

Author, Year, Country	Study Goal	Exercise Protocol Exercise Type	Number and Sex of Subjects	Key Findings
Nieman, 1990, USA <sup>21</sup>	Randomized controlled trial to investigate the relationship between improvement in cardiorespiratory fitness, changes in NK cell number and activity, and acute URTI symptomatology	<ul style="list-style-type: none"> <li>A randomly controlled 15-week ET study (five 45-min sessions/week, brisk walking at 60% heart rate reserve). Conducted in exercise and non-exercise groups, measured at baseline, 6-week, and 15-week testing sessions</li> <li>Brisk walking</li> </ul>	36 females who were mildly obese and sedentary (aged 34.4±1.1 years)	The ET group was found to have significantly fewer URTI symptom days/incidents than the nonexercised group. Moderate ET was associated with elevated NK cell activity after 6 but not 15 weeks, and reduced URTI symptomatology in comparison to a randomized, sedentary control group
Nieman, 1993, USA <sup>22</sup>	Randomized controlled trial to investigate the relationship between cardiorespiratory exercise, immune function, and URTI in elderly females	<ul style="list-style-type: none"> <li>Sedentary females randomized to a 12-week moderate intensity (30- to 40-min/day 5 days/week) walking program or stretching (45 min/day 5 days/week) in fall season</li> <li>Brisk walking or stretching</li> </ul>	32 sedentary females (aged 73.4±1.2 years); 12 highly conditioned females (aged 72.5±1.8 years)	URTI incidence 8% in highly conditioned, 21% in walkers, and 50% in controls
Nieman, 1998, USA <sup>23</sup>	Randomized controlled trial to investigate the effect of ET and/or moderate energy restriction on innate and adaptive immunity, NK cell activity, and mitogen-stimulated lymphocyte proliferation	<ul style="list-style-type: none"> <li>12-week (five 45-min walking sessions/week at 60–75% maximum heart rate) and/or moderate energy restriction (4.19–5.44 MJ or 1,200–1,300 kcal/day) randomized to one of four groups: control, exercise, diet, exercise plus diet</li> <li>Brisk walking</li> </ul>	91 females with obesity, aged 45.6±1.1 years, BMI: 33.1±0.6 kg/m <sup>2</sup>	Days with symptoms of URTI were reduced in subjects in the exercise group, relative to subjects in the non-exercise groups. Energy restriction and weight loss increased mitogen-stimulated lymphocyte proliferation, but had no effect on NK cell activity
Chubak, 2006, USA <sup>24</sup>	Randomized controlled trial to investigate the effect of a moderate-intensity, year-long exercise program on the risk of colds and other URTIs in post-menopausal females	<ul style="list-style-type: none"> <li>Subjects randomized to 12 months of moderate intensity exercise (45 min/day x5 days/week) or stretching control (45 min/day x1 day/week)</li> <li>Brisk walking or stretching</li> </ul>	115 post-menopausal females who were overweight, obese, and sedentary, (aged 60.7±6.9 years)	URTI incidence was 30% in exercise versus 48% in controls
Barrett, 2012, USA <sup>25</sup>	Randomized controlled trial to investigate potential preventive effects of meditation or exercise on incidence, duration, and severity of ARI illness	<ul style="list-style-type: none"> <li>Randomized to one of three study groups: 8-week training in mindfulness meditation, matched 8-week training in moderate-intensity sustained exercise, or observational control</li> <li>Brisk walking or jogging</li> </ul>	149 (82% female; 94% White; mean age: 59.3±6.6 years)	Both global severity and total days of illness (duration) displayed lower trends in the exercise group
Barrett, 2018, USA <sup>26</sup>	Randomized controlled trial to investigate preventive effects of meditation and exercise on ARI illness	<ul style="list-style-type: none"> <li>Randomized to an 8-week behavioral training in mindfulness-based stress reduction, matched 8-week training in moderate intensity sustained exercise, or observational waitlist control</li> <li>Brisk walking or jogging</li> </ul>	390 adults (76% female; mean age: 49.6±11.6 years)	There were 112 ARI episodes and 1,045 days of ARI illness in the mindfulness-based stress reduction group, compared to 120 episodes and 1,010 illness days in the moderate intensity sustained exercise group. In contrast, the observational waitlist control group showed 134 episodes with 1,210 days of ARI illness
Fondell, 2011, Sweden <sup>27</sup>	Epidemiologic study to investigate differences in URTI risk between physically inactive and moderately active adults. Population-based prospective cohort study with baseline questionnaire on physical activity; illness symptoms assessed every 3 weeks for a follow-up period of 4 months	<ul style="list-style-type: none"> <li>Three 24-hour physical activity recalls per evaluation were obtained and averaged to quantify total moderate-vigorous activity (≥3.0 MET)</li> <li>Several</li> </ul>	1,509 (725 male; 784 female; 20–60 years)	High levels of physical activity were associated with an 18% reduced risk of self-reporting URTI compared with low levels of physical activity
Matthews, 2002, USA <sup>28</sup>	Epidemiologic study (observational) to investigate differences in URTI risk between physically inactive and moderately active adults	<ul style="list-style-type: none"> <li>Reported URTI events at 90-day intervals over 12 months of follow-up (five evaluations) were measured. Three 24-hour physical activity recalls per evaluation were obtained and averaged to quantify total moderate-vigorous activity (≥3.0 MET)</li> <li>Several</li> </ul>	547 healthy adults (49% female; 20–70 years)	Male and female subjects reported mean of 1.2 (SD: 1.4) and 1.2 (SD: 1.2) URTI events per year, respectively. This effect was stronger in males, although at similar expenditure levels, risk was reduced by about 20% in both sexes
Zhou, 2018, China <sup>29</sup>	Epidemiologic study (cross-sectional) to investigate associations between the frequency of leisure-time exercise, cigarette smoking status, and frequency of the common cold in a cold area. Participants retrospectively reported frequency of illness and physical activity over the past year	<ul style="list-style-type: none"> <li>Any type of moderate-intensity exercise</li> </ul>	1,413 adults (38.9±9.04 years; 44.4% male)	A high frequency of leisure-time exercise (≥3 days/week) was associated with a 26% reduced risk of having at least one episode of the common cold compared with a low frequency group (<4 days/month)
Nieman, 2011, USA <sup>30</sup>	Epidemiologic study to investigate URTI symptoms and severity in a heterogeneous group of community adults with various physical activity and fitness levels	<ul style="list-style-type: none"> <li>Assessment over 12 weeks during the winter and fall seasons while monitoring URTI symptoms and severity using the Wisconsin Upper Respiratory Symptom Survey and reported frequency of aerobic activity</li> <li>Mild aerobic activity</li> </ul>	1,002 adults (18–85 years; 60% female; 40% male)	The number of days with URTI during the 12-week period was significantly reduced by 43% in subjects reporting ≥5 days/week aerobic exercise compared to those who were largely sedentary (≤1 day/week), and by 46% when comparing subjects in the high versus low fitness. URTI severity and symptomatology were also reduced in the physical fitness group