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Lifestyle-Related Behaviors and Mortality: A Comparison of Physical Inactivity and Smoking

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KEY FINDINGS

- Lifestyle behaviors significantly contribute to health outcomes.
- Physical activity improves longevity.
  - People with lower daily steps and those who do not exercise have higher mortality than those who are more active.
  - Activity, especially vigorous activity, is even more important for our health as we age.
- Exercise cannot negate the negative impact of smoking.
  - Physically active smokers experience worse mortality, on average, than the least active nonsmokers.

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Rates of diabetes, heart disease, respiratory disorders, certain cancers and other noncommunicable diseases are increasing globally, and a growing body of evidence links lifestyle behaviors, such as physical inactivity, poor nutrition and smoking, to the increase.

It should come as no surprise that spending excessive time behind a computer or on a couch, using tobacco products or eating fatty foods could have negative effects on longevity. The modern, sedentary lifestyle may be comfortable, but it contributes to a cluster of chronic and profoundly costly "sitting diseases." Perhaps the clearest indication of this phenomenon is the dramatic and well-documented global rise in obesity rates over the past 40 years. The average adult today is three times as likely to be obese compared to the average adult in 1975.[1]

A growing waistline is directly associated with a shrinking life span. In fact, the World Health Organization (WHO) estimates that rising obesity levels are responsible for the growing prevalence of a range of noncommunicable diseases, taking the lives of approximately 40 million people aged 30 to 70 annually. Worldwide the number of adults living with diabetes has almost quadrupled since 1980. In the United States, 30.3 million adults (nearly 1 in 10) have diabetes, 28.1 million have cardiovascular disease and almost 15.7 million suffer from chronic obstructive pulmonary disease (COPD).[2,3,4] Together these conditions are responsible for more than half of all deaths globally each year.

Growing awareness of the health risks associated with inactivity is fueling interest in insurance-linked wellness programs that are supported by activity evidence from wearable devices. Against a backdrop of growing use of nontraditional evidence in underwriting and accelerated underwriting, it can be tempting for insurers to replace the costly and slow nicotine/cotinine screening required to reliably detect an applicant's smoking status with data-driven variables reflecting physical activity. In this paper we investigate the relationship between physical activity, smoking and mortality risk using two large U.S. health data sets. We demonstrate that, while physical activity has a significant impact on longevity, no amount of exercise can negate the profoundly elevated mortality risk associated with smoking.

ASSESSING PHYSICAL ACTIVITY AND MORTALITY

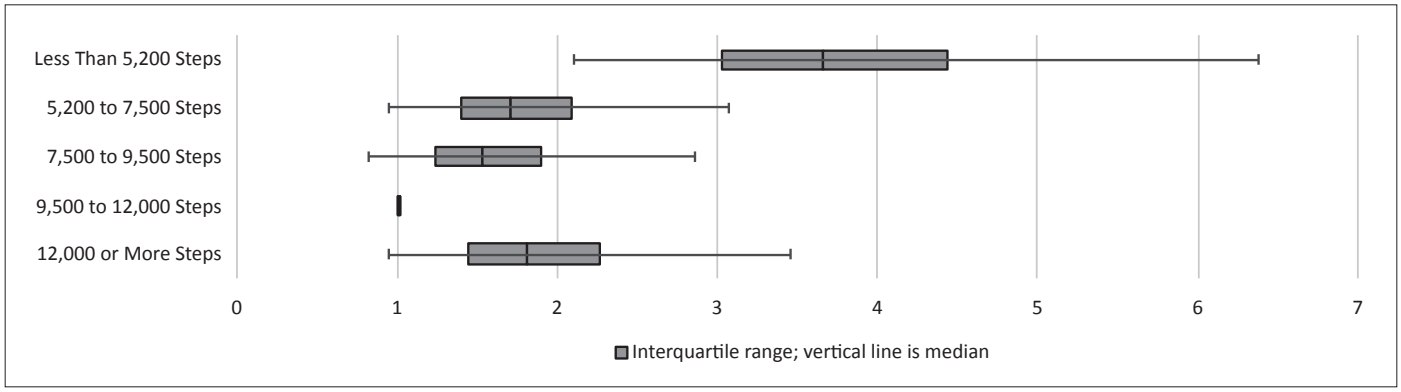
To understand the relationship between lifestyle behaviors and mortality, RGA investigated two national, health-related, mortality-linked data sets provided by the U.S. Centers for Disease Control and Prevention (CDC): The National Health and Nutrition Examination Survey (NHANES) and the National Health Interview Survey (NHIS).[5,6] For a complete description of the research methodology, please reference the research paper, "Lifestyle-Related Behaviors and Mortality: A Comparison of Physical Inactivity and Smoking."[7]

Steps

Step counts present an objective measure of physical activity. Additionally, step metrics have been available for many years, providing a greater amount of historical data for evaluation than some other activity metrics.

The all-cause mortality hazard ratios shown in Figure 1 segment the mortality of participants according to quintiles of measured activity with a reference category of 9,500–12,000 average daily steps. Those in the lowest quintile of steps per week—walking less than 5,200 steps—had the highest mortality. Mortality

Figure 1
All-Cause Mortality Hazard Ratios by Average Daily Step Quintile



Source: RGA analysis of 2005–2006 National Health and Nutrition Examination Survey data, paired with linked mortality followed up to 2011. Multivariate model adjusts for age, sex, smoking, disease history, health status, income and ability to walk a quarter mile.

experience declines with increasing step counts, though there may be some evidence of a slight increase in mortality for those walking 12,000 or more steps.

Although number of steps per day is certainly related to activity, it is important to note that measuring steps will not capture all elements of physical activity. For example, steps may be a reasonable activity measure for runners, but steps will not accurately capture the physical activity of swimming, cycling or even playing tennis. Wearable technology is rapidly evolving and devices are getting better at measuring other activities, but these measurements are difficult to compare against step counts. Therefore, it is important to review a host of activity metrics, not just steps, when trying to understand the relationship between physical activity and mortality.

Intensity and Age

Engagement in physical activity, particularly vigorous physical activity, becomes more important as we age. Numerous studies have concluded that regular participation in activities from moderate-intensity walking to very high-intensity sports increases accumulated daily energy expenditure and helps participants maintain muscular strength. In contrast, less active lifestyles have been linked to premature onset of cardiovascular and metabolic diseases, obesity, cognitive impairments and general frailty in the elderly.[8,9]

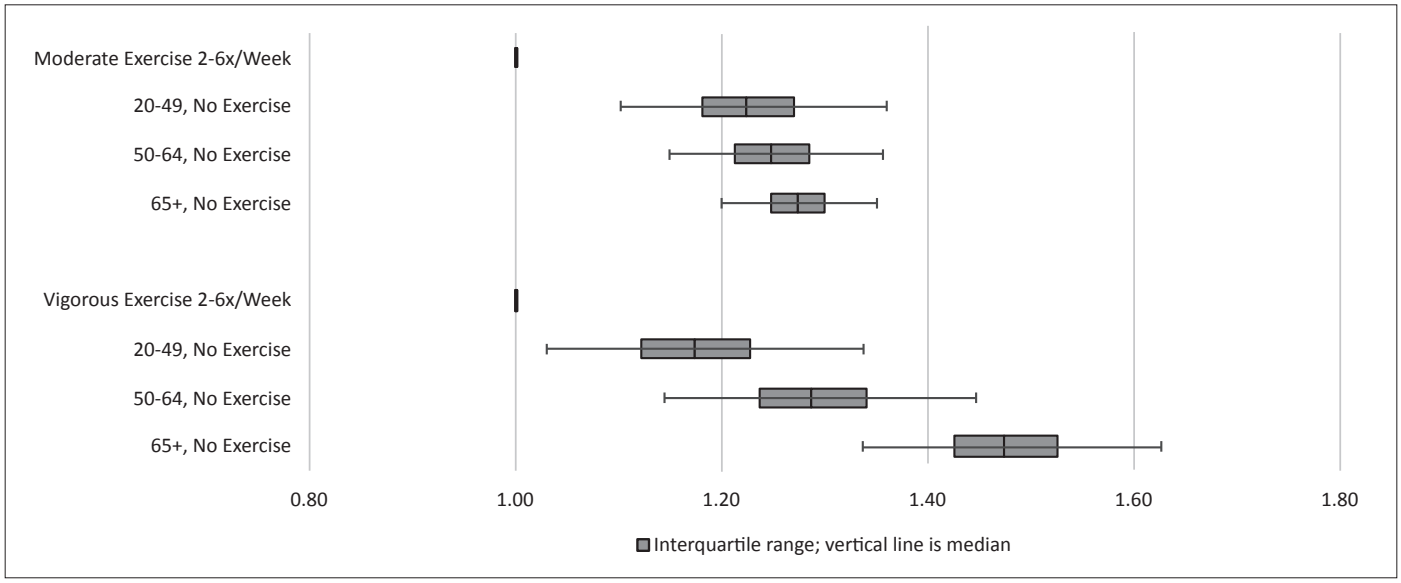
RGA studied NHIS data to better measure the impact of intensity on mortality experience. Findings in Figure 2 demonstrate the mortality experience of different age groups who do not exercise relative to the mortality of members of that same age group who exercise two to six times a week. The top set of bars compares moderate exercise by age, while the second set of bars compares vigorous exercise by age. Hazard ratios for those who do not exercise increase with age for both moderate and vigorous exercise intensity, indicating that physical activity is more important as we age.

PHYSICAL ACTIVITY AND SMOKING

Physical inactivity is pervasive—and continues to drive worrying levels of noncommunicable disease. So it is understandable to compare against another leading cause of mortality: tobacco use. In fact, such comparisons have led researchers and reporters alike to boldly declare that *sitting is the new smoking*. In other words, they claim physical inactivity is at least as detrimental to health as smoking. RGA set out to evaluate this claim by comparing mortality levels associated with both behaviors and determining the implications for insurers. The conclusion is clear: Although a sedentary lifestyle is clearly linked to higher mortality risks, smoking remains far more deadly.

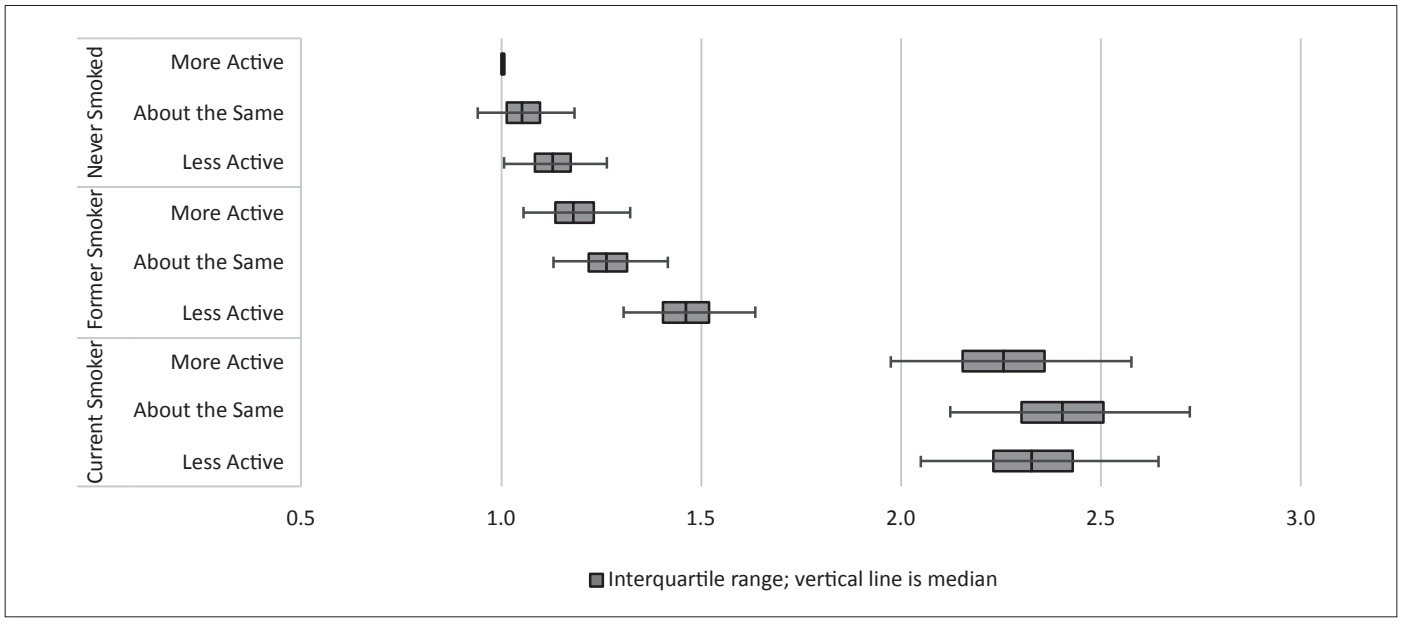
To study this, survey participants were grouped by both smoking status and physical activity. The measure of physical activity in this analysis was the perceived level of physical activity compared

Figure 2
All-Cause Mortality Hazard Ratios by Intensity Level



Source: RGA analysis of National Health Interview Survey data, 1987–2015. Multivariate model adjusts for age, sex, smoking, disease history, health status and income.

Figure 3
All-Cause Mortality Hazard Ratios by Smoker Status and Physical Activity Relative to Peers



Source: RGA analysis of National Health Interview Survey data, 1987–2015. Multivariate model adjusts for age, sex, disease history, health status and income.

to people of the same age (peers). The top three bars in Figure 3 represent hazard ratios for people who have never smoked by activity relative to peers, the middle bars show experience of former smokers, and the bottom bars show the experience of current smokers by varying levels of self-reported activity compared to peers. Every group's result is set relative to people who never smoked and who consider themselves more active than their peers. While mortality experience improves with more activity, even the more physically active smokers experience worse mortality than less active nonsmokers.

CONCLUSION

Lifestyle choices, including physical activity and smoking, significantly impact longevity. There are many challenges to researching the impact of lifestyle on mortality. As a consequence, it is critical that insurers view counterintuitive and sometimes conflicting reports with skepticism and ground risk assessment in statistically significant, reproducible analysis.

The evidence to date points to one conclusion: Exercise is still not a better predictor of mortality outcomes than tobacco use, even though exercise improves mortality experience and activity becomes more important as we age. A person cannot exercise away the damaging effects of smoking, but they can smoke away the benefits of exercise. ■

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ENDNOTES

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