An Atlas Injury Prevention Solutions White Paper

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Impact of Wellness Screens and Coaching in the Transportation Industry

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How well do we understand how biometric screening and coaching can impact driver health within the transportation industry? This paper will investigate the relationship using data provided by 1,169 drivers.

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Definitions

A review of the terms used during the analysis and development of graphs is provided.

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There were 1,169 drivers evaluated for the study. The characteristics of the population involved in the study are presented.

Health Risks, Wellness Programs, and Coaching

The relationships between biometric screening and coaching, and driver health are explored based on the data set. Recommendations on how the findings should impact a health and wellness program are provided.

Conclusions

A review of the relationships learned and primary considerations is presented.

INTRODUCTION

Commercial truck drivers face many challenges that create a workplace atmosphere of unhealthy habits. A sedentary job and lifestyle, decreased access to preventative health care, and easy access to poor food choices play a significant role in higher rates of Metabolic Syndrome (MetS) and obesity.

MetS includes 3 of the following 5 factors: hypertension, high blood sugar, increased waist circumference, and abnormal cholesterol or triglyceride levels. Individuals with MetS or those considered obese (>29.9 BMI) have an increased risk for cardiovascular disease, diabetes, and stroke[1].

Obesity can also increase the likelihood of accidents as there is a significantly higher crash rate with obese truck drivers. This is especially evident with newly hired drivers where data shows those who are obese have a 50% higher chance of a crash during their first two years of employment. Obstructive sleep apnea, which is often associated with obesity, also increases crash risk up to five times[2,3].

Another way a driver's unhealthy habits or obesity is putting pressure on the transportation industry is with employee retention. Currently, fleets have difficulty retaining drivers. A 2016 HireRight Transportation Survey reported that 21% of drivers leave their jobs due to health issues[4]. This statistic, as well as an aging workforce, leads many transportation companies to explore and implement health and wellness programs to retain drivers and help lengthen their careers.

The purpose of this white paper is to continue our examination of driver health and wellness. Previous papers in this series have focused on concerns related to discomfort, injury risk, and overall health concerns within certain demographic categories. In this paper, we will continue our focus on driver health and wellness but will approach the subject from a different perspective.

We will expand on our last paper, *Relationship Between Demographics and Wellness in the Transportation Industry*, by connecting the use of biometric screening and coaching, and driver wellness. We will define this relationship with a review of current research and by examining data collected from new drivers. Using the data obtained and a review of the current research, our objective is:

> Assist the person in charge of health and safety to better understand the impact of biometric screening and wellness coaching on drivers to address higher-risk health conditions.

OVERVIEW AND DATA COLLECTION

Data was collected by health professionals through biometric screens of newly hired drivers, as well as annual follow-up screens. The screen process included demographic questions focused on gender, age, height, weight, driving experience, and tobacco/nicotine use. Physiological testing was then completed and additional information was gathered on blood pressure, resting heart rate, blood glucose levels, cholesterol levels, triglyceride levels, waist circumference, and body mass index (BMI).

Our original dataset came from 15,165 employees, including drivers (5,953) and non-drivers (9,212). For the purposes of this paper, we will focus only on drivers—in particular, new drivers who completed multiple annual/bi-annual screens (1,169).

Atlas uses an online database to collect the data for tracking and evaluation purposes.

DEFINITIONS

In order to complete the study, it was necessary to process the data and present it in formats that aided in viewing the potential relationships. The following are the key measures of health that were used:

Metabolic Syndrome (MetS): a cluster of conditions — increased blood pressure (hypertension), high blood sugar, excess body fat around the waist (waist circumference), and abnormal cholesterol and triglyceride levels — that occur together. Individuals who have a combination of three or more of these factors have an increased risk for heart disease, stroke, and diabetes.

Hypertension: Although there are four stages of high blood pressure, or hypertension, for purposes of this study and the diagnosis of MetS, the threshold for blood pressure as a factor for metabolic syndrome is $\geq$ 130/85 mmHg.

Cholesterol level: The level of cholesterol in the blood is commonly measured by three scores: low-density lipoprotein (LDL), high-density lipoprotein (HDL), and total. For the purposes of this paper, we will focus on HDL, which is considered too low if it is below 40 mg/dL in men or below 50 mg/dL in women.

Blood glucose level: The level of glucose in the blood is tested after fasting for at least eight hours. Normal blood glucose is less than 100 mg/dL. The threshold for MetS is 110mg/dL.

Triglyceride level: A normal level of triglycerides in the blood is <150mg/dL.

Waist Circumference (WC): An indicator of health risk associated with excess fat around the waist is 40 inches or more in men or 35 inches or more in women.

Body Mass Index (BMI): The categories of BMI used are:

- Normal: 18.5-24.9
- Overweight: 25-29.9
- Obese I: 30-34.9
- Obese II: 35-39.9
- Obese III: 40 and over

Wellness Coaching: Drivers meet individually with a health professional after their biometric screen. The health professional reviews each result and provides lifestyle coaching relevant to their health metrics.

Engaged Coaching: An option for drivers to be involved with more than one biometric screen and individualized coaching session on their health metrics. This expanded coaching option includes additional information relevant to their health metrics, helps them address personal lifestyle barriers, and monitors their progress on health goals over time.

The following statistical analysis tools were used:

Significant Difference: When comparing differences between groups, a T-test is used to compare the averages of the groups (mean). A probability value (p-value) determines if the differences between the means are significant or are more likely due to chance. A significant difference would have a p-value <.05 or a less than 5% chance that the differences are due to chance alone. Therefore, when a significant increase or decrease is described below, the data demonstrates a p-value <.05.

Correlation Coefficient (*r*): A measure of the strength and direction of the linear relationship between two variables. The value of *r* is always between +1 and –1. The correlation must be greater than +.50 or less than -.50 to be considered significant.

> **Positive Correlation:** An *r*-value greater than 0. A positive correlation exists when one variable decreases as the other variable decreases, or one variable increases while the other increases. An *r*-value of +1.00 is considered a perfect positive correlation.
>
> **Negative Correlation**: An *r*-value less than 0. A negative correlation is a relationship between two variables in which one variable increases as the other decreases, and vice versa. An *r*-value of -1.00 is considered a perfect negative correlation.

In addition to these measures, the data and graphs within this paper have been formatted to provide the most effective means of conveying a message. Additional descriptions of the methods used to create them will be described as necessary.

PARTICIPANTS

This study examined a population of 1,169 new drivers who completed more than one annual/bi-annual biometric screening. These drivers were from a subset of transportation industry clients served by Atlas over a five-year period beginning in early 2014 and running through 2018.

Participation in the process was voluntary. This may lead to differences in health metric distributions between drivers in our data set and those who did not participate.

The figures below give a breakdown of the participants' demographic data at their initial screening.

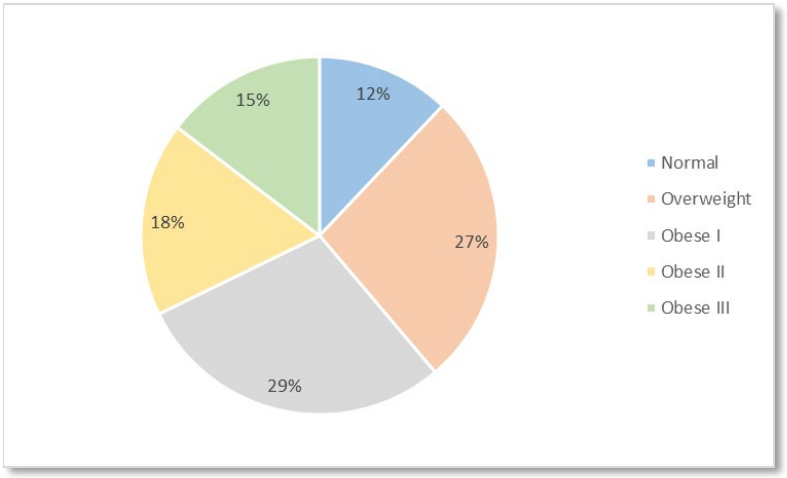

Figure 1: BMI Distribution

Figure 1 presents the breakdown of the study population based on BMI. This data demonstrates a higher incidence of obese and overweight workers in our population in comparison with information reported on the general population by the Centers for Disease Control and Prevention (CDC)[5]. The CDC found an incidence of obesity in the US of 38% as compared to the study's finding of 62%. Also, the CDC found 71% of people are either overweight or obese in comparison with the study's finding of 88%.

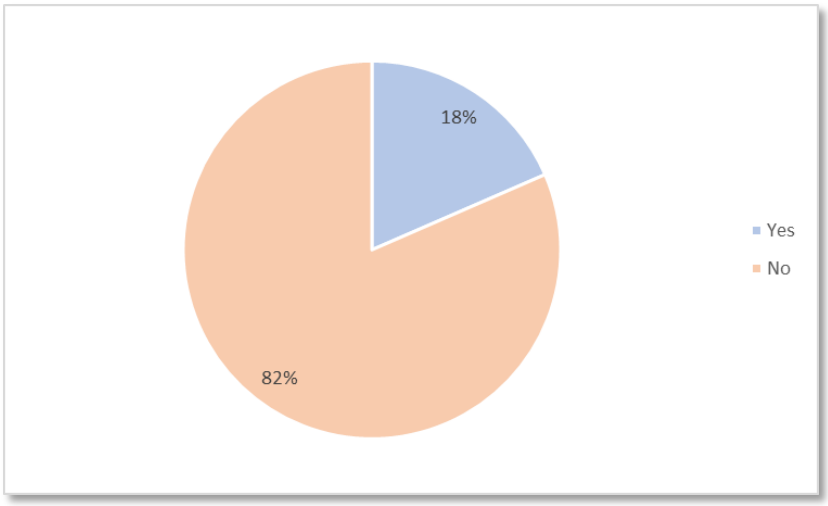

Figure 2: Tobacco/Nicotine Use

Figure 2 presents the breakdown of the study population based on use of tobacco/nicotine products. The figure shows 18% of the population report use of tobacco or nicotine within the past 90 days. This was measured subjectively as a "Y" or "N" survey question, not as a blood test. The percentage of actual tobacco/nicotine users is likely understated. It has been estimated by some of Atlas' clients that closer to 40% of their drivers are tobacco users, with an even higher percentage using either nicotine or tobacco.

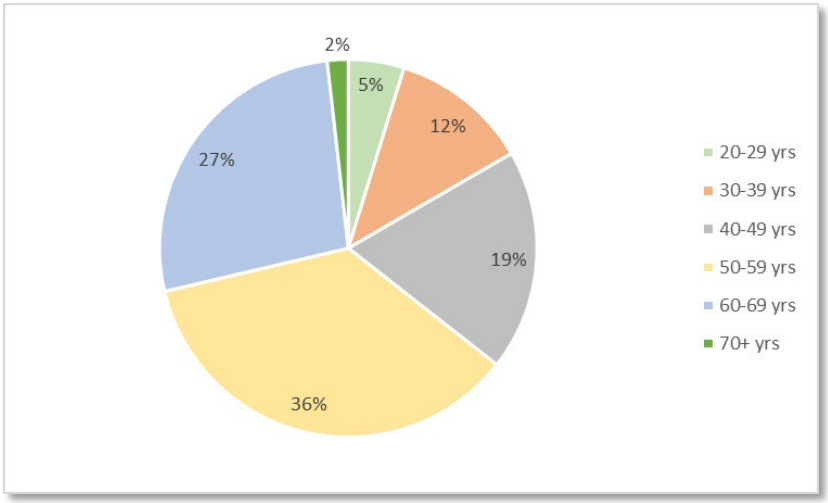

Figure 3: Age Distribution

Figure 3 presents the breakdown of the study population based on age with a median age of 52 years old.

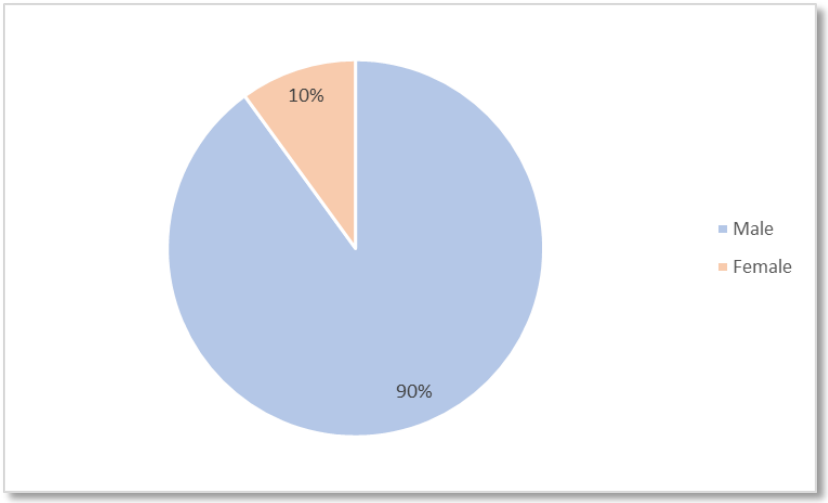

Figure 4: Gender Distribution

Figure 4 presents the breakdown of the study population based on gender. Male employees represent 90% of the total number of participants.

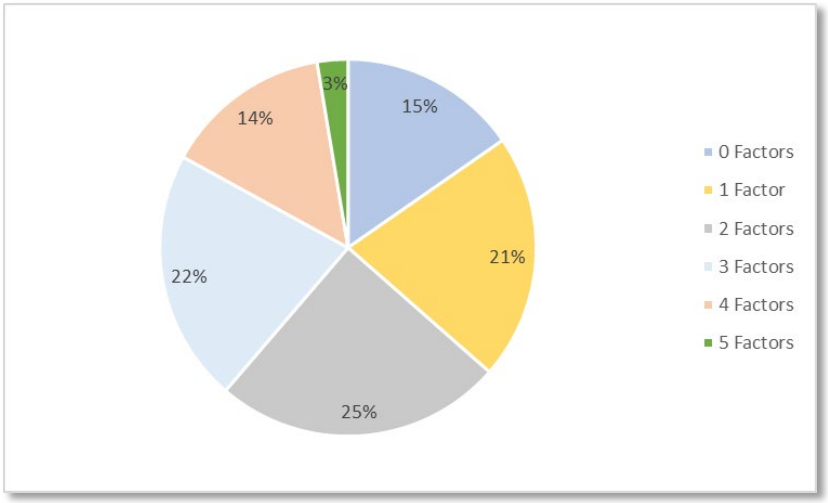

Figure 5: MetS Factors Present

Figure 5 presents the breakdown of the number of MetS factors the participants exhibit at the initial screening. Within our dataset 39% of the population has MetS (with 3 or more factors).

HEALTH RISKS, WELLNESS PROGRAMS AND DRIVER HEALTH

The finding of our most recent white paper, *Relationship Between Demographics and Wellness in the Transportation Industry,* mirrored the current sentiment found in research—drivers have a higher risk for MetS and obesity than the general US population. Our data found that drivers are 80% more likely to have MetS than workers in the non-driver category and have a 30% higher obesity rate. In fact, the average driver BMI places them in an obese category. In addition, drivers are 130% more likely to smoke than non-drivers, which as we have earlier stated is expected to be understated.

These factors demonstrate that drivers have many preventable risk factors that lead to a variety of health concerns including diabetes, cardiovascular disease, stroke, and many types of cancers[6]. It can be concluded from this data that transportation companies could benefit from programs and practices to assist drivers improve healthy behaviors and decrease the risks of their sedentary work and lifestyle. Their goals should be to keep healthy drivers healthy and to improve unhealthy drivers' behavior.

The difficulty with MetS is that outside of an individual's waist circumference, the risk factors are not visible. Coupled with the mistaken belief that obesity is not a factor that warrants medical attention, most drivers are unaware that they are at risk for MetS.

The use of biometric screening as part of a wellness program is one tool that can help drivers become aware of the risks associated with their current lifestyle. The subset of drivers who were involved in this study have all undergone biometric screening upon being hired and have had at least one follow-up screening. We will begin our discussion with a review of the effects of biometric screening on MetS factors.

Biometric Screening

The biometric screen that was completed included testing for each of the five factors of MetS, self-reported tobacco/nicotine use, BMI, and various demographic information. 97% of the study group were given wellness coaching that reviews each result, and lifestyle coaching relevant to their health metrics. The drivers were then able to have subsequent screens and further (engaged) coaching. Approximately 30% of the drivers received engaged coaching in which they were provided additional information relevant to their health metrics, help to address personal lifestyle barriers, and monitoring of their progress on health

goals over time. The average number of screens the drivers completed during engaged coaching for this study was 2.3.

To further evaluate the effect of the screening process on the health of drivers, we will evaluate the trends found in the following areas: BMI, reported tobacco/nicotine use, and MetS factors.

BMI

Participants' BMI was recorded at the time of each of their screenings. The average BMI of the drivers upon their first screening was 32.9, which places them in the Obese I category, with 45% of the drivers being obese and 88% either overweight or obese. Figure 6 compares BMI readings between a participant's first and last screening.

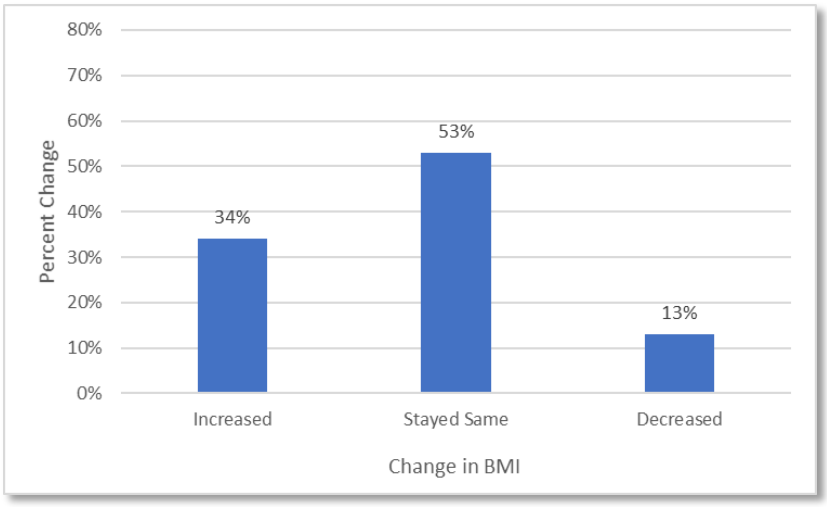

Figure 6: Percent Change in BMI After Biometric Screening

The average change is 32.9 to 33.0 which is statistically insignificant. What can be derived from the data is that the participants' BMI did not increase significantly over this time period. Approximately two-thirds of the participants demonstrated maintenance or decrease of current BMI.

When the data is further examined to compare groups based on number of times the driver follows up with a biometric screen over their tenure, there are notable differences. In Figure 7 we compare drivers according to the number of interactions they had with a health professional. Here we see a positive correlation (r=.92) between the number of interactions and the number of drivers that were able to maintain or decrease their BMI. This data shows that more frequent sessions and follow up can help drivers maintain if not improve their BMI.

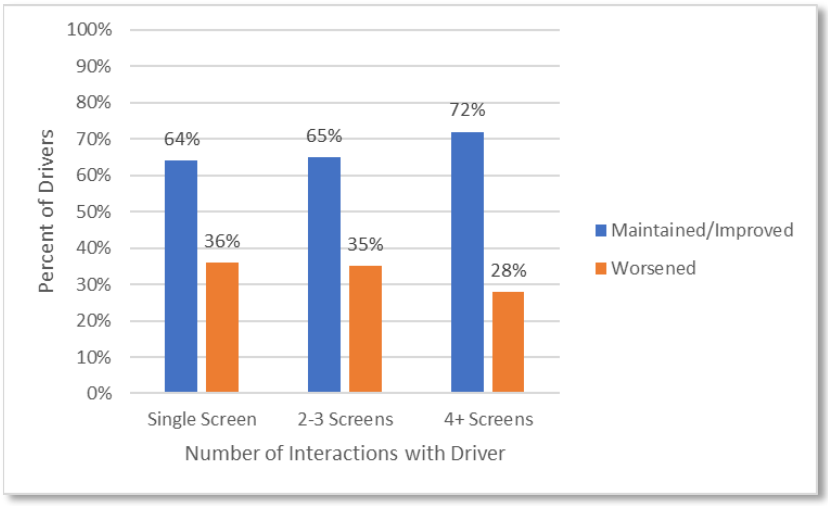

Figure 7: Comparison of Change in BMI After Biometric Screening v. Number of Interactions with Driver

Impact on Approach

The BMI of some drivers did increase over time, but the majority were able to maintain or decrease their initial BMI. While we are unable to compare our data to that of drivers who did not complete a screening, we can make some comparisons based on current literature. The CDC reports an average weight gain from approximately 186 lbs. for males in their 30s to 202 lbs. for males in their 50s[7]. With a driver's sedentary lifestyle, it would be expected that their rate of weight gain would be higher than the general population. Thiese et al. found over a 5-year period the average weight of drivers increased significantly from 211 lbs. to 227 lbs., and average BMI increased from 30.6 to 32.6[8].

In our data set there was an insignificant increase of .1 for BMI in drivers that completed the biometric screening and coaching, from 32.9 to 33.0. The data shows that the more contacts or interactions a driver has with healthcare professionals, the less likely their BMI will increase.

Tobacco/Nicotine Use

Tobacco use is known as a leading contributor to mortality and morbidity, but smoking and smokeless tobacco also have a negative effect on all five conditions in MetS[9]. Overall, 18% of the driver population in this study were tobacco/nicotine users. Since drivers self-reported their tobacco/nicotine use, the overall use could be higher, as noted earlier in this paper. This sub-group of our population also includes drivers using non-tobacco nicotine products such as

vaping and smoking cessation products (nicotine gum and patches). Although the metabolic effects of nicotine products are less than tobacco use, nicotine causes an increase in blood pressure and blood sugar levels[12].

One goal of screening and coaching is to help those drivers who use tobacco/nicotine to quit. Figure 8 looks at the data on the change in tobacco/nicotine habits.

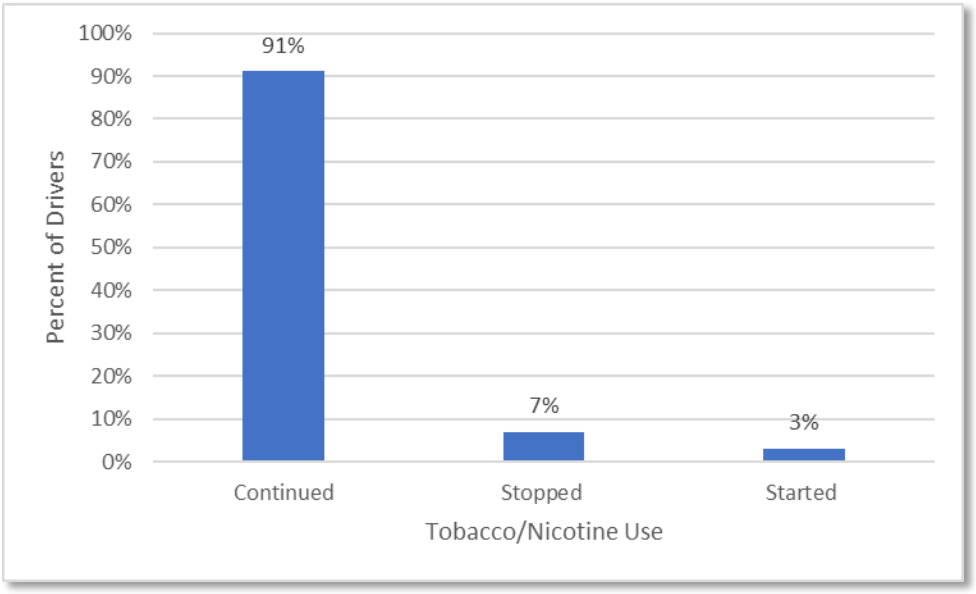

Figure 8: Changes in Tobacco/Nicotine Use Within the Study Population

With the overwhelming majority continuing their tobacco/nicotine habit, it is evident more must be done to assist drivers in their effort to stop use of tobacco/nicotine products. Figure 9 demonstrates that there is also no significant difference in drivers' product use based on the number of interactions the driver has with the medical professional screening.

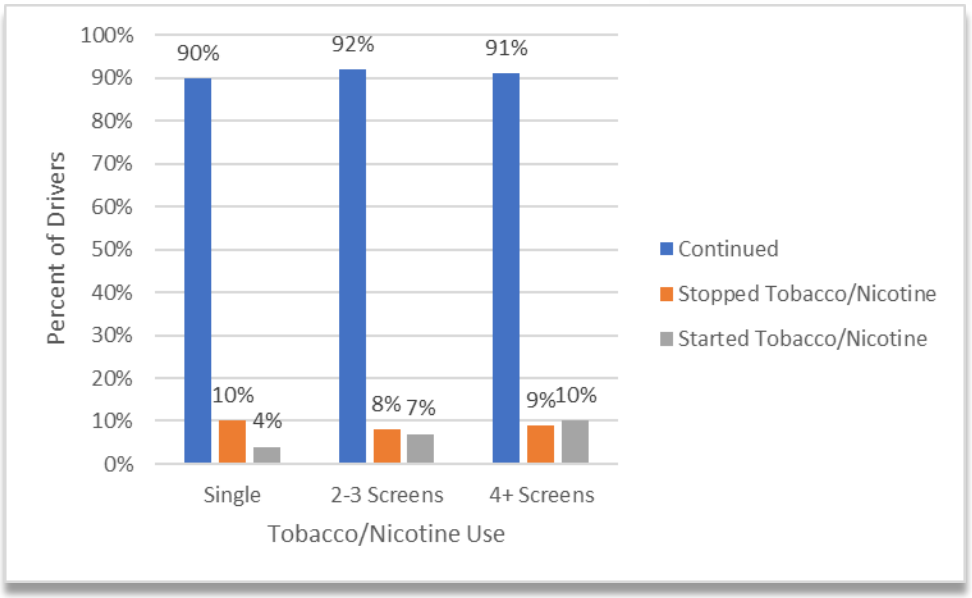

Figure 9: Change in Tobacco/Nicotine Use vs. Numbers of Interactions with Driver

IMPACT ON APPROACH

Nicotine and tobacco products have a strong effect on suppressing HDL levels, raising triglyceride levels, raising blood pressure and blood sugar levels therefore significantly affecting four of the five MetS factors.[9,10]. Unfortunately, our data shows that biometric screening and coaching do not positively impact tobacco and nicotine use.

Emphasis should be placed on developing and implementing more effective tobacco/nicotine cessation programs for drivers. Currently, just 18% of transportation companies offer some type of program[4]. Increasing awareness of the health benefits from decreasing tobacco and nicotine use can decrease MetS factors and improve cardiovascular health.

Metabolic Syndrome

During a biometric screen, each of the drivers' five MetS factors were recorded. The average number of factors present on the initial screens is 2.03 with 39% of drivers exhibiting 3+ factors. Figure 10 compares the number of participants with MetS in their first screening compared with their last screening.

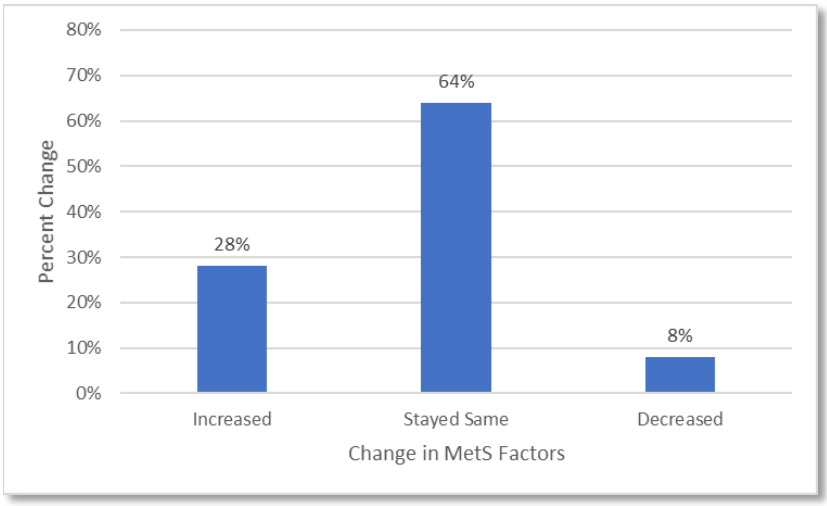

Figure 10: Percent Change in MetS Factors After Biometric Screening

The average change between the groups increased from 2.03 to 2.11. This increase is statistically insignificant. Similar to the findings with BMI, the data above demonstrates that the number of the participants' MetS factors did not increase significantly over this time period. Across the US population there is a significant upward trend in the incidence of MetS. A study completed by the CDC demonstrated that MetS symptoms increase with age. Males and females ages 40–59 years were three times more likely than those in the 20–39 years age group to demonstrate MetS. Males 60 years and older were more than four times more likely and females 60 years and older were more than six times more likely than the 20-39 years age group to meet the criteria of MetS[11]. These statistics, in conjunction with the sedentary lifestyle of drivers, places this group at a very high- risk category. Our data is promising as approximately 72% of the participants demonstrated maintenance or decrease in MetS factors.

When reviewing the MetS data in more detail, we found that most individual factors did not demonstrate significant change between screenings. Figure 11 depicts how the individual factors changed between the initial and last screening. Although there is a slight increase seen in all of the factors, it is not statistically significant. Two factors—low HDL and high triglycerides, however, did demonstrate more notable increases that are impacted by tobacco/nicotine use (discussed above) and lack of physical activity.

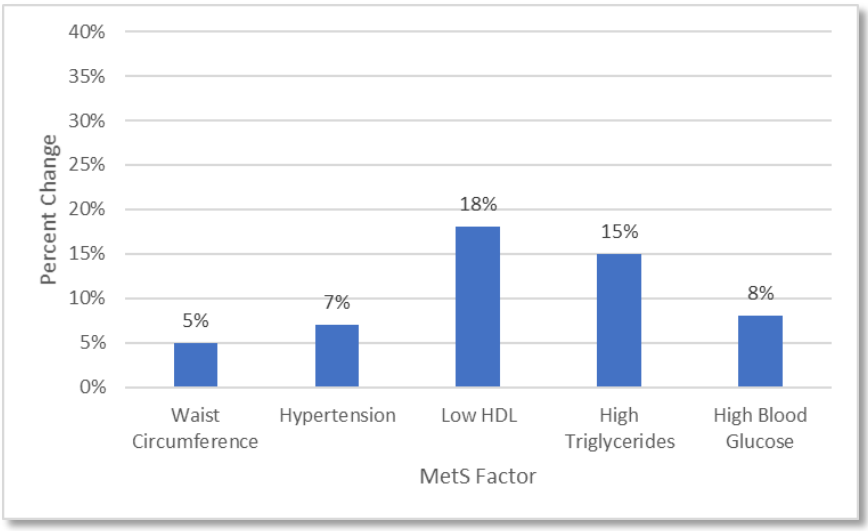

Figure 11: Percent Change in MetS Conditions After Biometric Screening

There are again only subtle differences seen when the data is further broken down into groups based on number of contacts, but a correlation is seen as shown in Figure 12. Here we see there is an increase in the percentage of drivers that maintain or improve their number of MetS factors as the number of screenings and coaching interactions increase (r=.98).

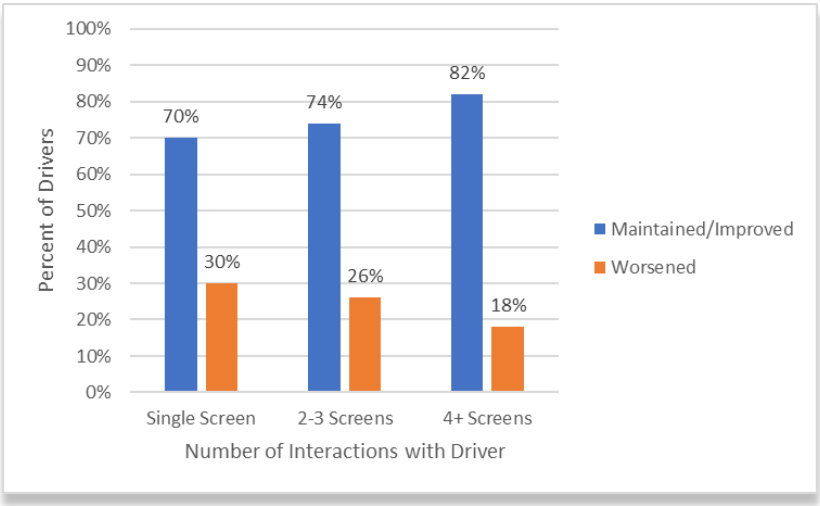

Figure 12: Comparison of Change in MetS Factors After Biometric Screening Between Single and Multiple Screenings

In Figure 13, individual conditions are compared with the number of contacts the drivers had. The data demonstrates that the drivers with the highest number of contacts (4+) have a lower percentage of increase when compared to drivers with fewer (2 – 3) contacts. It is worth noting that these drivers have been in the job and experiencing a sedentary lifestyle for a longer period of time. Therefore,

we would expect a higher level of increase with this driver segment, which is not the case.

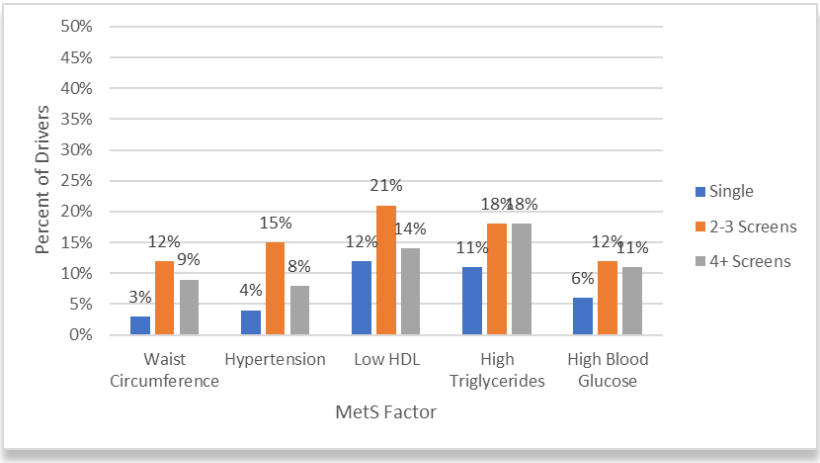

Figure 13: Change in MetS Factors vs. Numbers of Interactions with Driver

Impact on Approach

Driver awareness of critical health factors that would otherwise be missed is an essential part of the biometric screening. Data shows that repeated screening and follow up coaching by a wellness/health promotion team will benefit drivers and help decrease the negative effect of time in a sedentary lifestyle. Emphasis should be placed on not only continuing/expanding health programs for unhealthy drivers, but also keeping healthy drivers healthy.

CONCLUSION

This is the fourth paper of a series looking at trends within the transportation industry. Trends related to biometric screening and coaching and how it relates to BMI and metabolic syndrome were analyzed over a five-year period. Recommendations based on the findings are summarized below.

General

Obesity continues to be overlooked as a condition that warrants medical attention. The lifestyle of a driver places them at risk for obesity due to the sedentary work, poor food options/choices, and limited access to regular exercise. Many MetS factors are present within the obese population, yet they will go unnoticed if not screened. Biometric screenings coupled with coaching are a critical first step to raise driver awareness of the risk factors and potential impact on their health/wellness.

Screening and additional coaching can help drivers understand what their current health level is and how to reduce the barriers drivers face in order to establish a healthier lifestyle. Teaching drivers to talk with their health care providers and utilize existing medical coverage can help them establish and maintain healthy lifestyle changes.

BMI

Increasing the frequency of communication between drivers and health care professionals/health promotion team increases the probability drivers will maintain or improve their weight and BMI.

Tobacco/Nicotine Use

Screening and coaching programs can help raise driver awareness of tobacco and nicotine products' negative effects on their bodies. But these types of programs are not enough to make a measurable difference.

Currently only 18% of transportation companies are addressing tobacco/nicotine use with wellness programs. Emphasis should be placed on the development of 1) smoking cessation programs, and 2) awareness programs on the connection between all types of tobacco/nicotine use and MetS conditions for drivers. Companies should be more proactive in

addressing the negative effects of tobacco/nicotine associated with cardiovascular health and the development of MetS.

Metabolic Syndrome

Most MetS factors are undetectable without a blood test. Diabetes, cardiovascular disease, stroke, and many cancers have been linked to MetS, and therefore a majority of drivers do not know they are at risk.

Screening and coaching improve a driver's knowledge and awareness of what the risk factors are, what they mean, and how to make positive changes to reduce risk. Repeated screening and coaching sessions can improve driver health by giving drivers benchmarks and goals. More frequent coaching will provide drivers valuable feedback on how their health is progressing, and what further actions or follow up may be needed. This study has shown that an increase in coaching interactions helps drivers maintain and improve MetS risk.

However, even with a higher level of coaching interaction, two MetS factors demonstrated a notable increase—low HDL and high triglycerides. Tobacco/nicotine cessation and physical activity are key to maintaining favorable HDL and triglyceride levels. As stated earlier, more must be done to help decrease use of tobacco/nicotine. Also, when a new driver starts their career and faces the challenges of their new lifestyle, coaching should be provided to help them exercise and remain active.

Other Points Worth Noting

Most drivers lack a strong understanding of their health risks, and up to 80% do not attend an annual preventative exam with a personal health care provider. Instead, they rely on the less comprehensive information they receive on a DOT examination. The DOT exam will miss many MetS factors that would be discovered by biometric screening and coaching.

Experienced drivers are aware of the significant lifestyle challenges that exist with over-the-road employment. However, new drivers may not be aware of the challenges and are less prepared to address them. It is easier to keep new and healthier drivers healthy than trying to correct the situation after years on the road.

As a driver's health deteriorates over time, they will likely face a crossroads in their career where they:

- Face the difficult path to improve their health,
- Continue down the path of escalating medical costs and waning productivity,

- Experience a critical illness,
- Are unable to pass a DOT examination, or
- Leave the industry.

For the driver, fleet, and industry, maintaining good health is the best option. Rather than taking a reactive approach to medical costs and health-related turnover, fleets should strongly consider investing in health awareness programs that include biometric screening or annual physical exams. Coaching and program development must be specific to the lifestyle and daily routine of the driver to be effective. This type of approach will improve driver awareness and their ability to make meaningful strides towards improving and maintaining a healthier lifestyle.

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