic exercise activities.

Bass and Riggio's (2006) intellectual stimulation factor provided a theoretical lens for examining leaders' behavior towards addressing new or continuing problems by incorporating followers' suggestions into novel approaches to facilitate solution development. The intellectual stimulation factor entails transformational leaders through creative exchanges with followers finding innovative solutions to address new and old problems affecting workgroups or organizations (Bass & Riggio, 2006). For example, sports domain researchers examining physical education teachers' exhibition of transformational teaching concluded that insufficient intellectual stimulation resulted in students reporting negative beliefs, decreased motivation, educator dissatisfaction, and low importance of physical activity and educational outcomes (Morton et al., 2010). Conversely, physical education teachers recognized as intellectually stimulating increased students' enthusiasm and enjoyment of physical education (Morton et al., 2010). In the present study, viewing interviewees' described behaviors towards promoting

workplace aerobic exercise activities through a transformational leadership lens signifies elements of the intellectual stimulation factor. In particular, Leaders 7 and 9 portrayed behaviors towards eliciting followers' novel solutions that helped to further individuals' workplace aerobic exercise outcomes theoretically paralleled transformational leadership's intellectual stimulation factor. Thus, in the present study interviewees described behaviors conformed with transformational leaders' employment of followers' intellectual creativity to resolve group-level or organizational problems (Bass & Riggio, 2006).

Research Question 2

How does a fire service leader's influence change followers' performance of workplace aerobic exercise?

Theme 5: Planned Exercise Regimen

Five interviewees indicated the planned exercise regimen comprised fire service leaders' behavior towards formulating workout periods to support followers' performances of workplace aerobic exercise activities. In particular, Leaders 6 and 10 explained that establishing specified workout periods positively affected followers' aerobic exercise activities in the workplace. Leader 7 also shared that adhering to a structured exercise routine changed followers' workplace fitness training outcomes. Leader 3 elaborated on the importance of lessening temporal interruptions to followers' workplace exercise periods. Finally, Leader 9 alluded to the importance of also incorporating aerobic exercise into followers' leisure time.

Although the transformational leadership framework does not address leaders' behavior toward establishing temporal workout periods, investigators construct meaning by viewing participant data through an interpretative lens when conducting qualitative research (Creswell & Poth, 2018). Creswell and Poth (2018) described interpretive research as eliciting participants'

real-life experiences rather than a theory to garner individuals' understanding of an actual situation or event. Accordingly, examining participants' views through an interpretive lens indicated that five participants identified the importance of establishing a prescribed planned workout regimen. Interviewees conveyed routine adherence to a planned exercise regimen regardless of cultural hindrances, such as responding to emergency calls or long periods of inactivity, influenced followers' performances of workplace aerobic exercise activities. Researchers established that firefighting personnel's perceived time allocation for on-duty physical training signified leaders' priority to health and wellness in the fire service domain (Jahnke et al., 2014) and higher levels of weekly physical activity (Gendron et al., 2020). In the present study, participants affirmed Jahnke et al.'s (2014) and Gendron et al.'s (2020) conclusions that granting followers time to work out promoted healthy culture and on-duty performance of workplace physical exercise activities, respectively.

Study Limitations

This study has distinctive limiters and delimiters. One limitation in this instrumental case study was locating interviewees with experiences involving the leadership behaviors that influenced followers' workplace aerobic exercise activities. Another limitation of this research study entailed interviewees' recalling past incidents involving the perceived leadership behaviors exhibited to influence followers' performance of workplace aerobic exercise activities. Consequently, the investigator assumed that any self-reported interviewee data collected represented factual accounts for this study. Furthermore, even though assertions within this study may not generalize among all vocational contexts, readers acquired experiential learning (naturalistic generalizations) from the project results could be used to influence followers' performances of workplace aerobic exercise activities (Stake, 1995). Finally, the investigator

bracketed latent biases involving 30 years of fire service experience before data collection and analysis by taking an interpretive approach towards learning from subjects' interview data relative to the studied phenomenon (Creswell & Poth, 2018).

As mentioned earlier, some concomitant delimiters coexist within this qualitative research study. First, unlike cross-sectional quantitative research studies predicting fire department members physical activity intentions (Amodeo & Nickelson, 2020) or longitudinal trends in firefighters aerobic exercise behavior (Cameron et al., 2018), this study examined a purposively sampled population of fire service leaders' perceived leadership behaviors that influenced followers' workplace aerobic exercise activities within Florida public-sector fire departments. Moreover, the purposively sampled population needed one year of leadership experience and followers within a Florida fire department to qualify for the study. As a final point, this instrumental study underpinned by the transformational leadership framework was designed to explore perceived fire service leaders' influence on followers' workplace aerobic exercise activities using Bass and Riggio's (2006) defined elemental components of the transformational leadership theory.

Implications for Future Practice

The purpose of this qualitative study was to explore fire service leaders' perceived leadership behaviors that aided in followers' performances of workplace aerobic exercise activities (Creswell & Poth, 2018). Even though this bounded instrumental case study's sample population was comprised of 10 fire service leaders, the rich qualitative insights into the studied phenomenon obtained from interviewees have implications for other contemporary administrators in the firefighting domain. Thematic findings in this instrumental case study illuminated the transformational leadership behaviors needed to promote followers' performance

of workplace aerobic exercise activities. In addition, research from the present study also provided insights for implementing planned workout regimen periods to promote followers' workplace aerobic exercise activities.

This study's findings regarding fire service leaders' role-modeling behavior exemplify the importance of performing workplace aerobic exercise activities. Applicably, interviewees' accounts concerning role modeling behaviors increased followers' awareness about the need to perform aerobic exercise activities within the firefighting domain. In addition, leaders with the representative aerobic capacities to work out promoted followers' performances of workplace aerobic exercise activities. According to Jahnke et al. (2014) and Harrington (2018), role modeling leadership behavior is vital to establishing health-related cultures in the fire service domain.

Fire service leaders exhibiting supportive behavior towards interactive exchanges, job-related training, and team-building help followers perform workplace aerobic exercise activities. Specifically, sharing envisioned changes through interactive exchanges focused on positive peer pressure can help support followers' performances of workplace aerobic exercise. Jahnke et al. (2014) noted that positive peer pressure served as a motivator for fire service members to make needed health and wellness modifications. Combining interactive exchanges with leaders' behaviors towards utilizing job-related training and team building could increase followers' performance of workplace aerobic exercise activities.

Findings in the present study highlighted that fire service leaders' cooperative behavior towards *working out*, scaling exercises, and procuring fitness equipment, helped promote followers' workplace aerobic exercise activities. Moreover, fire service leaders' cooperative behaviors towards guiding and recognizing fitness differences by scaling exercises helped

promote followers' workplace aerobic exercise activities. Additionally, Gendron et al. (2020) and Jahnke et al. (2014) reported that providing exercise equipment or alternative workout resources furthered followers' performances of workplace aerobic exercise activities. Therefore, fire service leaders employing cooperative behaviors could increase followers workplace aerobic exercise performance outcomes.

Fire service leaders' visionary behaviors towards "thinking outside of the box" and eliciting innovative solutions when addressing *workout* barriers could promote followers' performances of workplace aerobic exercise activities. For example, Leader 9 discussed how working with line-level followers helped address deterrents and encouraged the performance of workplace fitness, respectively. Likewise, Leader 7's described "outside of the box" visionary behavior towards focusing on interpersonal and organizational barriers helped foster followers' performances of workplace aerobic exercise activities. Fittingly, leaders eliciting innovative solutions from followers could help promote followers' performance of workplace aerobic exercise activities (Bass & Riggio, 2006).

In addition to the described leadership behaviors, fire service leaders' behavior toward employing planned exercise regimen changes promoted followers' workplace aerobic exercise activities. Thematic findings in this study have implications for fire service leaders' routine scheduling of followers' planned exercise regimens. According to Gendron et al. (2020) and Jahnke et al. (2014), physical training on-duty and policies that outline temporal periods for *working out* increased fire service members' performances of health-related exercises and promoted healthy cultures in fire department contexts, respectively. Therefore, fire service leaders exhibiting behaviors towards implementing planned exercise regimens could help to improve followers' performance of workplace aerobic exercise activities.

Recommendations for Future Research

This bounded instrumental case study's sampled population of contemporary fire service leaders provided considerable insight into the studied phenomenon. However, despite the findings generated from ten Florida fire service leaders, further research into the leadership behaviors influencing followers' performances of workplace aerobic exercise activities is needed. Future research using a mixed-methods approach among those serving in the firefighting domain would allow investigators to gather additional qualitative and quantitative data. Utilizing pedometers or wearable fitness trackers, researchers should examine the frequency, duration, and intensity levels of followers performing workplace aerobic exercise activities among fire service leaders perceived to exhibit transformational leadership behaviors measured by the multifactor leadership questionnaire rater form. Complementary to the collected quantitative data, researchers could utilize focus groups or face-to-face interviews to elicit from followers what perceived behaviors leaders employed promoted followers' performances of workplace aerobic exercise activities. Therefore, researchers conducting future studies of this nature should consider purposively sampling nationwide fire service members and using a mixed-methods case study design as outlined above to concurrently analyze qualitative thematic insights and quantitative data regarding leaders' perceived influences on followers' performing aerobic activity during scheduled work periods within the workplace.

Conclusion

The present study was designed to explore leaders perceived leadership behaviors that aided in followers' performances of workplace aerobic exercise activities. Interviewees participating in this instrumental case study identified role-modeling, supportive, cooperative, and visionary themes that indicate fire service leaders exhibiting behaviors linked to the

transformational leadership theory and implementing planned workout regimens increase followers' performances of workplace aerobic exercise activities. In addition, the results of this instrumental case study have added to leadership literature in the fire service domain. Therefore, this study's findings have practical implications for helping fire service leaders lessen cardiovascular-related events by illuminating the leadership behaviors and planned exercise regimen needed to promote followers' performances of workplace aerobic exercise activity.

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Appendix A

Interview Guide & Script

Project: An Instrumental Study of Fire Service Leaders' Influence on Followers' Workplace Aerobic Exercise Activities

Date: **Interview Time:**

Investigator: Paul Ebanks **Interviewee:**

Interviewee's Rank/Position:

Typed Informed Consent Form Returned: Y N

Interviewee's Years of Experience:

Project Purpose: The purpose of this qualitative research study is to examine fire service leaders' perceived leadership behaviors influencing followers' workplace aerobic exercise activities (Creswell & Poth, 2018).

Interview Questions

Tell me how you got started working in the firefighting and emergency services field.

How did you attain your leadership position in the fire service?

As a fire service leader, how do you impress upon followers' that performing workplace aerobic exercise is important?

As a fire service leader, how do you try to get followers involved in workplace aerobic exercise?

In your opinion as a fire service leader, what workplace barriers prevent followers from performing aerobic exercise?

What leadership actions do you take to help address barriers that prevent followers from performing workplace aerobic exercise?

As a fire service leader, how do you support inclusiveness involving followers' aerobic exercise in the workplace?

As a fire service leader, how do you make adjustments to followers' interest in shifting from long periods of inactivity to performing aerobic exercise in the workplace?

What else would you like to contribute to this study on fire service leaders' influence on followers' workplace aerobic exercise?

Concluding Script: Thank you for participating in this interview. The digital and written information collected during this interview will be kept private and will not identify you as a participant in the study. Once again, thank you for assisting with this research study!

Appendix B

Listserv Recruiting Script

Project: An Instrumental Study of Fire Service Leaders' Influence on Followers' Workplace Aerobic Exercise Activities

Greetings,

My name is Paul Ebanks, and I am a doctoral candidate enrolled in the Doctor of Education Organizational Leadership Program at Southeastern University. My dissertation centers on research that examines fire service leaders' influence on followers' workplace aerobic exercise activities. I would like to invite you to participate in a voluntary and confidential web-based interview that will take approximately 30-45 minutes. If you are interested in participating in this research study, please follow the scheduling details outlined in the attached flyer.

Sincerely,

Paul Ebanks

Appendix C

Interview Recruitment Flyer

Florida Fire Service Leaders Are Invited For

An Instrumental Study of Fire Service Leaders' Influence on Followers' Workplace Aerobic Exercise Activities

Investigator: Paul Ebanks, Doctoral Candidate

The purpose of this qualitative research study is (Creswell & Poth, 2018) to examine fire service leaders' perceived leadership behaviors influencing followers' workplace aerobic exercise activities.

Contact Info
To find out about scheduling an interview for this study, please contact:
Paul Ebanks
386.837.1474
pebanks@seu.edu

Eligible Participants Must:
Be 18 years old or older
Be a career fire service leader with at least one year of experience
Have followers in the workplace

Participation in this study involves:
Commitment to a 30–45-minute web-based video interview
Review and Return Study Document(s)

IRB Protocol #21 ED 18

Appendix D

Voluntary Informed Consent for Digital Interview Southeastern University

Title: An Instrumental Study of Fire Service Leaders' Influence on Followers' Workplace Aerobic Exercise Activities

Investigator(s): This study is designed to gather information for a dissertation conducted by the student co-investigator Paul Ebanks. Dr. Kevin Weaver is the principal investigator, and Dr. Janet Deck is the methodologist (co-investigator) for this study.

Purpose: The purpose of this qualitative research study is to examine fire service leaders' perceived leadership behaviors influencing followers' workplace aerobic exercise activities (Creswell & Poth, 2018).

What to Expect: This research study is administered online. Participation in this research study will involve completing a digitally recorded (video/audio) interview between you and the student investigator. You will be expected to complete the video interview only once and may skip any question you do not wish to answer. Also, you will be expected to review interview transcripts for authenticity and then return them to the student investigator. In sum, the interview should only take about 30-45 minutes to complete.

Risks: There are no perceivable risks associated with this project expected to be greater than those ordinarily encountered daily.

Benefits: For the research participants, there are no direct benefits. However, participating in this study may extend your understanding of how qualitative research is conducted.
Compensation: There is no compensation provided for your participation in this study.

Your Rights and Confidentiality: Your participation in this study is voluntary, and you may withdraw your consent and involvement from the project at any time without penalty.

Confidentiality: No personal information other than the study participants' names, hierarchical rank, and years of experience will be collected. Also, the participants will be given pseudonyms for confidentiality during the data analysis phases of the study. All of the digital and transcribed data collected will be stored on a password-protected thumb drive, secured in the student investigator's home office, and permanently destroyed five years after the study is completed.

Contacts: If any questions or concerns arise relative to this project, you may contact Dr. Kevin Weaver via email at kweaver@seu.edu or pebanks@seu.edu. For any concerns about your rights as a research volunteer, please contact the Southeastern University Institutional Review Board Office at IRB@seu.edu.

If you choose to participate: Please type your name here:
By typing my name above, I am at least 18 years of age and freely and voluntarily agree to participate in this study. Also, my typed name indicates that I reviewed, understand, and agree to

this Voluntary Consent for Digital Interview. After typing your name above, please email the completed consent form back to pebanks@seu.edu. Thank you for helping with this study!

Appendix E

Institutional Review Board Approval

SOUTHEASTERN UNIVERSITY

NOTICE OF EXEMPTION FOR HUMAN RESEARCH

DATE:	May 12, 2021
TO:	Kevin Weaver, Janet Deck, Paul Ebanks
FROM:	SEU IRB
PROTOCOL TITLE:	An Instrumental Study of Fire Service Leaders' Influence on Followers' Workplace Aerobic Exercise Activities
FUNDING SOURCE:	NONE
PROTOCOL NUMBER:	21 ED 18
APPROVAL PERIOD:	Approval Date: May 12, 2021 Expiration Date: May 11, 2022

Dear Investigator(s),

The Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled, An Instrumental Study of Fire Service Leaders' Influence on Followers' Workplace Aerobic Exercise Activities. The project has been approved for the procedures and subjects described in the protocol.

Any changes require approval before they can be implemented as part of your study. If your study requires any changes, the proposed modifications will need to be submitted in the form of an amendment request to the IRB to include the following:

- Description of proposed revisions;
- *If applicable,* any new or revised materials;
- *If applicable,* updated letters of approval from cooperating institutions

If there are any adverse events and/or any unanticipated problems during your study, you must notify the IRB within 24 hours of the event or problem.

At present time, there is no need for further action on your part with the IRB.

This approval is issued under Southeastern University's Federal Wide Assurance 00006943 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under the IRB's Assurance, please do not hesitate to contact us.

Sincerely,

Rustin Lloyd
Chair, Institutional Review Board
irb@seu.edu