

### **Antitrust Notice**

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### Have you ever fallen asleep behind the wheel?

- More than one in three drivers report having fallen asleep behind the wheel at some point in their lives
- More than one in ten has fallen asleep behind the wheel in the past year
- More than one-in-five fatal car accidents involves a drowsy driver

Ref: https://www.aaafoundation.org/drowsy-driving

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Wellness data used in Health, not P&C	_
Wellness data widely used in Health Insurance     Health Risk Assessments/Questionnaire: lifestyle choices, including meals, sleep, work and exercise, in addition to seatbelt usage and specifies.	
speeding	
<ul> <li>A sleeping giant for P/C Insurance</li> <li>Current UBI application focus on behaviors surrounding the insured asset, but not a policyholder's larger decisions about wellness</li> </ul>	
<ul> <li>A more effective approach might address how to minimize underlying risk factors that - when not properly accounted for - cause or contribute to P/C losses</li> </ul>	
Verlak Insurance Solutions   ISO ART Workholds Xactories 4	
Fision Solutions	
Obese at greater risk in auto collisions	
Americans with a body mass index (BMI) over 35 are more than 50 percent more likely to be involved in fatal car accidents.	
- Emerg Med J 2014;Vol31	
Verbik Insurance Solations   SO ARI Workholds Xactorins 5	
Fish hsurance Solutions	
Good mental health improves	
workers comp risk	
Workers reporting "high stress" have medical costs nearly 50% higher when compared with workers	

reporting lower levels of stress.

- Journal of Occupational & Environmental Medicine 1998;Vol40

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### **Eyesight testing reduces auto losses**

Refinements to eyesight testing requirements could save tens of millions of dollars in annual claims costs.

- 2012 report from RSA

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# Prototype on Auto Insurance Wearable Predictive Modeling

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### Wearable are now commonplace

- Activity Tracker
  - Monitor and track fitness-related metrics such as distance walked or run, calorie consumption, and in some cases heartbeat and quality of sleep
  - o Fitbit, Jawbone, Garmin, Misfit, etc.





- Smartwatch
  - Like wearable computers. Many run mobile apps, play music, answer phones, send text, collect information from internal or external sensors. etc
  - Samsung Gear, Apple Watch, Sony SmartWatch, etc



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### Smart earbuds, earrings and lenses are hidden in plain sight

- Smart Accessory
- o Earbuds, Earrings
- Integrated sensors for tracking movement, and some may tracking core temperature, heart rate, blood pressure and other health matrix



Smart Lens

 Google and Novartis developed a glucose-sensing contact lens that is able to detect the glucose level from human tears



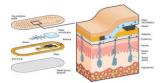
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### Sweat sensors, the 'smart bandaid'

- Sweat Sensor
- o Sweat is a rich source of chemical data that could help doctors determine what is happening inside the human body
- Researchers have devised a soft, flexible, wearable sensor array to continuously
  monitor changes in four molecular components of sweat and to provide real-time
  tracking of a person's health



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### Smart clothing used on industrial sites

- Wearable Platform
  - Incorporate wearable technology, artificial intelligence and building information modeling to create an ecosystem



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SS	in	personal	auto

### Case Study: Wellness in personal autopricing

- Data Source
- o The Behavioral Risk Factor Surveillance System (BRFSS) City and County Data
  - Health-related telephone survey system
  - Geographically aggregated to county level
- o ISO Stat Plan: Split into training and test datasets
  - A sample of 6M records (2009-2013) as training set
  - A sample of 3M records (2009-2013) as test set
- · Modeling method
- o Pure Premium model
- o Tweedie Distribution
- o Log Link function
- o Control rating factors, such as territory loss costs, symbol relativities, class factors, etc

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### Variables: Weight, mental health, smoking, drinking

- Weight
- o Average body mass index (BMI)
- o % of population are **overweight** with BMI≥ 25
- o % of population are **obese** with BMI≥ 30
- Mental
- $_{\odot}$  % of population with  $\ensuremath{\text{good mental health}}$
- o % of population with bad mental health
- Smoking
  - $_{\odot}$  % of population are regular smokers
- $_{\circ}$  % of population are smokers
- $\circ$  % of population are former smokers
- Drinking
- $\circ$  % of population are heavy drinkers

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### Included chronic health conditions

- Chronic Health Conditions
- o % of population had a heart attack before
- $_{\odot}$  % of population have angina or coronary heart disease
- o % of population had a **stroke** before
- $_{\odot}$  % of population have asthma currently
- % of population had asthma formerly% of population never have asthma
- o % of population have diabetes
- $\circ$  % of population have pre-diabetes, borderline diabetes or gestational diabetes

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Univariate	analy	sis		
Variable	BI	PD	Collision	Comprehensive
Good Mental Health	x	x	x	X
Bad Mental Health	x	×	×	×
Heart Attack		x	×	x
Angina/Coronary		 X	×	x
Stroke	x		x	x
Current Asthma		x		х
Former Asthma	x	х		х
Never Asthma	x			x
Obese		x	х	x
Over Weight		x	x	x
Average BMI		х	х	x
Diabetes	x	х	x	х
Prediabetes	x	х	x	х
Regular Smoker	x	x	x	х
Smoker	x	х	x	x
Former Smoker	x	х	x	x
Heavy Drinker				x

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Multivaria	te vari	able si	gnifica	nce
Variable	BI	PD	Collision	Comprehensiv
Good Mental Health	- 👢	- 👢	- 1	+1
Bad Mental Health				
Heart Attack		_		
Angina/Coronary		- 4		
Stroke	+ 👚			
Current Asthma		- +		
Former Asthma	+ 👚	+ 👚		+1
Never Asthma				-1
Obese		+ 🛊		The state of the s
Over Weight			_	_
Average BMI				
Diabetes			+ 👚	+1
Prediabetes				_
Regular Smoker				
Smoker	- 👢	-4		+1
Former Smoker				
Heavy Drinker				

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### A discount to smokers?

• Smoking while driving may distract drivers and cause accidents; Smoking harms nearly every organ of the body and causes many diseases

### However,

- "In non-abstinent smokers and nonsmokers, nicotine enhanced finger tapping and motor responses in tests of attention"1
- "Among smokers, cigarette smoking may improve driving performance and that there may exist an optimal nicotine dose for the enhancement of cognitive and psychomotor function  $^{\rm n2}$

<sup>1</sup> Heishman SJ, Taylor RC, Henningfield JE. (1994): Nicotine and smoking: a review of effects on human performance. Exp Clin Psychopharm 2: 245–395.
<sup>2</sup> Sherwood N (1995): Effects of cigarette smoking on performance in a simulated driving task. Neuropsychobiology 1995; 32(3): 161-8.

## Wellness model shows great lift Residual Lift Chart - BI Residual Lift Chart - BI Outside (Rank by Predicted Loss Cost) Residual Lift Chart - Collision Residual Lift Chart - Collision Residual Lift Chart - OTC Quintile (Rank by Predicted Loss Cost) Residual Lift Chart - OTC Outside (Rank by Predicted Loss Cost) Outside (Rank by Predicted Loss Cost) Residual Lift Chart - OTC Outside (Rank by Predicted Loss Cost) Outside (Rank by Predicted Loss Cost)

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### Conclusion - Wellness data helps

- Adding wellness variables to standard rating structure improves predictive power for most coverages and there is opportunity for better risk selection
- •The result of some wellness variables seem to be contradict our intuition. Human behavior could change how certain wellness characteristics affect the model

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### **Modeling - Next Steps**

- Current model utilized static county level health information from CDC. Individual's risk characteristics from their own health history or data captured from wearables would be even better
- The same practice could extend to other Line of Business, such as Homeowners, Workers Compensation
- More advanced modeling techniques should be considered since the current model is mainly for proof of concept

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### Life insurance leaders adopt Wellness

In April 2015, John Hancock partners with Vitality to integrate life insurance with a comprehensive healthy living program for consumers

- $\circ\mbox{The products offer potential for savings on annual}$ premiums, as well as discounts and rewards from leading retailers to encourage policyholders to take small steps to improve their health
- ○New policyholders receive a free Fitbit to help track their progress



### Allstate - Driver Safety Ratings patent

- Driver Safety Ratings by Allstate
  - oRevealed in a patent application
  - o Take into account of speed laws, road signs, traffic signals
- o Incorporating real-time feedback such as warnings that you are driving over the speed limit or approaching a stop sign
- o Goes beyond telematics. Data collected by vehicle includes your heart rate, electrocardiograph signals and blood pressure through your hands from sensors embedded in the steering wheel

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### State Farm - Total Impairment Score

- · Total Impairment Score by State Farm
  - o Revealed in a patent application
  - o Combine biometric measurements with automotive data to create a "total impairment score'
  - Monitor your every move while driving, measure your emotions, detect angry behavior and deliver stimuli such as music to calm you down("Emotion Management System")
  - $_{\odot}$  The system can monitor below biometrics:
    - Heart rate
    - Grip pressure on the steering wheel
    - Body temperatureArm movement

    - Head direction and movement
    - Vocal amplitude and pattern
    - Respiration rate

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### Workers Comp – AIG partners with Human Condition Safety

- AIG partnered with a startup "Human Condition Safety", who makes wearable devices to monitor the movements of employees in factories, on construction sites and at other hazardous workplaces to reduce onthe-job accidents
- The system uses sensors attached to the back of workers' safety vests and transmits data about their movements in real time
- Could potentially reduce workplace injuries and decrease fraud in Workers Compensation

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### Issues to be addressed

- Privacy
- An automated system is not sophisticated enough to account for the unique characteristics of individual drivers, e.g. if a driver is in recovery from a heart attack, or on medication, etc
- •What a potential health score may mean
- Regulatory issues

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### **Future of Wellness in Insurance**

- Foresee the Change
- $_{\odot}$  Millennials will dominate the market in the years to come
- $_{\odot}$  The least engaged of any generation presently buying insurance
- The integration of high-tech wearables into insurance underwriting or rating may promote the engagement of Millennials
- o "Worried well" generation increasingly join in health and wellness activities for prevention or reassurance rather than waiting for treatment
- Be Innovative
- o Think out of box and not be limited by current concerns
- Be ahead of Market
- o Move fast and play offense stead of defense.

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### Reference • Jim W.(2015): Getting Well Soon: The Next Trillion-Dollar Industry for P/C Insurers. Carrier Management, 2015 Jun;

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Questions?

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### Inertia and Incentives

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### Inertia

- Insurers
- Regulators
- Consumers



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### Incentives

- Discounts
- Penalties
- Effort > Benefit

