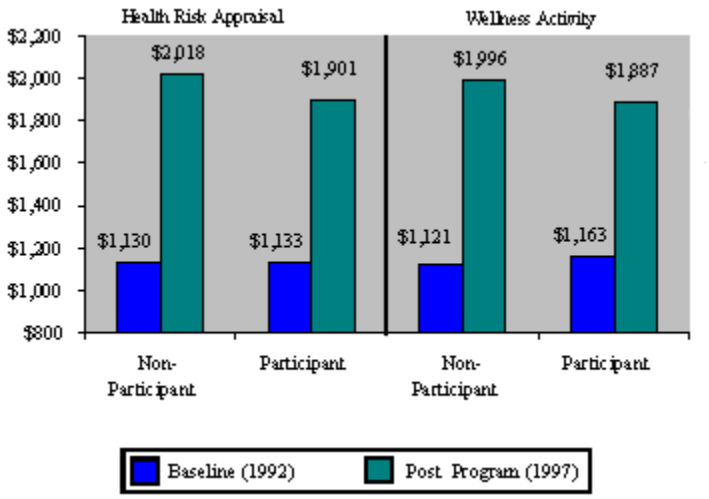
1. Impact of StayWell Programs on Chrysler Health Care Costs, 1999

This study is an expansion of an earlier study of the effects of the Wellness Program on the healthcare costs of DaimlerChrysler employees. The earlier study had found that completing a StayWell Health Risk Assessment (HRA) was associated with a substantial reduction in 1995 health care costs. Data for the current study comes from 38,318 employees from 10 Chrysler sites.

A multivariate regression analysis was used to estimate the effects of various wellness initiatives on 1997 healthcare costs. The study included DaimlerChrysler employees in either traditional indemnity insurance or PPO insurance between 1992 and 1997 and who completed at least one HRA. To detect and control for possible selection effects, program effects were split into two components: the impact on health care costs of each risk factor and the effect of each program on the probability of having a risk factor.

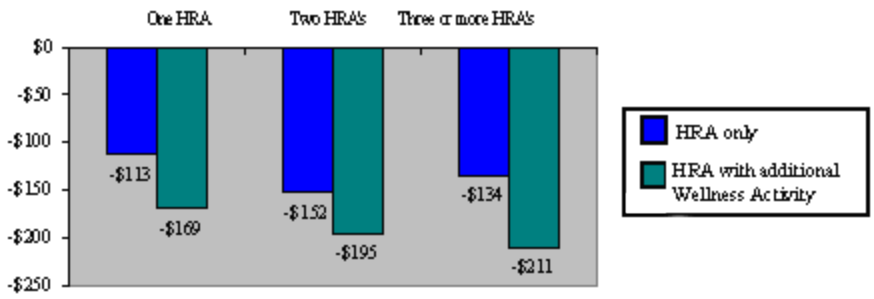
Results of the analysis supported earlier findings that completion of an HRA is associated with cost reductions. In addition, the results showed that one or more HRAs combined with an additional wellness activity tended to lower costs further (see Figure 1).

Figure 1: Health Care Costs Comparisons



Many health risks were associated with increased costs, for example cardiovascular disease, smoking and weight (see Figure 3). Some of the largest savings areas are in behavioral and attitudinal risks, for example depression, stress, self care knowledge and back pain (see Figure 4).

Figure 2: Participation Reduces Health Care Costs



Health care costs were very similar in all groups at baseline. Health care costs increased in all groups from baseline to post Program. However, the post Program health care costs were significantly less in both health risk appraisal ($117) and wellness activity ($109) participants.

Participation in the Program, either by doing HRA only or by participating in additional wellness activities, resulted in health care cost reduction. The greatest reduction in health care costs was seen for employees who participated by doing 3 or more HRA's and also participated in at least one other wellness activity.

Increased Health Care Costs Associated with Health Risks

Multivariate regression analysis of health care costs associated with health risks identified by HRA found that employees at medium risk level and high risk level have higher health care costs when compared to the low risk group. The following two charts show some of the risk factors associated with increased costs.

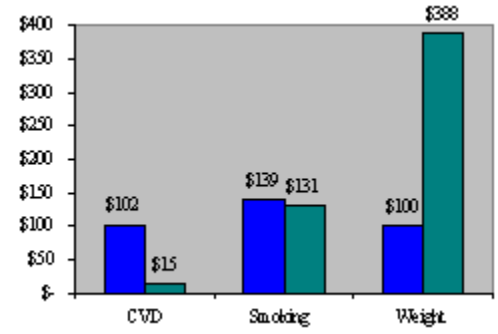
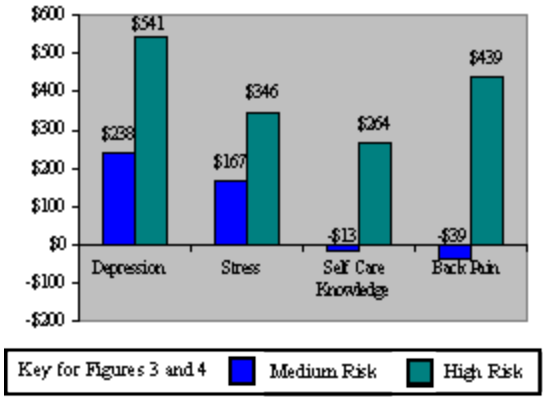


Figure 3: Increased Costs Associated with CVD, Smoking, and Weight Risks

Cardiovascular disease (CVD) medium risk is defined as 10 year risk for developing CVD between 10—20% based on Framingham risk equations, high risk is 20% or more. Smoking medium risk is a former smoker, high risk is a current smoker. Weight medium risk is a body mass index (BMI) between 25 and 30, high risk is a BMI over 30.

Figure 4: Increased Costs Associated with Depression, Stress, Self-Care Knowledge, and Back Pain



Note: Independent effects controlling for location, plan choice and employee demographics.

Depression medium risk is occasionally depressed, high risk is frequently depressed. Stress medium risk is often troubled by stress and has inadequate coping skills, high risk is always troubled by stress. Self-care medium risk knows how to treat 2-6 out of 8 common health problems, high risk is 0 or 1. Back pain medium risk is no current back pain with job that creates risk, high risk is back pain in last 6 months.

2. StayWell Impact Analysis, 1997

StayWell's impact on DaimlerChrysler's health care expenditures was studied, measured, and evaluated in this report. The impact of the StayWell Program appears to have been favorable in demonstrating its association with significant health care savings for DaimlerChrysler Corporation.

Statistical Analysis (Overall Multilvariate Analysis)

The purpose of this was to provide an understanding of the effect the StayWell Program has had controlling for all known factors. Statistical methods were used which were developed for the RAND Health Insurance Experiment that was repeatedly validated over many years and has been used as a standard approach to studying health care expenditures.

In summary:

- StayWell participation increased steadily from 1991 to 1994, and increased significantly in 1995.
- StayWell participation attracted a higher percentage of non-bargaining members, PPO members, and younger employees. In addition, StayWell has attracted those employees with a history of lower expenditures("healthier" employees). Thus, when comparing StayWell participants to Non-Participants, StayWell participants had lower expenditures per patient and per employee than Non-Participants did.
- To isolate the effects attributed solely to the StayWell Program (independent of prior expenditure behavior, bargaining unit status, health plan, geographic location, age and gender), multiple regression techniques were used, and demonstrated that StayWell participants would have higher expenditures per patient and per employee if they had not been participants in the StayWell Program.

- Savings estimates revealed that StayWell was associated with significant savings in dollars per employee from 1991 to 1995, with the highest dollar savings achieved in 1995 ($16 per employee per month). See Table 1 below:

Table 1: Average Difference in Monthly Health Care Claims Expenditures per Employee (Wellness Program Participants 1991 - 1995) Year Savings per Participant per Month

Year	Savings per Participant per Month
1991	$5.23
1992	$12.97
1993	$7.20
1994	$10.18
1995	$16.01

Wellness Program participation was associated with monthly health care claims savings that ranged between $5 - $16 per participant, per month.

3. Health Risks and their Impact on Medical Costs, 1995

This study was conducted to answer how an individual's health habits affect medical claims. It was designed to measure the relationship between health risk and behavior and the cost of medical care. Medical utilization and cost data were analyzed for low and elevated levels of risk for each category. The following health behaviors were studied:

- Smoking
- Eating Habits
- Alcohol Use
- Cholesterol
- Exercise
- Weight Control
- Mental Health
- Driving Habits
- Blood Pressure
- Stress

This study was the result of the joint efforts of Milliman & Robertson, Inc., StayWell Health Management Systems, Inc., Chrysler Corporation, and the International Union, UAW (UAW). Health risk status information was provided by StayWell for Chrysler employees enrolled in the voluntary Wellness Program.Claims data was submitted by Chrysler Corporation and UAW. Milliman & Robertson designed the study,tabulated the data and interpreted the results, with assistance in the study design and interpretation provided by StayWell.

This study was a follow-up to a similar research project done in 1987 by Milliman & Robertson with Control Data Corporation, the former parent company of StayWell Health Management Systems. The 1987 study, which analyzed the relationship between health behaviors and medical costs, established the linkages between lifestyle and medical cost.

The primary conclusion of this study was similar to the 1987 study: a significant difference exists in the cost of medical care by health risk status. The study showed that a person with an elevated level of risk generally uses more medical care than a person with a low-risk status. The extent of this effect varied by the behavior being analyzed. For example, this study showed:

- Smokers experienced 31% higher claims
- Employees outside the healthy weight range had 143% higher hospital inpatient utilization
- Employees with poor eating habits generated 41% higher
- Those at an elevated risk for stress had overall claim costs 24% higher
- Those with mental health risks had 13% higher costs

4. Management Summary Data

Health Risk Assessments identify areas where participants can reduce their risks through lifestyle changes. The following data is based on 18,638 employees that completed and HRA in 1999 and at least one other HRA in the past. Following are three management summaries for subsets of the total population that completed the HRA.

Changes in Health Risk Among Employees From the Headquarters Complex

In 1999, 2,282 white-collar employees at the Headquarters complex completed a health risk appraisal. Of those participants, 1,930 had completed at least one other risk appraisal between the years of 1986 and 1999. The average time between their current and initial (baseline) assessment was 5.9 years. Of these participants with two more assessments, their greatest changes in health risks between baseline measurement and 1999 were:

- Driving risk decreased 51%
- Smoking risk decreased 33%
- Alcohol risk decreased 32%
- Mental health risk decreased 26%
- Nutrition risk decreased 23%

Additional changes in health risks included:

- Exercise risk decreased 20%
- Stress risk decreased 14%
- Blood pressure > 139/89 decreased 12%
- Blood pressure > 159/99 decreased 7%
- Self care high-risk decreased 7%

Among the 1,930 participants with two or more health risk assessments, those with fewer than three risky habits increased from 19% to 32%, while the percentage with three to five health risks decreased from 57% to 53%, and the percentage with the highest number of risks (six or more) decreased from 24% to 16%.

In addition, the average Lifestyle Score (0-100 score) of those with two or more assessments improved from 64 to 68. This change indicates an overall improvement in health status of these participants. Based on the changes in health risks of the 1,930 white collar participants with two or more assessments the Program estimated an annual savings of $1,187,300.

Changes in Health Risk Among White Collar Employees Throughout the Corporation

In 1999, 5,630 white-collar employees from 12 sites throughout the corporation completed a health risk appraisal. Of those participants, 4,184 had completed at least one other risk appraisal in the past. The average time between current and initial (baseline) assessment was five years. Of these participants with two more assessments, their greatest changes in health risks between baseline measurement and 1999 are shown below.

- Driving habits risk decreased 42%
- Smoking risk decreased 27%
- Alcohol consumption risk decreased 29%
- High-risk alcohol consumption decreased 39%
- Mental health risk decreased 20%

Additional changes in health risks include:

- Exercise risk decreased 13%
- Stress risk decreased 9%
- Blood pressure > 159/99 decreased 10%
- Self care high-risk decreased 7%

Among the 4,184 participants with two or more health risk assessments, those with fewer than three risky habits increased from 19% to 28%, while the percentage with three to five health risks decreased from 56% to 53%, and the percentage with the highest number of risks (six or more) decreased from 25% to 19%.

In addition, the average Lifestyle Score (0-100 score) of those with two or more assessments improved from 64 to 66. This change indicates an overall improvement in health status of these participants. **Based on changes in the health risks of the 4,184 white collar participants with two or more assessments, the Program estimated an annual savings of $1,648,700.**

Changes in Health Risks among Employees from U.S. Manufacturing Sites

Of 20,674 active employees from DaimlerChrysler Corporation's U.S. manufacturing locations, a subset of 14,454 participated two or more times. The average time between the current and baseline assessments was 3.0 years.

- Driving habits risk decreased 20%
- Alcohol consumption decreased 14%
- Smoking/tobacco use risk decreased 11%

Among the 14,454 participants from U.S. manufacturing locations with two or more health risk assessments, those with fewer than three risky habits increased from 6% to 10%, while the percentage with three to five health risks decreased from 48% to 51%, and the percentage with the highest number of risks (six or more) decreased from 46% to 40%.

In addition, the average Lifestyle Score (0-100 score) of those with two or more assessments participants improved from 51 to 53. This change indicates an overall improvement in health status of these participants. **Based on changes in the health risks of the 14,454 participants from U.S. manufacturing locations with two or more assessments, the Program estimated an annual savings of $4,259,900.**

5. Focused Intervention Model
Impact of a Phone-Based Intervention on the Reduction of Health Risks

The Program's phone based intervention (a lifestyle risk counseling program targeted at high risk employees) has been evaluated in a study by Gold and et al.

Abstract

Purpose. Evaluate the long-term impact of phone-based interventions that targethigh-risk, ready-to-change individuals.

Design. Quasi-experimental design with pre/post comparisons between participants and non-participants.

Setting. Six organizations from the private and public sector.

Subjects. 607 intervention participants were compared to a control group of 1,134 eligible non-participants.

- **Measures.** Health risk assessment at baseline and an average of 2 years later measured risk in 13 lifestyle areas.
- **Intervention.** Programs were offered in seven areas: back care, cholesterol control, eating habits, exercise & activities, stress management, tobacco use, and weight control. Each program was conducted by a trained health educator who provided information and counseling to facilitate change in the area selected by the participant. All counseling was done by telephone and included 3 to 5 contacts over a 1-year period.

Results. Binary logistic regressions controlling for gender and age revealed both *specific*and *general* effects. Participants were 1.8 to 3.5 times as likely as non-participants to reduce the targeted risk in six of seven risk areas. In addition, participants were 1.7 to 3.5 times as likely as non-participants to reduce their risks in nine of 13 areas not targeted by the intervention (i.e., general effect). Overall, participants significantly *reduced* their number of risks, while non-participants significantly *increased* theirs (difference of .85 risks).

Conclusions. Results show that at-risk participants make long-term improvements in health risks directly related to the intervention in which they participate. Results also suggest that this intervention helps individuals develop behavior-change skills they apply to other lifestyle issues.

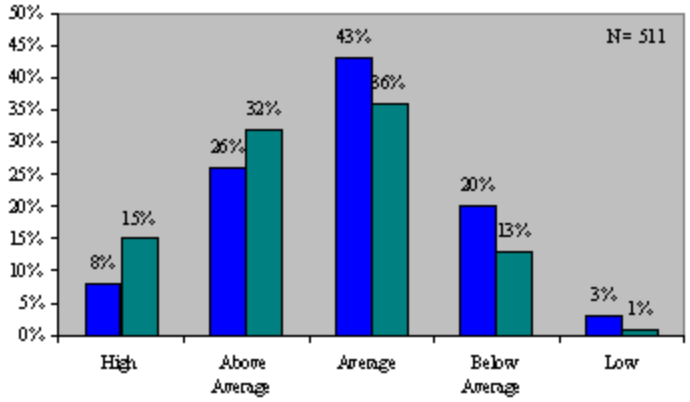
6. Health Activity Center Physical Performance Data

Physical performance data is presented for over 500 Health Activity Center members that have completed at least 2 fitness assessments. An initial fitness assessment to assess current fitness level (baseline) and establishing exercise program goals is required for fitness center membership. Resting heart rate and blood pressure, cardiovascular endurance, flexibility, muscular strength and endurance, body composition and back fitness assessments are conducted by degreed fitness professionals. Reassessments are voluntary.

The data is derived from the results of members' fitness assessments. Results for cardiovascular fitness are presented in categories from high levels of fitness (high) low levels of fitness (low). Results for resting blood pressure measurements are presented in categories from optimal levels of blood pressure (optimal) to high levels of blood pressure (high).

Evidence of conditioning improvement is shown by the decrease in the percentage of members in the low, below average and average categories and an increase in the percentage of members in the above average and high categories. This change indicates a general upward trend in members' conditioning levels. The greater percentage of members in average to high categories indicates more members are achieving or surpassing benchmarks. (See Figure 5)

Figure 5: Change in Cardiovascular Conditioning



Improvements in both systolic and diastolic blood pressure measurements are evident. The percentage of members with normal and optimal blood pressure are higher from baseline to post Program in both systolic (6%) and diastolic (9%) blood pressures while the percentage of members with high normal and high blood pressures have decreased by 9% from baseline to post Program in both systolic and diastolic blood pressures. (See Figures 6 and 7).

Figure 6: Change in Systolic Blood Pressure

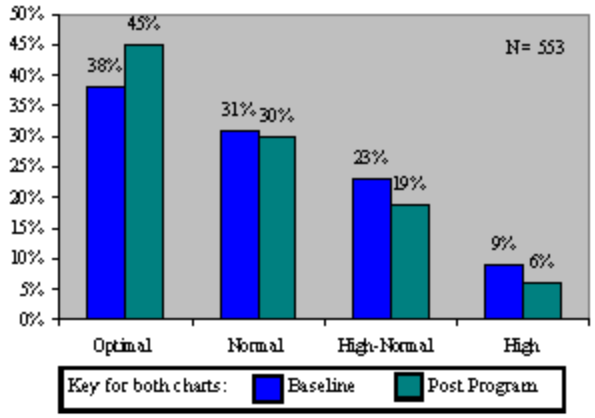


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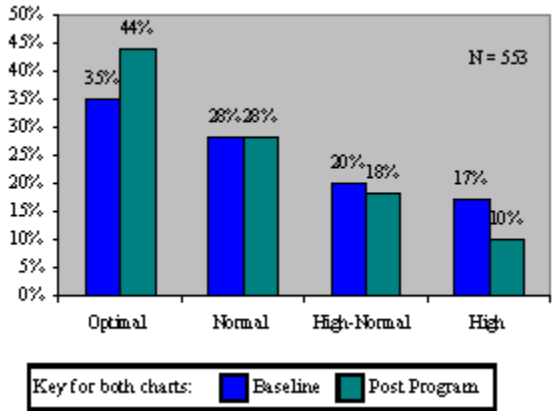
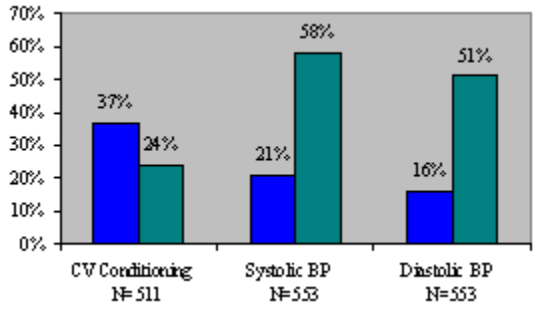
Figure 7: Change in Diastolic Blood Pressure



Further evidence of improved conditioning is shown by the percentage of members who improved their status[Defined as changes from low, below average, or average for cardiovascular conditioning (or from high or high-normal for blood pressure) to any higher category.] or maintained desirable status [Defined as maintaining a score of high or above average for cardiovascular conditioning or optimal or normal for blood pressure.].

Figure 8: Change in Status



In Cardiovascular conditioning, 37% that scored low to average, improved status while 24% were able to maintain status at or above the benchmark, i.e., above average or high. Twenty-one percent that scored

high or high-normal in systolic blood pressure, improved status while 58% were able to maintain score within the normal and optimal categories. Sixteen percent that scored high or high-normal in diastolic blood pressure, improved status while 51% were able to maintain score within the normal or optimal categories. (See Figure 8)

7. Participant Satisfaction

Customer satisfaction surveys were conducted upon completion of all wellness activities such as courses, screenings and workshops. Program evaluations completed in 1998 showed a 97% satisfaction rate of very satisfied/satisfied and 95% of participants indicated they intended to improve a health habit, after participating in the activity. In 1999, the numbers remained relatively unchanged, with 97.9% very satisfied/satisfied with the activity and 95.8% said they would change a health habit. (See Figures 9 and 10.)

Figure 9: Program Satisfaction

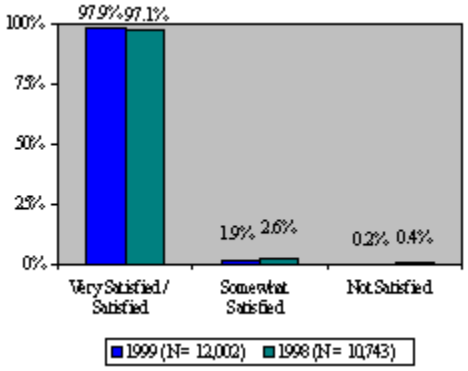
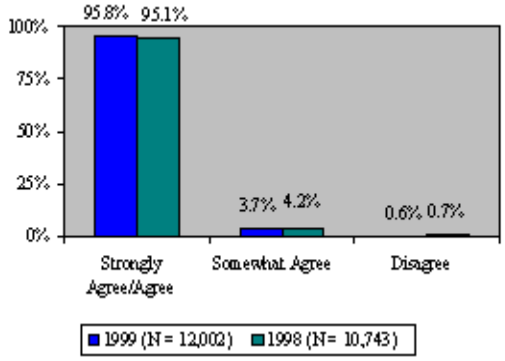


Figure 10: Intent to Improve a Health Habit



Reliability and Validity of Health Risk Assessment

The validity of *StayWell's* health risk assessment technology has been developed and field-tested over a 20-year period and has been subjected to rigorous validation testing.

Content validity has been assured through a two-step process. First, subject matter experts were consulted to: 1) identify and prioritize content domains to be included, 2) identify standard and often previously validated measurement protocols, and 3) develop initial questions for testing as necessary. Second, large groups of test participants were asked to complete and evaluate the questionnaire. Based on their comments and suggestions, improvements were made to assure that participants clearly understood the questions and were able to answer them appropriately. Subsequent use of the assessment tools by several million participants has provided further verification of exceptional content validity.

Predictive validity of the assessment tools on key indicators such as mortality, medical costs, and absenteeism has been validated by several landmark studies. StayWell's 1987 study linking health risk assessment questions to medical costs, *"Health Risks and Behavior: The Impact on Medical Costs,"* conducted jointly with the actuarial firm of Milliman & Robertson, Inc., has been acclaimed as a milestone in the health promotion field. A 1995 joint study with Milliman & Robertson, *"Health Risks and their Impact on Medical Costs,"* replicated and extended these earlier results. Recently, a peer-reviewed publication of research sponsored by the *Health Enhancement Research Organization (HERO)* has become the new "gold standard" in linking HRA health risks to medical costs. Results are found in Goetzel, R.Z., Anderson, D.R., Whitmer, R.W., et al.: "The Relationship Between Modifiable Health Risks and Health Care Expenditures: An Analysis of the Multi-employer HERO Health Risk and Cost Database." *Journal of Occupational and Environmental Medicine*, 1998; 40 (10): 843-854.

The American Institutes for Research, Cambridge Research Center validated mortality predictions made by 40 health risk assessment instruments against cases selected from the Framingham Study that had known mortality outcomes. The validity of the *StayWell*assessment's risk estimates was comparable to the best health risk appraisals available in the study. [Found in Smith, K.W., McKinlay, S.M. & Thorington, B.D. "The Validity of Health Risk Appraisal Instruments for Assessing Coronary Heart Disease Risk." *American Journal of Public Health*, 1987; 77(4): 419-424; and American Institutes for Research, Cambridge Research Center, March 1986.]

StayWell's health risk assessment aggregate data profiles have been found to differentiate known differences in questionnaire responses across age, gender, and job categories. These aggregate data profiles also correspond well to available population norms regarding the prevalence of health risks.

Screening assessment questions and feedback are confirmed by their alignment with nationally accepted guidelines from groups including, but not limited to: The American College of Sports Medicine; the Centers for Disease Control and Prevention; the Department of Health and Human Services; the U.S. Preventive Services Task Force; and the National Institutes of Health.

Reliability of the HRA tools was examined (beyond the above predictive validity research) concordance between baseline and follow-up risk levels across both self-reported and screening risk measures. For 2-week intervals of test-retest reliability assessment, concordance levels generally approached 100% for most assessed risk areas.

StayWell Impact ModelTM

The StayWell Impact Model (SIMTM) is a proprietary analysis tool that estimates avoidable health care costs based on demographic and health risk data collected by StayWell's health risk assessment tools. **SIM** projects *current avoidable costs* related to*current participant health risks*. Ten health risks representing substantial avoidable health care costs are currently included in **SIM**. The risks are smoking, exercise, weight, driving, blood pressure, cholesterol, back injuries, stress, mental health and alcohol use.

SIM was developed based primarily on the results of a series of studies conducted by StayWell in consultation with specialized consulting firms over a 15 year period. The first of these was the landmark study, *Health Risks and Behavior: The Impact on Medical Costs,*completed in 1987 by StayWell and the actuarial consulting firm of Milliman & Robertson, Inc. The most recent research supporting **SIM** is the "HERO Study," conducted by StayWell and the MEDSTAT Group and sponsored by the Health Enhancement Research Organization. Selected results of other important research are also incorporated into **SIM**.

The StayWell database contains a complete history of more than 50,000 employees eligible for the StayWell Program in a major customer organization over a five-year period. Encompassing 27 locations nationwide, this employee population comprises a*representative cross-section of the U.S. workforce*. The database includes demographic characteristics, health risk assessment data, and health care claim records, all of which can be linked by encrypted employee identification number for analysis. The HERO database includes these same data types.

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