

# The effects of stress management on symptoms of upper respiratory tract infection, secretory immunoglobulin A, and mood in young adults

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## Abstract

**Objective:** To investigate the efficacy of a stress management programme on symptoms of colds and influenza in 27 university students before and after the examination period. **Method:** The incidence of symptoms, levels of negative affect, and secretion rate of secretory immunoglobulin A (sIgA) were recorded for 5 weeks before treatment, for the 4 weeks of treatment, and for 8 weeks after treatment in treated subjects and in 25 others who did not participate in stress management. **Results:** Symptoms decreased in treated subjects but not in controls during and after the examination period. Although sIgA secretion rate increased

significantly after individual sessions of relaxation, resting secretion rate of sIgA did not increase over the course of the study. Negative affect decreased after examinations in both groups, but was not affected by treatment. **Conclusion:** Stress management reduced days of illness independently of negative affect and sIgA secretion rate. Although the component of treatment responsible for this effect has yet to be identified, psychological interventions may have a role in reducing symptoms of upper respiratory tract infection. © 2001 Elsevier Science Inc. All rights reserved.

*Keywords:* Secretory IgA; Stress management; Upper respiratory tract infections

## Introduction

The common cold is the leading cause of appointments to medical doctors in the developed world [1]. The National Centre for Health Statistics in America reported that acute respiratory conditions (mainly influenza and the common cold) occur annually in 90% of the population [2]. It has been estimated by the US Centre for Disease Control and Prevention that more than 425 million upper respiratory tract infections (URTI) occur annually in the United States, resulting in US\$2.5 billion in lost school and work days and in medical costs [2]. Since there is no specific medical treatment for viral infection (except for influenza A), understanding the relationship between URTI and its various risk factors has potential implications for public health.

Psychological stress is now recognized to be one of the important risk factors for URTI. The incidence of colds and

flu has been linked to dissatisfaction with life, a high degree of life change events, a decrease in desirable daily events, and an increase in undesirable daily events [3–14]. Furthermore, in studies which controlled the exposure to respiratory viruses, symptoms of URTI varied in proportion to ratings of life stress preceding the inoculation [15–19].

If psychological stress increases susceptibility to symptoms of URTI, then psychological treatments theoretically should lower susceptibility [20]. We recently reported that days of illness decreased after stress management training and training in imagery techniques in children with frequent URTI [21]. Treatment effects persisted at follow-up 1 year later. To date, the utility of these techniques for reducing susceptibility to URTI in adults does not appear to have been explored.

Upon infection by a pathogen causing URTI, there is an outpouring of secretory immunoglobulin A (sIgA), a marker of protection against URTI [22], which peaks by the fourth day of symptoms [23]. sIgA is a major effector against pathogens causing URTI by preventing adherence of viruses to the nasal and oral mucosa. Chronic sIgA deficiency, on the other hand, has been associated with

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recurrent URTI [24,25], presumably due to loss of this important effector function.

A variety of psychological techniques involving various kinds of relaxation have been found to be effective in increasing sIgA levels. Interventions employed in these studies include humorous video [20,26], progressive muscle relaxation and focused breathing with and without imagery [27], Benson's relaxation response, guided visualization, massage, lying quietly with eyes closed [28], focused breathing alone [29], music-assisted specific imagery, music-assisted nondirected imagery, sitting quietly [30,31], hypnosis with and without specific suggestion to alter immune responses [32], and relaxation with and without specific suggestions [33,34]. These findings are important because they offer the possibility of developing psychological treatments to increase resistance to URTI by increasing average levels of sIgA. In a previous study in our laboratory [21], a decrease in symptoms of URTI toward the end of psychological treatment was accompanied by an increase in basal levels of sIgA. Thus, psychological treatment may increase resistance to infection of the upper respiratory tract.

The aim of the present study was to determine whether stress management techniques would decrease symptoms of URTI in university students during the examination period, a time traditionally regarded as highly stressful. We also wanted to determine whether stress management techniques would influence basal secretion of sIgA. We hypothesized that basal secretion of sIgA would be higher and symptoms of colds and flu would be lower in students who received stress management training than in a control group who recorded their cold and flu symptoms over the study period but who were not trained in stress management.

## Methods

### *Subjects*

The sample consisted of university students who were required to be in good health, apart from a history of URTI. Subjects were recruited by notices placed around the university campus publicizing a stress management programme for students who suffered from examination anxiety. However, most of the subjects who volunteered to participate were enrolled in undergraduate psychology units. Of 84 potential subjects who were interviewed by telephone, 32 suffered from a medical condition, decided not to continue after their initial inquiry, or dropped out during baseline. The 52 remaining subjects were aged between 18 and 54 years (10 males and 42 females). The gender bias towards females reflects the preponderance of females enrolled in undergraduate psychology units at our university. Twenty-seven participants (seven males) were allocated randomly to the Treatment Group and 25 (five males) to the Control Group. Twelve of the treated subjects and 13 of the control subjects were sedentary, whereas the remainder exercised

three times per week or more. There were four smokers in the treatment group and three smokers in the control group. Each subject provided their informed consent for the procedures, which were approved by the Murdoch University Human Research Ethics Committee.

### *Experimental procedure*

The university semester consisted of 13 teaching weeks and two nonteaching weeks. The examination period was preceded by 1 week of preparation. Mood and symptom ratings were initially obtained over a 5-week period in all subjects (pretreatment baseline). For subjects allocated to the treatment group, eight treatment sessions were completed over the next 4 weeks. Treatment ended in the last teaching week before semester examinations.

Sessions 1 and 2 of treatment covered stress awareness training and time management strategies. To raise their awareness of stress-related symptoms, subjects rated the degree of discomfort caused by anxiety in specific situations (e.g., tests or deadlines), by interpersonal and nonspecific anxiety, negative moods and emotions (e.g., depression, anger, fear), and by physical symptoms (e.g., muscular tension, headaches, indigestion, sleeping difficulties). Principles of time management (identifying high priorities, setting effective goals, developing an action plan, organizing time, evaluating progress, and combating procrastination) were then discussed as a starting point for managing exam-related anxiety [35]. During Sessions 3–5, subjects practiced breathing techniques, progressive muscle relaxation, and guided imagery [32]. In Session 3, subjects focused their attention on internal physical sensations and on sensations associated with breathing. Subjects then practiced deep abdominal breathing and other calming techniques [35]. Progressive muscle relaxation was introduced in Session 4. At the end of this session, participants were provided with a 90-min cassette tape containing a selection of relaxation exercises, and were asked to listen to parts of the tape daily for the rest of the treatment period. In Session 5, relaxation was supplemented by a guided imagery script used by Olness et al. [32], modified slightly to suit adults rather than children. The visualization in this script encourages participants to feel in control of their body, and to imagine themselves producing immune proteins in their saliva that fight disease. This visualization was included on the relaxation tape, and subjects were asked to listen to it daily. In Session 6, a stressful events hierarchy was individually constructed, and participants practiced the relaxation techniques while they worked their way through the hierarchy in imagination. In Session 7, participants created a personal list of stress-coping thoughts and applied these thoughts as well as the relaxation techniques to the stress hierarchy. Since many students had included end-of-semester exams in their stressful events hierarchy, the group attended the examination room to practice their relaxation skills in Session 8.

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