Published in final edited form as:
Int Arch Occup Environ Health. 2013 January ; 86(1): 79–88. doi:10.1007/s00420-012-0748-6.

Assessment of a prevention program for work-related stress among urban police officers

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Abstract

Objective—To determine the efficacy of a primary prevention program designed to improve psychobiological responses to stress among urban police officers.

Methods—A random sample of 37 police cadets received complementary training in psychological and technical techniques to reduce anxiety and enhance performance when facing a series of police critical incidents. Training was done by Special Forces officers, trained by the authors in imaging. A random sample of 38 cadets, receiving training as usual, was followed in parallel. Assessment of somatic and psychological health, and stress biomarkers, was done at baseline, immediately following training, and after 18 months as regular police officers. Comparison was done using two-way repeated analysis of variance (ANOVA) and logistic regression.

Results—The intervention group improved their general health and problem-based coping as compared to the control group. They also demonstrated lower levels of stomach problems, sleep difficulties, and exhaustion. Training was associated with an OR of 4.1 (95% CI, 1.3–13.7; $p < 0.05$) for improved GHQ scores during the study as compared to no changes or worsening score.

Conclusions—This first primary prevention study of high-risk professions demonstrates the validity and functional utility of the intervention. Beneficial effects lasted at least during the first 2 years on the police force. It is suggested that preventive imagery training in first responders might contribute to enhanced resiliency.

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Conflict of interest The authors declare that they have no conflict of interest.

Keywords

Critical incident; First responder; GHQ; Psychosomatic; Resiliency

Introduction

Research has consistently demonstrated that police officers are exposed to a wide variety of stressors, rendering police work one of the most difficult occupations (Anshel 2000; Paton and Violanti 1997). In addition to the experience of workplace stress and harassment that is found in other occupations (Aaron 2000; Laufesweiler-Dwyer and Dwyer 2000), police officers and other first responders are also exposed to threatening and potentially traumatic events at a much greater frequency during the course of duty than the average person (Sommer and Ehlert 2004; LeBlanc et al. 2008).

This frequent exposure to such marked occupational stress exerts a heavy toll, and, consequently, police officers are at an elevated risk for adverse mental and physical health outcomes, including stomach disorders, anxiety, depression, heart disease, and posttraumatic stress disorder (Gross et al. 2006; van Hasselt et al. 2008; Buchanan et al. 2001; Sheehan and Van Hasselt 2003). Furthermore, behavioral consequences such as divorce, drug, and alcohol abuse, and in extreme instances, suicide, have demonstrated a significant positive correlation with the occupational stress police officers face (Dowling et al. 2006; Miller 2006; Biggam et al. 1997; Walker 1997).

Yet, the detrimental effect of police occupational stress becomes increasingly severe when the impact on the performance of individual officers and police precincts is considered. It has been consistently shown that officers experiencing undue stress are more likely to demonstrate an increase in absenteeism (Wright and Saylor 1991), report dissatisfaction with their job (Norvell et al. 1998), experience burnout (Brown et al. 1996; Lord 1996), and retire prematurely (Becker et al. 2009; Kop et al. 1999). In short, the persistent stressfulness of police work produces severe negative effects on police officers, both in terms of their ability to serve and their general quality of life.

Recognizing the impact of stress as a factor in mental and physical health requires precise consideration of its biological correlates. Cortisol serves as the primary glucocorticoid stress hormone that is released into the blood and saliva, subsequent to an activation of the amygdala and hypothalamic–pituitary–adrenal axis (Yehuda et al. 2002; Otte et al. 2005). The release of cortisol is associated with increased vigilance and arousal, and it is believed to play a role in the formation and retrieval of fearful memories. It is generally believed that an elevation in cortisol levels during stressful experiences is a defensive mechanism designed to return the body to homeostasis (Yehuda et al. 2002). However, sustained cortisol activation in response to stressors has been found to have severe negative effects, including osteoporosis, immunosuppression, hypertension (Whitworth et al. 2005), depression, and anxiety (Carroll et al. 2007).

A similarly relevant adrenal steroid is dehydroepiandrosterone (DHEA), a hormone secreted synchronously with cortisol (Haglund et al. 2007). It has been found to have positive effects on cognition and memory and appears to be positively correlated with successful symptom recovery and coping (Yehuda et al. 2006).

A final hormone of interest is prolactin. Prolactin responses have been noted to occur during periods of acute stress in humans (Armario et al. 1996). Though prolactin serves as a

somewhat broad indication of psychological distress, it nonetheless provides a measure of stress that is not entirely accounted for by elevations in cortisol (Sobrinho 2003).

Given that frequent exposure to occupational difficulties (Morash et al. 2006) and potentially traumatic events is a ubiquitous element of police work (Liberman et al. 2002) and that the consequences of this exposure are notably severe, police officers serve as an ideal population for the implementation and assessment of stress prevention techniques. Building upon this recognition, the present study sought to develop a primary prevention training protocol for police officers, designed to reduce the negative impact of work-related stress. The theoretical underpinning of this training model was to enhance the officers' sense of control over stress-provoking situations by rendering the incidents more predictable and by providing a psychological/tactical repertoire for the officers to utilize. Officers with such training were expected to demonstrate superior coping abilities in the face of stressful events, thereby blunting the negative effects experienced by other officers.

To test this hypothesis, a randomized trial of our unique training protocol was conducted among members of a police force who were nearing the completion of their academy training. Officers participating in the training were compared against police officers of equal experience who received no additional preparatory training, both of which were followed for a total of 2 years of their careers, starting as they graduated from the police academy. It was hypothesized that officers engaging in the training would ultimately produce lower scores on biological markers of stress, lower self-reported distress and sleep disturbances, and self-report fewer physical ailments. A systematic confirmation of these hypotheses would offer strong support for the efficacy of the novel training program developed for the present investigation.

Method

Participants

All trainees in the final term of the Swedish Police Academy training were invited to attend an educational session regarding the present research. A total of 221 volunteers attended the meeting, representing various police departments in major Swedish cities. Based upon review of the attendance sheet, 85 officers were randomly invited to participate in the research, with 75 ultimately accepting the offer. This random sampling was stratified by gender, requiring that approximately one-third of the participants be women. The final sample was reflective of the demographic characteristics of the Swedish police force at large.

These 75 officers were randomly assigned to two gender-matched groups. Twenty-five men and 12 women were assigned to the intervention group. This group received an imagery and skills training program to supplement their standard training regimen. The remaining 26 men and 12 women were assigned to a control group that completed police training as usual. Baseline assessments confirmed that there were no significant differences between the intervention and control groups on any of the measures used.

Intervention

All of the training took place during normal academy hours and was facilitated by group leaders—Swedish Special Forces officers who had been trained by the researchers in administering the intervention. Each group facilitator worked with only one group of cadets ($n = 8$) throughout the training in order to better establish rapport between the cadets and their facilitator.

The training program began with an initial psychoeducational session to familiarize the participating officers with the nature of the intervention. The purpose of the training sessions —to prepare officers to successfully cope with job-related stress—was explained, and they were familiarized with the weekly, 10-session, and 90-min classroom format. The components of the sessions were described, including relaxation training, use of guided imagery to facilitate imaginal exposure to potentially stressful on-the-job incidents, and the mental practice of police tactical skills. Didactics in adaptive coping strategies for the different scenarios were covered, and an educational presentation that included discussion of the theory of stress, impact on health and performance, and the rationale behind the benefits of imagery-based exposure and skills training was provided. Finally, participants were taught Jacobsen's (1938) progressive muscle relaxation technique, along with cue-controlled relaxation. Homework to practice the relaxation technique daily was assigned.

Following this, participants met once per week, for 90-min sessions, for nine consecutive weeks, in small groups with their police group leader. The leader began each session with a review of the previous week's session and homework assignment. The leader addressed any difficulties and emphasized enhancing skills to succeed in difficult situations. The group then practiced an abbreviated, 15-min version of the relaxation techniques. Over the next 60 min, two police-relevant stress scenarios were presented. The presentation included exposure to critical incident police work scenarios via narrated, present-tense scenarios and guided imagery, read aloud by the group leader. Direction in adaptive coping skills and police technical/strategic skills was incorporated into the scenario presentation. For example, officers might be instructed to imagine themselves approaching a threatening situation with particular tactical movements, attending to certain stimuli in the environment, and using their weapon appropriately. Each scenario was described in great detail with vivid imagery to ensure that participants developed vivid, life-like mental images during the scenario, were emotionally engaged and physiologically aroused.

This skills training emphasized producing helpful internal states (e.g., using cue-controlled relaxation technique to remain calm and focused), as well as employing proper tactical solutions (e.g., managing one's weapon effectively). The police group leader then debriefed participants' experiences of the imagery exercises and helped to address possible unanticipated effects. To solidify the training's effects, officers were encouraged to practice at home three or four times per week between the sessions, and 76% of officers reported that they reviewed the scenarios 3 or more times per week. A scripted audiotape was provided to all participants in order to facilitate the imaginal process and to induce cue-controlled relaxation.

The imaginal training was designed to increase participants' familiarity with potential future trauma and stressors, which is expected to increase their cognitive processing efficiency when applying their skills to similar situations on the job. Thus, participants not only had exposure-based preparation for potential duty-related incidents, but also learned job-specific skills, self-efficacy, and increased predictability of their job in order to promote successful adjustment to future trauma exposures.

To develop the scenarios used in the present study, highly experienced police officers were interviewed about their experiences with potentially difficult events. During these interviews, the officers identified 33 stressful emotions and experiences that police officers were likely to encounter within their first year on the force. Based upon these interviews, a survey containing 33 police scenarios was developed. The survey was mailed to 26 other experienced officers in two different police districts and scored for stressfulness. The respondents were asked to select the 10 most commonly experienced scenarios, or the scenarios they were most concerned about experiencing. The 10 most frequently endorsed

scenarios were ultimately retained and developed into training scenarios. The ten scenarios were as follows: 1. a threatening situation while alone in a room, 2. fire with civilians left in the house, 3. active robbery with gunshots, 4. domestic violence where children are adversely affected, 5. death involving a child, 6. facing a threatening situation not really knowing what a suspect is carrying in his hands, 7. meeting an armed suspect with a gun face-to-face, 8. high-speed car chase where the officer does not have control over the direction of the suspect's car, 9. traffic accidents with multiple car involvement and with severely injured persons, and 10. experiencing another police officer in a life-threatening situation.

Measures

Participants received a full battery of tests three times in the course of this study: Time 1—during the final semester of police academy immediately before the initiation of training in the intervention group (i.e., baseline), Time 2—after the completion of training and 3 weeks before graduating from the academy, and Time 3—after 18 months of service as a police officer (thus, all officers were followed for a total of 2 years). All of the indicated measures were given at each testing interval.

Somatic symptoms

Somatic symptoms were measured with the Bodily Symptom Scale (Cronbach's alpha = 0.71), an instrument developed by the present authors in a previous study (Petterson et al. 1995). This self-report measure taps a number of relevant constructs using Likert-type scales, with higher scores indicating higher degrees of symptoms. We employed the following indices from this measure: gastric pain (range 3–12), gastric symptoms (range 5–20), and heart complaints (range 4–16).

Coping

A brief, 3-item measure of coping was adopted from previous research into work-related psychosocial stressors (Petterson and Arnetz 1998). This problem-based coping measure (Cronbach's alpha = 0.62) utilizes a response format of 1–4, with higher scores indicating greater use of active planning and stepwise concentration to manage work problems.

Mental well-being

To assess mental well-being, the 12-item abbreviated version of the General Health Questionnaire (Banks et al. 1980; Goldberg 1980), which has been well validated and used in a large number of studies, was used. Responses are provided on a 4-point Likert-type scale. Scores range from 12 to 48, with lower scores indicating greater mental well-being.

Sleep quality

The Karolinska Institute Sleep Questionnaire (Kecklund and Akerstedt 1992) was used to measure sleep quality. The scale has 12 items (measured on a 1–5 scale) and measures three aspects of sleep: quality of sleep (6 items), nighttime awakening (2 items), and daytime sleepiness (4 items), with higher scores indicating a better quality of sleep. This scale has been validated by comparing it to electroencephalographic measurements, shift work behavior, and endocrine responses (Åkerstedt et al. 1994).

Exhaustion

The concept of vital exhaustion (excessive fatigue, irritability, and demoralization) was measured using Appels et al.'s Maastricht Questionnaire (Appels et al. 1987). Higher scores on the measure indicate greater levels of exhaustion. This 21-item questionnaire has

adequate psychometric properties and has demonstrated a positive correlation with depression and other physical ailments (Raikkonen et al. 1996).

Blood hormone sampling and analysis

Blood sampling was conducted in the morning during the same time period for each participant (i.e., there was never more than a 15-min difference in the time of day between a participant's three blood samplings in order to control for possible differences due to circadian rhythm). The bloods samples were all collected between 8:00 and 10:00 a.m. Blood samples were centrifuged and frozen at −80°C for later determination in a university laboratory with an approved control/quality assurance program (Arnetz and Kallner 1994). Serum levels of prolactin, serum cortisol, and dehydroepiandrosterone-sulfate (DHEA-s) were determined using commercially available radioimmunoassay techniques. The coefficient of variation for this test is 7.0%. For all of the indicated hormones, there are established internal and external laboratory quality checks to ensure the laboratory performance keeps up to specifications.

Statistics

A two-way, repeated-measures ANOVA was conducted to examine for the presence of an interaction between type of training (i.e., control vs. intervention) and outcome measures. There were no significant baseline differences between the two groups regarding physiological or psychosocial variables. Additionally, a two-way, repeated-measures ANOVA examined whether the two groups experienced differing levels of exposure to threat and violence between the start of training and 18 months later. The two groups did not differ in levels of self-reported violence exposure: $F(1,62) = 1.18$, $p = 0.81$.

A series of logistic regression models were reviewed to compare the two groups' improvement across the study's duration. Three such models were tested: Model 1—group membership predicting "Improvement" or "No Improvement/Decrease" on the GHQ; Model 2—group membership predicting "Improvement" or "No Improvement/Decrease" on the GHQ, controlling for the exposure to violence; and Model 3—group membership predicting levels of prolactin ("Lower" or "No Change/Increase"). To qualify as having improved, a participant had to demonstrate a one-point increase from their initial measurement (during their final semester at the academy) to their concluding measurement (after 18 months as an active duty police officer).

The study was approved by the Karolinska Institute's Ethics Committee, and informed consent was obtained from the officers prior to their participation.

Results

All variables of interest are summarized in Tables 1 and 2.

As can be seen in Figs. 1, 2, 3, 4, and 5, significant differences between imagery-trained police and the control group emerged over time in a variety of physical and psychological health measures. No significant gender differences were found on any of the present variables.

Figure 1 reveals that general health (as measured by the GHQ) in the intervention group developed differently than controls over time, with the intervention group enhancing their GHQ and the control group decreasing theirs (time × group interaction $p < 0.05$). At time 3, general health in the intervention group ($M = 31$, SD = 2.03) was significantly higher than in the control group ($M = 27$, SD = 2.03).

Stomach problems, as measured by the Bodily Symptoms Scale, were found to develop differently over time, with the intervention group reporting a decrease in symptoms and the control group reporting an increase in symptoms (time × group interaction $p < 0.05$). At time 3, the intervention group reported fewer gastric symptoms and less gastric pain ($M = 6.1$, SD = 4.06) than did controls ($M = 27$, SD = 2.03). However, significant differences among heart complaints did not arise. See Fig. 2.

Reported sleep difficulties were also found to develop differently over time between the two groups. Those in the intervention group decreased their self-reported sleep difficulties, while those in the control group increased theirs (time × group interaction $p < 0.05$). At time 3, the intervention group ($M = 6.6$, SD = 2.74) reported significantly lower levels of sleepiness and less difficulty waking up in the morning than did controls ($M = 6.1$, SD = 2.16). See Fig. 3.

Significant differences between imagery-trained police and the control group were also found on psychological variables. Over time, imagery-trained officers reported less vital exhaustion and controls reported significantly more (time × group interaction $p < 0.05$). At time 3, imagery-trained officers ($M = 36$, SD = 12.17) reported significantly less vital exhaustion than controls ($M = 32$, SD = 18.49). These items were reverse coded, such that vital exhaustion became described as a positive trait (i.e., resistant to vital exhaustion). See Fig. 4.

Similarly, those in the intervention group significantly increased their use of problem-based coping over time, while those in the intervention decreased theirs (time × group interaction $p < 0.05$). At time 3, those in the intervention group ($M = 10.1$, SD = 4.01) also demonstrated significantly more problem-based coping than controls ($M = 8.4$, SD = 4.13). See Fig. 5.

No significant differences were found between the two groups on measures of cortisol or DHEA.

Multivariate analyses

The first logistic regression model used group membership (i.e., intervention or control) to predict participants' likelihood of either "Improving" their GHQ scores, or demonstrating "No Improvement/Decrease." The model accounted for a significant portion of the variance in GHQ improvement ($p < 0.05$). Review of the odds ratios revealed that those in the intervention group were significantly more likely to increase their GHQ score as compared to the control group: OR = 3.5 (95% CI, 1.2–10.0; $p < 0.05$).

The second logistic regression model used group membership to predict participants' likelihood of either "Improving" their GHQ scores, or demonstrating "No Improvement/Decrease," while treating exposure to violence as a covariate. The model accounted for a significant amount of the variance in GHQ improvement ($p < 0.05$). Review of the odds ratios revealed that those in the intervention group, after controlling for differences in exposure to violence, were significantly more likely to increase their GHQ score: OR = 4.1 (95% CI, 1.3–13.7; $p < 0.05$).

The third logistic regression model used group membership to predict participants' likelihood of either "Lowering" their level of prolactin, or demonstrating "No Change/Increase." The model accounted for a significant amount of the variance in prolactin decrease ($p < 0.05$). Participants in the intervention group were significantly more likely to decrease their level of prolactin: OR = 3.4 (95% CI, 1.1–10.7; $p < 0.05$).

Discussion

The results of the present study provide evidence for the utility of an imagery-based training protocol for urban police officers. These results suggest that the training protocol is efficacious in reducing stressful responses among police officers in terms of both physical health and psychological well-being. The ultimate aim of the program was to provide police officers with the necessary skills to better endure the extreme stressors of their profession, thereby providing a protective factor against the development of deleterious psychobiological responses. Given the present study's results, it appears that there is preliminary evidence to suggest that the program can prove successful in this regard.

In a fashion similar to techniques designed to prepare individuals to endure stressful medical procedures (Schultheis et al. 1987), the provided training bolstered the officers' resiliency in the face of stressful incidents, thereby dampening their negative impact. This is demonstrated through the intervention group's significantly lower scores on the General Health Questionnaire (GHQ). Factor analytic investigations have revealed that the GHQ is comprised of two central domains: 1. the inability to engage successfully in one's typical functions and 2. the emergence of new distressing symptoms (Werneke et al. 2000). Thus, the GHQ provides a general measure of the officers' level of mental health, as well as their current functioning. The lower scores presented by the intervention group suggest that officers who received the training enjoyed lower levels of depression, anxiety, and social dysfunction than did the control group. Additionally, though it is speculative, blunting the effects of present stressors may ultimately lessen the cumulative toll that officers endure, thereby offering the intervention group added protection against the future difficulties. In support of this notion, results of the logistic regression analyses revealed that even after 18 months of field work, those receiving the training were more likely to exhibit improved GHQ scores than controls.

Of further interest is the finding that the intervention group experienced significantly less sleep difficulty than did controls. Sleep disturbances are strongly associated with stress and general psychopathology (Marmar et al. 2006) and are a particularly common concern among police officers (Philips et al. 1991). By obtaining adequate amounts of rest, police officers in the intervention group are likely bolstering their physical and psychological resiliency. Similarly, in addition to improved resiliency, obtaining adequate rest may provide officers with additional physical energy and cognitive resources, an important result given that previous research has indicated that difficulties in sleep are negatively correlated with improved work performance (Kales et al. 1984). Both such benefits may ultimately provide a protective factor against future stress exposure. In essence, officers complaining of sleep difficulties may in fact be providing evidence of underlying psychological difficulties.

In support of this notion, officers receiving the training also self-reported fewer stomach problems. This again provides a barometer of physical health, but more interestingly, it serves as an indirect measure of psychological complaints. There is evidence to suggest that the report of gastric symptoms often represents the somatization of underlying psychic conflicts, though this relationship appears to be partially mediated by quality of sleep (Mohr et al. 2003). Given police officers' noted hesitancy to self-report psychological difficulties (Becker et al. 2009), the appearance of potentially somatic symptoms is of great importance. Though the present study cannot disentangle the precise nature of the relationships between quality of sleep, stomach difficulties, and general mental health, it seems reasonable to suggest the lower level of potentially somatic symptoms (and therefore greater physical health) found within the intervention group offers strong evidence for the training's effectiveness.

Yet beyond the mere absence of symptoms, those participating in the training also reported greater use of coping strategies in their work, meaning that they identified specific goals and enacted plans to achieve them. This use of adaptive coping strategies among the intervention group suggests that the police officers receiving the training were better able to use their internal resources to formulate responses to external demands. It would seem that officers who have engaged in the imaginal training are able to translate the sense of control and awareness emphasized in the training to their general work. This is a highly relevant protective factor for police officers, as those who view external stimuli as challenges that can be successfully engaged (a core message of the intervention's training) are least likely to develop symptoms of anxiety-based disorders (Sommer and Ehlert 2004). The rehearsal and skills training offered in the intervention thus seems to not only lessen the impact of stress exposure, but further helps officers to develop more confidence regarding their ability to function adaptively.

We used serum prolactin as an unspecific, but highly sensitive marker of physiological arousal (Arnetz 1996). Participants in the intervention group were significantly more likely to lower their prolactin during the 2 years in the field as compared to controls. This is in line with self-reports of lower stress and improved resiliency, including sleep, in the intervention group.

It is important to note, however, that the predicted differences among levels of cortisol and DHEA did not arise. In the case of the former, the failure of the two groups to produce differing levels may be explained in a variety of ways. The precise relationship between cortisol and resiliency has been difficult establish, and it seems that a number of variables may moderate the relationship between the two, including the extent of previous trauma exposure and levels of anticipatory stress (Yehuda et al. 2002). Additionally, although previous research has indicated that the training protocol is capable of producing higher levels of cortisol immediately following a stressful experience (i.e., a protective increase), the duration of these gains is short term (Arnetz et al. 2009). Given that the span of time between measurements was 12 months, it is perhaps unreasonable to expect sustained changes in baseline levels. Finally, given the important distinction between a short-term elevation of cortisol in response to an immediate experience and the deleterious effects of extended cortisol activation, it may be argued that the failure to find significant differences suggests an adaptive physiological response for both groups.

The case of DHEA is somewhat more difficult to explain. Previous research has suggested that it may provide a superior measure of resiliency and may have a more long-term effect (Morgan et al. 2005). It is uncertain why the present study has not significantly impacted the production of DHEA, despite the training's previously established ability to improve performance and biological markers of stress (Arnetz et al. 2009) and the concurrent finding that the training improves physical and mental well-being. Of course, a myriad of factors underlie resilience, including personality, previous experiences, and incident-related attributions. Spoken simply, resiliency is more than DHEA values. Future research with greater numbers and a broader assessment of participant characteristics will likely be required to better understand this issue.

In sum, the present study provides important evidence for the incremental validity of the employed training protocol. By comparing police officers receiving the training as a supplement to their standard curriculum against those receiving training as usual, the positive gains witnessed may be regarded as extending beyond that which police officers would typically receive. It appears that training blending psychological preparation and tactical rehearsal is capable of greatly improving the psychological resilience of active police officers, providing a critical supplement to standard training.

Furthermore, by assessing the officers after they had served for an extended period of time on active duty, ecological validity can be confidently asserted. Whereas more laboratory-based assessments are often somewhat artificial (e.g., Kirschbaum et al. 1993), the performance of officers in the field provides the ultimate litmus test for the training's utility. That the critical incident simulation was able to maintain significant benefits over the course, a 2-year period provides its most important result. Police officers represent an important population for study because of their frequent exposure to stressful work conditions and events; thus, only training that is able to sustain its gains in the face of such frequent trauma exposure is truly worthwhile.

In conclusion, the validity and functional utility of the employed training protocol has been supported. Those receiving the training protocol were found to have superior psychological and physical health than those in the control group, and these benefits were maintained after 2 years of police work, not only in terms of self-reported health, but in a objectively measured biomarker of stress—prolactin. The successful implementation of this intervention among active duty police officers, a population whose rate of stress-related maladies is alarmingly routine, is the study's greatest endorsement. To successfully employ a novel, stress prevention training protocol among a group that faces extremely difficult conditions suggests that similar methodologies could find equal or greater success among other populations. It further offers strong evidence for the worth of preventative training, as opposed to the reactionary interventions that are more commonly utilized.

Acknowledgments

The authors would like to thank the participating police cadets and officers, the management of the Police Academy of Solna and the Stockholm Police Department, as well as representatives of the Special Forces who made this study possible by volunteering their time and expertise. This research was financed by the Swedish Work Environment Fund (currently, Swedish Council for Working Life and Social Research), project reference numbers 91-0734 and 94-1782. Dr. Arnetz and Mr. Arble were partially supported by Award Number R34MH086943 from the National Institute of Mental Health. Dr. Arnetz was furthermore partially supported by a grant from the Swedish Royal Foundation (Kungafonden). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Mental Health or the National Institutes of Health.

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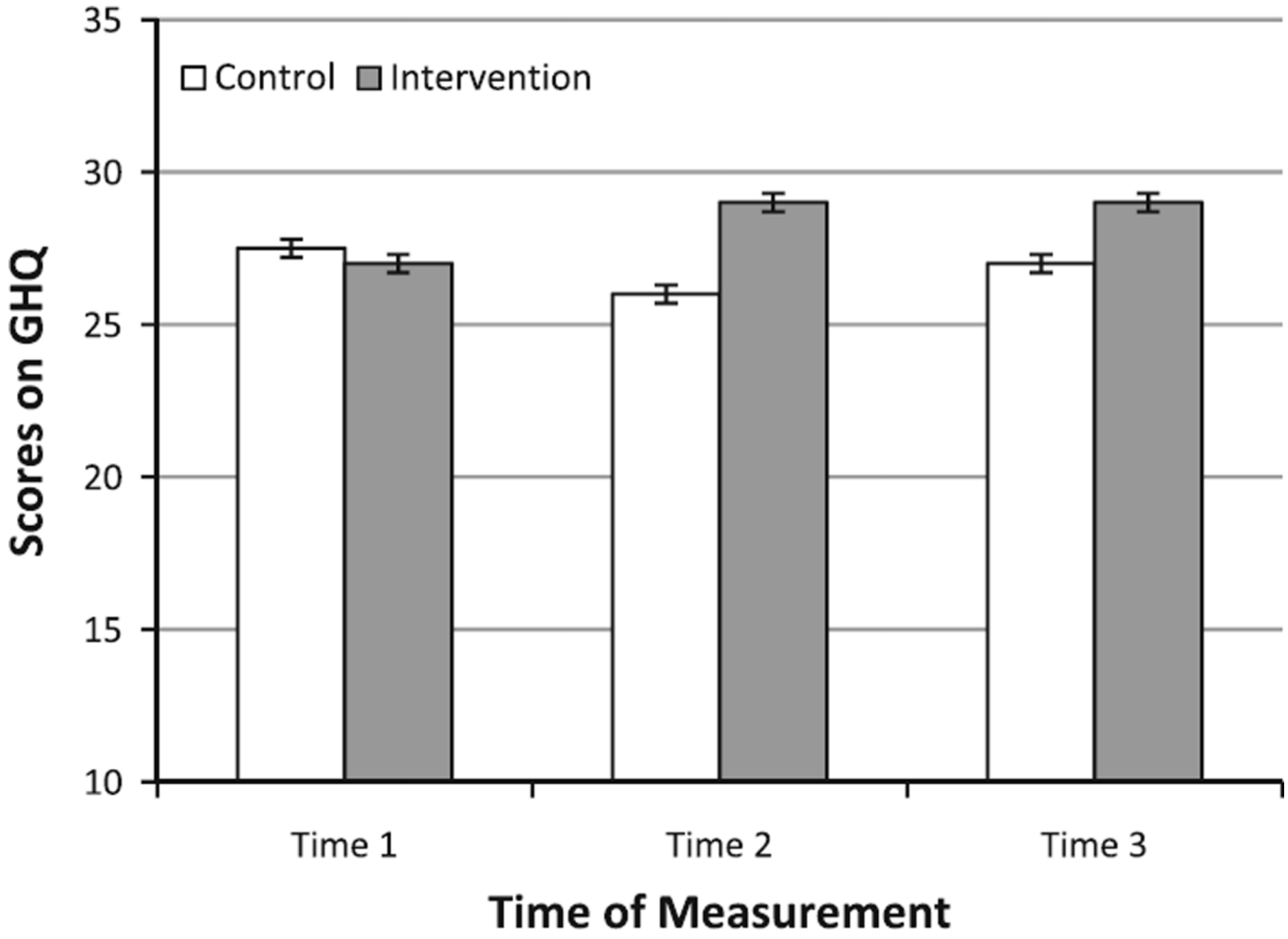

Fig. 1.

Interaction of time of assessment with group membership (i.e., control vs. intervention) on scores on the General Health Questionnaire (±SE). The interaction between time and group membership was found to be significant: $p < 0.05$. *GHQ* General Health Questionnaire. Higher scores on the GHQ indicate greater levels of health

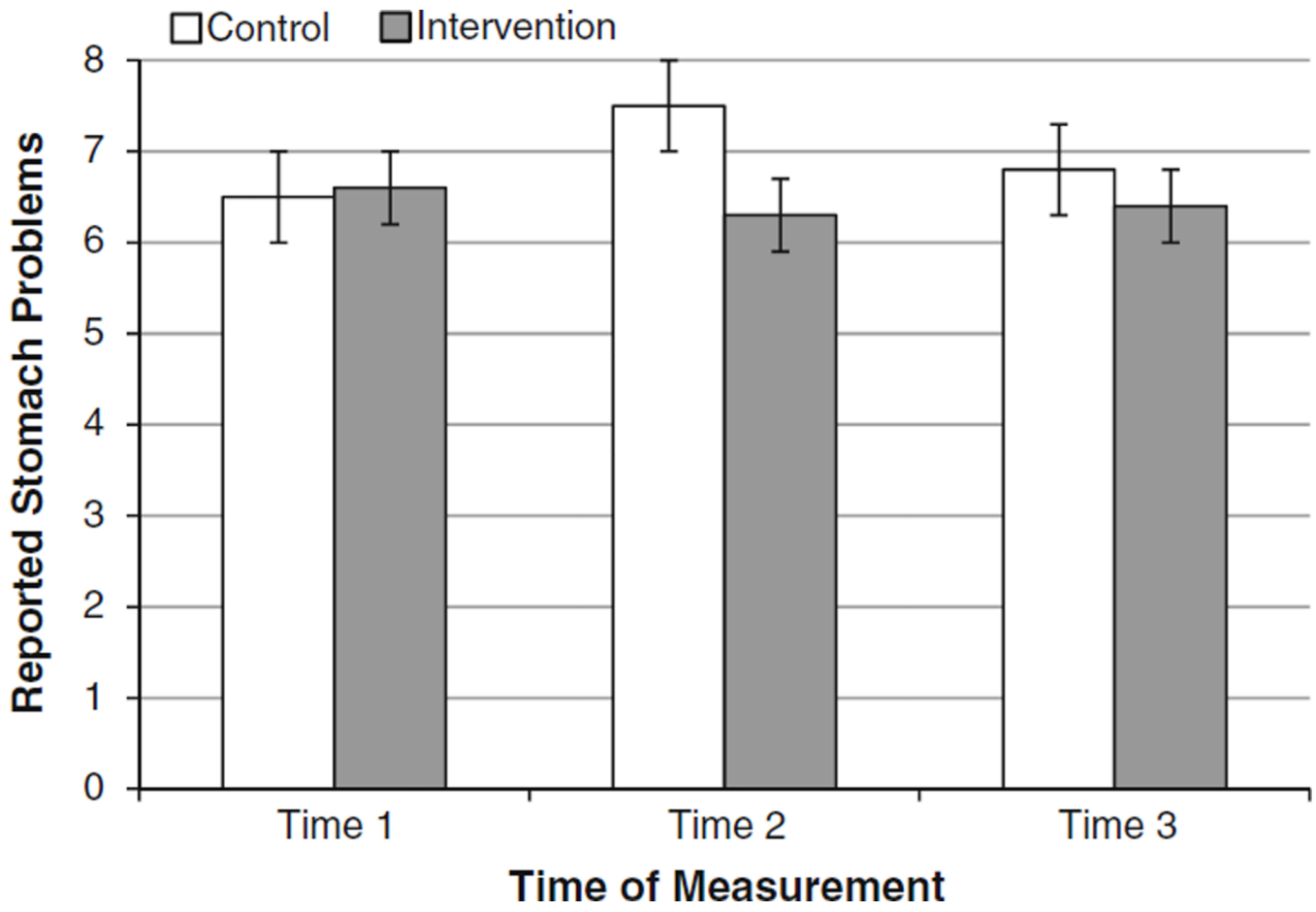

Fig. 2.

Interaction of time of assessment with group membership (i.e., control vs. intervention) on stomach difficulties reported on the Bodily Symptom Scale (±SE). The interaction between time and group membership was found to be significant: $p < 0.05$. Higher scores on the Bodily Symptom Scale indicate greater levels of stomach difficulties

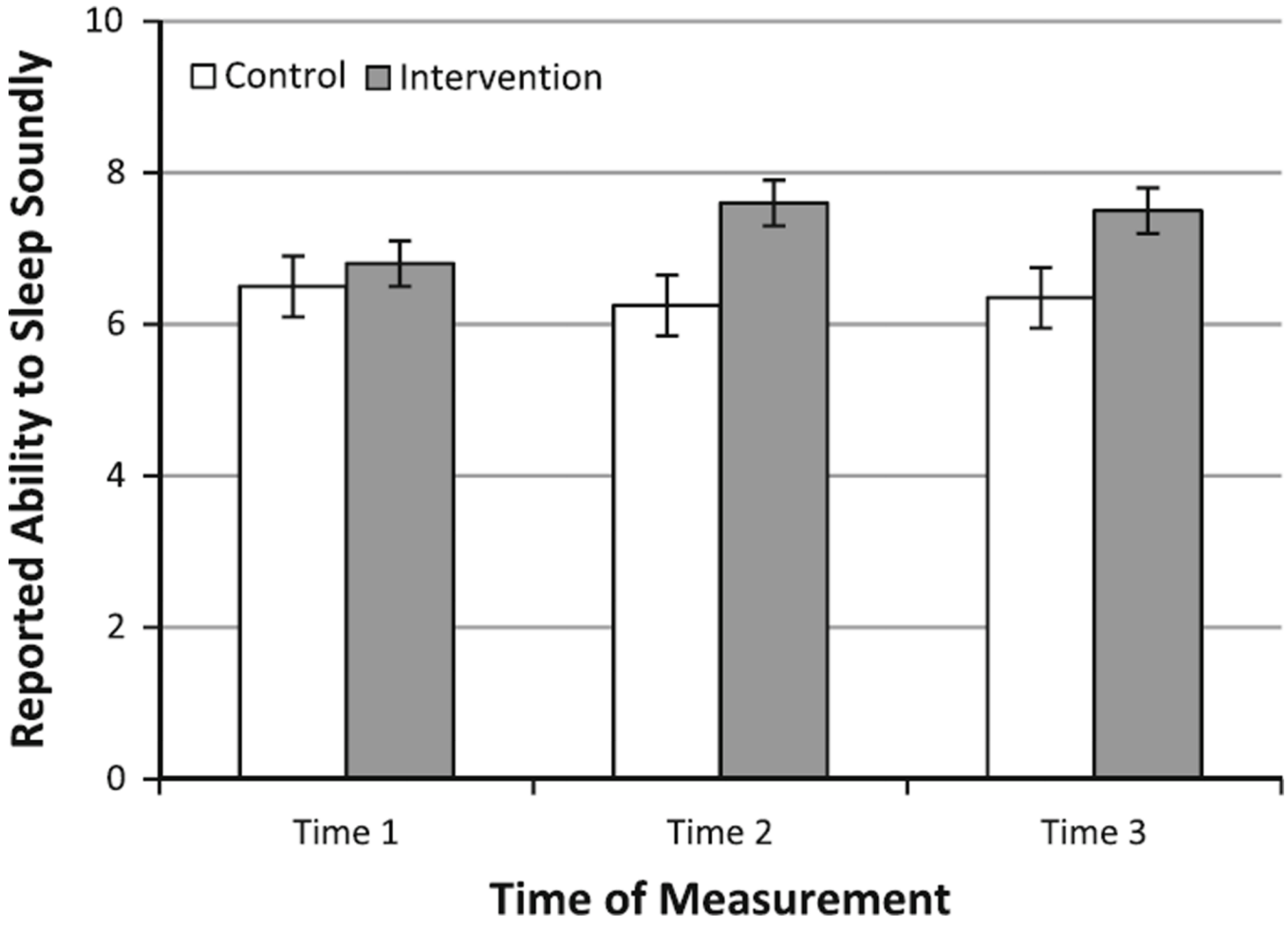

Fig. 3.

Interaction of time of assessment with group membership (i.e., control vs. intervention) on scores of ability to sleep soundly (±SE). The interaction between time and group membership was found to be significant: $p < 0.05$. Higher scores indicate a better quality of sleep

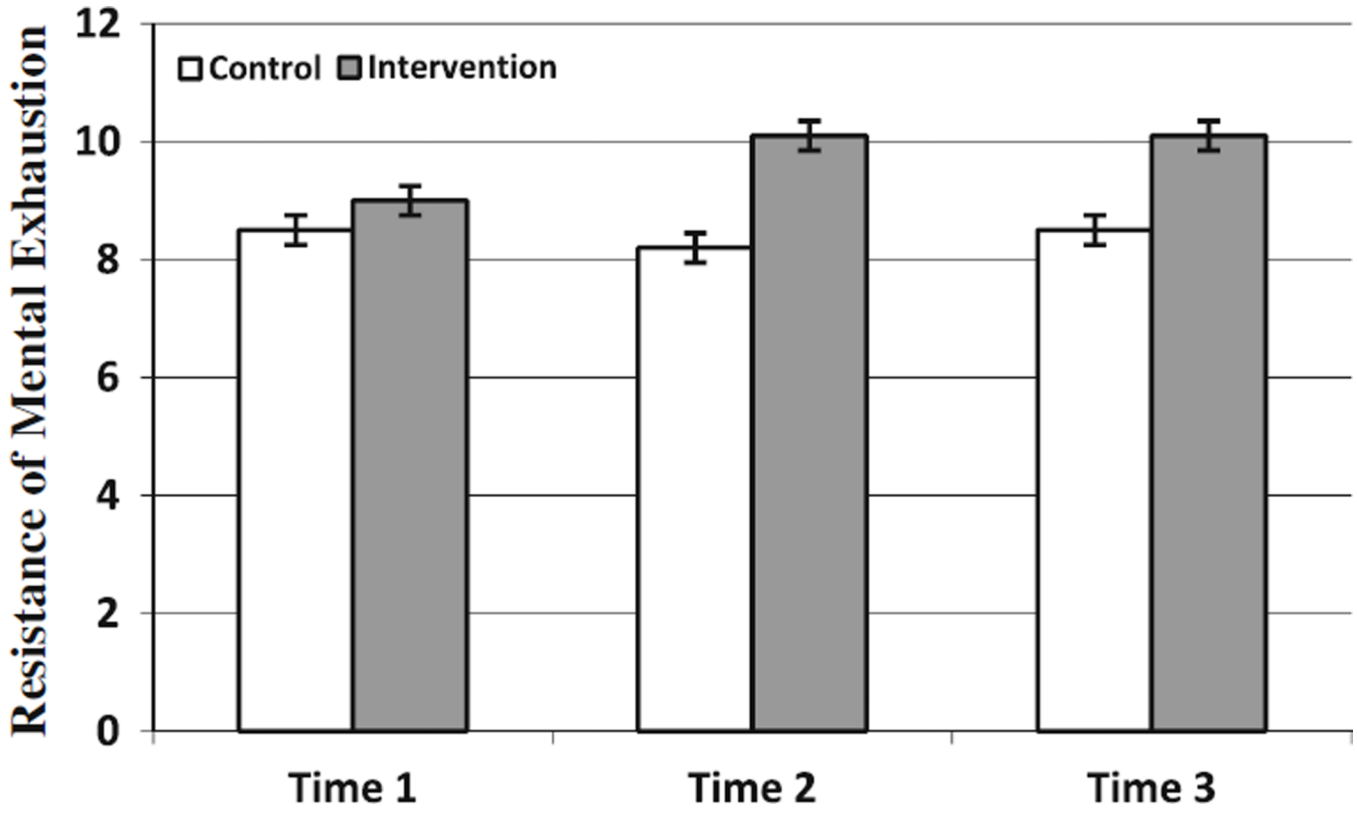

Fig. 4.

Interaction of time of assessment with group membership (i.e., control vs. intervention) on scores of vital exhaustion (±SE). The interaction between time and group membership was found to be significant: $p < 0.05$. Scores were coded such that higher scores indicate lower levels of exhaustion

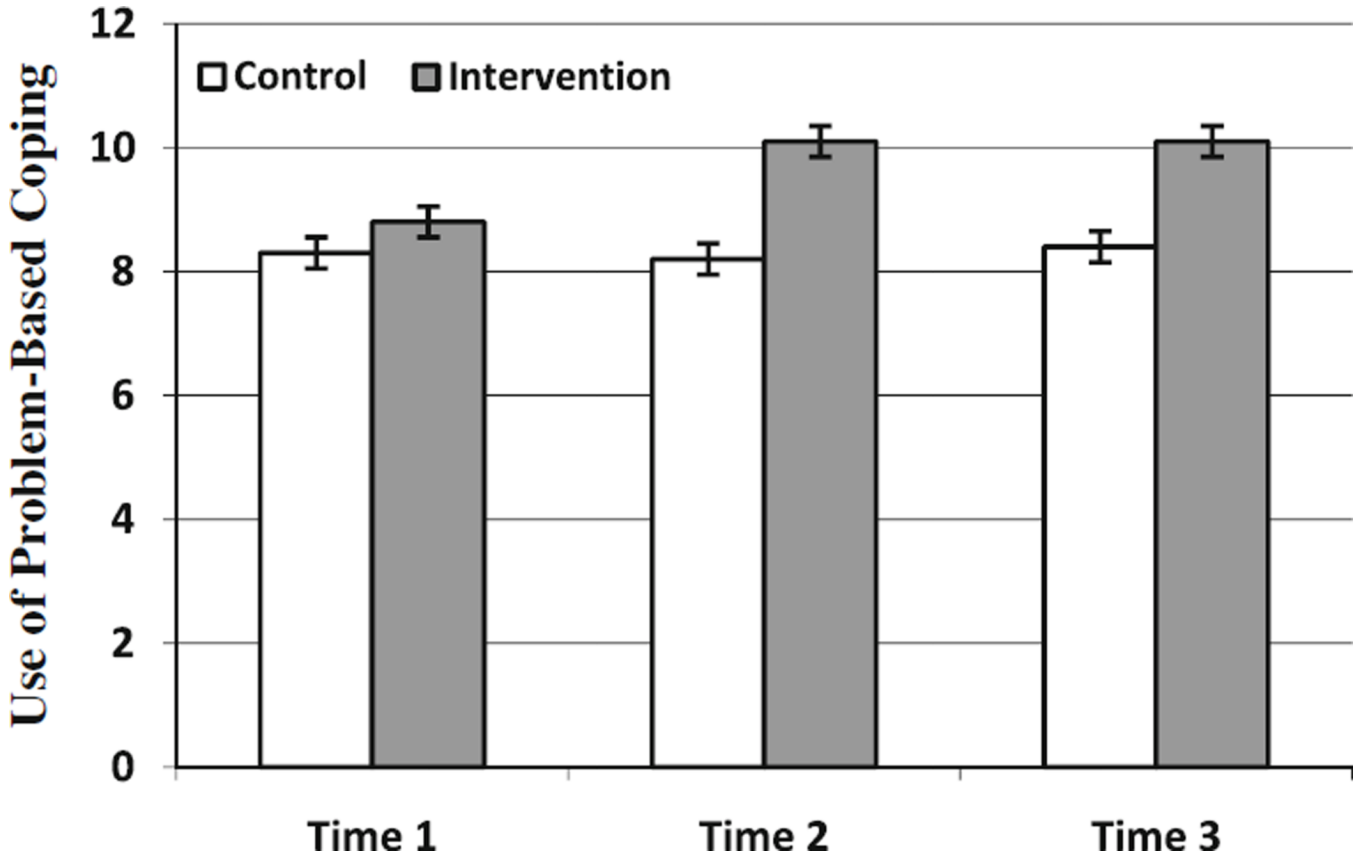

Fig. 5.

Interaction of time of assessment with group membership (i.e., control vs. intervention) on scores of problem-based coping (±SE). The interaction between time and group membership was found to be significant: $p < 0.05$. Higher scores indicate greater use of problem-based coping

Table 1

Summary statistics for the intervention group ($n = 31$)

Variable	Baseline			Follow-up		
	Mean (SD)	SEM	Range	Mean (SD)	SEM	Range
Prolactin (μg/L)	7.23 (4.10)	0.74	3.40–21.00	7.65 (3.65)	0.66	3.60–19.00
DHEA (nmol/L)	13.22 (4.87)	0.87	4.50–25.00	12.71 (8.77)	1.57	4.00–51.00
Cortisol (nmol/L)	418.32 (165.08)	29.65	237.00–872.00	425.97 (137.06)	24.62	162.00–802.00
Coping skills	26.65 (2.93)	0.53	21–31	27.94 (2.31)	0.41	23–32
Appels'	34.61 (7.03)	1.26	18–42	38.03 (4.44)	0.80	21–42
GHQ	28.42 (4.06)	0.73	19–33	30.39 (4.21)	0.76	15–36
Karolinska	24.30 (3.48)	0.63	15–30	25.13 (2.94)	0.54	18–30
Cardiovascular complaints	4.43 (0.86)	0.16	4–7	4.23 (0.68)	0.12	4–7
Gastric pain	6.87 (1.98)	0.36	5–13	6.30 (1.47)	0.27	5–11
Gastric symptoms	3.55 (1.12)	0.21	3–7	3.69 (0.93)	0.17	3–6
Bodily symptoms *	14.79 (3.08)	0.57	12–26	14.24 (2.60)	0.48	12–22

* Cardiovascular complaints + gastric pain + gastric symptoms

Int Arch Occup Environ Health. Author manuscript; available in PMC 2014 January 01.

Table 2

Control group (n = 34)

Variable	Baseline			Follow-up		
	Mean (SD)	SEM	Range	Mean (SD)	SEM	Range
Prolactin (µg/L)	6.62 (3.62)	0.62	2.60–20.00	8.00 (5.34)	0.92	3.30–32.00
DHEA (nmol/L)	15.59 (6.95)	1.19	6.80–32.00	12.94 (7.43)	1.27	2.00–35.00
Cortisol (nmol/L)	435.82 (165.61)	28.40	215.00–839.00	489.53 (197.68)	33.90	142.00–1,130.00
Coping skills	25.37 (2.52)	0.43	20–30	25.66 (2.51)	0.42	21–32
Appels’	35.20 (5.76)	0.97	23.00–42.00	34.29 (7.60)	1.28	8–42
GHQ	28.79 (3.11)	0.53	20–33	29.09 (3.37)	0.58	17–35
Karolinska	24.06 (2.90)	0.51	19–30	23.52 (3.27)	0.57	15–30
Cardiovascular complaints	4.09 (0.29)	0.05	4–5	4.29 (0.63)	0.11	4–6
Gastric pain	6.83 (1.69)	0.29	5–12	6.97 (1.60)	0.27	5–11
Gastric symptoms	3.55 (1.12)	0.21	3–7	3.69 (0.93)	0.17	3–6
Bodily symptoms *	14.24 (1.95)	0.34	12–19	15.06 (2.74)	0.47	12–24

* Cardiovascular complaints + gastric pain + gastric symptoms