



Do exercise and fitness buffer against stress among Swiss police and emergency response service officers?☆

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ABSTRACT

Objectives: During the past three decades, researchers from many disciplines have been interested in whether exercise can help people to cope better with stress. Past research examining the stress buffering effects of exercise, however, is limited by small sample sizes, poorly validated measures of stress, exercise and health, and the exclusion of samples that are at-risk for chronic stress exposure. The purpose of the present study, therefore, was to address these limitations by exploring the stress buffering effects of exercise and fitness in a sample of police and emergency response service officers.

Design: The design of the current study is cross-sectional.

Method: The current study recruited 533 employees of the police force and emergency response service corps in an urban area of German-speaking, North-Western Switzerland (22.9% females). All respondents filled in a self-administered battery of validated questionnaires assessing stress, exercise, perceived fitness and health.

Results: The data showed that increased stress was associated with poorer health. There was no significant relationship between exercise and stress; however, increased fitness was associated with reduced stress. Exercise and fitness were associated with enhanced health. Hierarchical regression analyses revealed significant interactions, suggesting that exercise protects against stress-related health problems. Exercise was a more powerful stress buffer than perceived physical fitness. Moreover, moderate exercise was more suited to counteract stress than vigorous exercise activities.

Conclusions: The findings indicate that exercise and fitness can help foster a healthy and thriving workforce that takes less sick leaves and feels better prepared to cope with chronic stress.

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During the past three decades, researchers from different fields within sport science, such as exercise physiology and sport and exercise psychology, have taken a great interest in exploring whether or not fitness and exercise can help people to cope more successfully with stress. Each discipline has used different methodological approaches to investigate the stress buffering effects of exercise. In particular, exercise physiologists have investigated whether exercise can be understood as a physical stressor that activates typical stress reactions (e.g., secretion of norepinephrine, cortisol) (e.g., Meeusen, 2006), acute bouts of exercise lead to reduced reactivity and increased recovery when individuals face experimentally induced stressors right after an exercise session (e.g., Boutcher & Hamer, 2006), and chronic exercise regimes or

elevated fitness levels generally suppress individuals' stress reactions to, or boost recovery from experimentally induced stress (e.g., Jackson & Dishman, 2006). In sum, this line of research was concerned with exploring the plausibility of a cross-over effect from one particular stressor (exercise) to other stressors (e.g., cognitive, social threats) by attenuating (habituation) or precipitating (sensitization) the initial stress reactions (Sothmann, 2006). While physiological factors may present one explanatory mechanism for the influence of exercise on stress, stress buffer effects may also have psychological and behavioral foundations.

Researchers within health, sport and exercise psychology generally have been less concerned with establishing the underlying mechanisms for potential stress buffer effects (see Gerber, 2008a). Rather, they have made an effort to find out whether individuals who face taxing and stressful life circumstances are more capable of maintaining good health if they engage in regular physical exercise. From a public health point of view, this emphasis of such general aspects focusing on naturally occurring stress appears more pertinent than the previously described (physiological) approach,

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as investigating possible underlying mechanisms is of little consequence if there is no evidence to suggest that exercise has the potential to act as a stress buffer in real life.

Sport and exercise psychologists generally see exercise as an emotion-oriented coping strategy that provides stressed individuals with a time-out from daily stresses (Berger, 1996; Rostad & Long, 1996). Accordingly, research has shown that exercise has mood-enhancing effects, particularly if individuals initially felt low and irritated prior to exercise (Ekkekakis & Acevedo, 2006). Attempts to empirically examine the potential stress buffering effects of exercise began in the 1980s. In a study with 137 male business executives, Kobasa, Maddi, and Puccetti (1982) provided evidence that exercise interacts with stressful events to prevent illness. In line with this, Brown (1991) found that both exercise and objectively assessed aerobic fitness moderate the stress-illness relationship whereby active and fit individuals reported better health and fewer health center visits when exposed to stress. Furthermore, partial support for the stress buffer hypothesis was obtained in the U.S. National Health Interview Surveys (Zuzanek, Robinson, & Iwasaki, 1998). Similarly, Carmack, Boudreaux, Amaral-Melendez, Brantley, and De Moor (1999) reported that exercise inhibited the development of physical symptoms and anxiety associated with minor stressors in college students, although no moderation effects were found when major life events and aerobic fitness were used as predictor variables. Using a similar sample, Lochbaum, Lutz, Sells, Ready, and Carson (2004) found that strenuous exercise was associated with lower levels of psychosomatic complaints when respondents encountered increased stress. Likewise, Ensel and Lin (2004) indicated that exercise alleviated depressive and psychosomatic complaints when individuals were under stress in a representative sample of Upstate New York. Similarly, Kaluza, Keller, and Basler (2001) showed that exercise protected against back pain and psychological symptoms when employees of a university hospital were exposed to heightened occupational stress.

Prospective and longitudinal research mostly supported the stress buffer hypothesis as well. First, Howard, Cunningham, and Rechnitzer (1984) illustrated that exercise had a significant buffering effect on the relationship between life events and somatic complaints at entry, two and four years later. Second, Kobasa, Maddi, Puccetti, and Zola (1985) provided evidence that male business executives suffering from high stress levels reported fewer concurrent and prospective illnesses the more they originally had engaged in exercise activities. Equally, Fuchs and Appel (1994) found that exercise mitigated depression (20 months later) resulting from unemployment stress.

Past research, however, does not unanimously support the stress buffer hypothesis. Using a sample consisting of law enforcement officers, Young (1994) observed no moderating effect between cardiorespiratory fitness (assessed by maximal treadmill exercise testing) and both general and job-related stress on physiological health risk factors such as blood pressure and cholesterol level. Similarly, Roth, Wiebe, Fillingim, and Shay (1989) found no cross-sectional evidence for self-perceived fitness and exercise moderating the stress-illness relationship. This is in accordance with Manning and Fusilier (1999) who did not find reduced health care use among regular exercisers when exposed to stress. Likewise, Siu, Cooper, and Leung (2000) found that the association between occupational stress and health was largely independent of respondents' exercise levels in a study with male Hong Kong managers. Equally, no substantial significant interaction effect was observed in an investigation comparing college varsity athletes and non-athletes (Skirka, 2000).

In summary, although exercise physiologists have not been able to provide convincing evidence for the physiological mechanisms

by which exercise buffers stress (Gerber, 2008b), there is increasing evidence from cross-sectional and longitudinal studies that exercise can alleviate the effects of real-life stress on health (Gerber & Pühse, 2009). In spite of past research providing mixed results whether exercise mitigates stress, exercise-based stress buffer effects were supported by a majority of the previous studies. Moreover, no evidence exists that increased exercise precipitates stress-related health problems. Given the large variability with regard to research designs, sample characteristics and assessments of key variables, these divergent results are not surprising. Moreover, when significant results were found, interaction effects were often weak and explained limited amounts of additional health variance. Thus, additional research is warranted to permit a more solid conclusion about the potential impact of exercise on the stress-health relationship.

Nevertheless, detecting statistically significant interaction effects is difficult, especially if sample sizes are small (McClelland & Judd, 1993). Accordingly, previous research might have underestimated the role of exercise by predominantly using small samples with less than 300 participants (Gerber & Pühse, 2009). The first aim of the present study, therefore, was to test the stress buffer hypothesis with a large sample. As prior research has with a few exceptions made little attempts to examine populations at-risk to be exposed to heightened stress levels, a second aim of the current study was to test the stress buffer hypothesis in two professional groups (police and emergency response service [ERS] officers) whose work is thought to be inherently stressful (e.g., Amaranto, Steinberg, Castellano, & Mitchell, 2003; Collins & Gibbs, 2003; Deschamps, Paganon-Badinier, Marchand, & Merle, 2003; Violanti et al., 2006). Furthermore, we compared the potential for exercise and perceived fitness, as well as moderate and vigorous exercise activities to buffer stress. Additionally, a special emphasis was placed on using validated measures of exercise and stress as previous studies have largely used poorly validated measures (see Gerber & Pühse, 2009). For example, exercise was often measured with general instruments consisting of one single item. Furthermore, stress measures varied from assessing single stressors, such as widowhood or unemployment after migration in some studies to using measures that disregarded the subjectivity of stress appraisals, had not been validated previously, or were too general in nature in other studies.

Based on the literature reviewed, the following five hypotheses were made. First, we hypothesized that stress would be negatively associated with health. Hypothesis 1 was based on prior literature reviews of police stress research which showed that stress affects almost every part of the human body (see Swanson, Territo, & Taylor, 1998). Second, we expected a negative relationship between exercise/fitness and stress. Hypothesis 2 was derived from previous studies that have shown associations between increased exercise levels and lowered stress perception (e.g., Aldana, Sutton, & Jacobson, 1996; Kouvonen et al., 2005). Third, based on conclusions drawn from epidemiological studies (see Biddle & Mutrie, 2006), Hypothesis 3 anticipated a positive relationship between exercise/fitness and health, which is in accordance with police studies, in which officers with elevated exercise participation reported lower levels of pain and absenteeism (e.g., Franke & Anderson, 1994; Nabeel, Baker, McGrail, & Flottemesch, 2007). Fourth, we expected that exercise would have a stronger potential to buffer against stress than perceived fitness. Hypothesis 4 is based on past research, which provided more support for exercise-based than fitness-based stress buffer effects (see Gerber & Pühse, 2009). Fifth, Norris, Carroll, and Cochrane (1992) found that high intensity exercise training was more efficient than moderate intensity exercise to mitigate stress; therefore, Hypothesis 5 assumed that vigorous activities would have a particularly strong impact to buffer stress.

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