

# **The Economics of Wellness: A Successful Group-Based Wellness Intervention in the Laboratory**

Gary Charness  
University of California at Santa Barbara

Roger Jahnke  
Institute of Integral Qigong and Tai Chi

November 28, 2010

**Abstract:** The enormous cost of health care in the United States has sparked increasing interest in innovative and alternative approaches to both physical and emotional wellness. We demonstrate the value of an easy-to-implement, stress-reducing and wellness-enhancing methodology. In our pilot study, undergraduate students who participated in a weekly meeting over the course of two months had, relative to a control group, a significant decrease in the resting-pulse rate over time, as well as significant improvement in several measures of wellness. Our results suggest that simple lifestyle-oriented wellness-promotion interventions may have significant benefits in terms of increasing health and productivity, as well as diminished medical costs.

**Acknowledgments:** We would like to acknowledge Rebecca McLean, Maya Shaw-Gale and Kira Jones for their help in assisting us at the sessions. We would also like to thank Michael Kuhn for outstanding research assistance in developing the estimates for reduced medical costs. We thank Kelly Bedard, Ted Frech, Peter Kuhn, Heather Royer, and Cathy Weinberger for very helpful comments.

**Contact:** Gary Charness, Department of Economics, University of California, Santa Barbara, 2127 North Hall, Santa Barbara, CA 93106-9210, [charness@econ.ucsb.edu](mailto:charness@econ.ucsb.edu), <http://www.econ.ucsb.edu/~charness>. Roger Jahnke, OMD, Director of Research, Health Action Synergies and the Institute of Integral Qigong and Tai Chi, 5276 Hollister Ave, #257, Santa Barbara, CA, 93111, [DrJahnke@HealthAction.net](mailto:DrJahnke@HealthAction.net), <http://HealthAction.net> and <http://CircleOfLife.net>.

## 1. Introduction

The Center for Disease Control and Prevention (2008) estimates that 75% of all medical costs are for the treatment of preventable chronic disorders. Ali et al. (2004) find that nine out of the 10 major causes of death are preventable, at least in the short run.<sup>1</sup> Expenditures on health care in the United States surpassed \$2 trillion in 2006, almost three times the \$714 billion spent in 1990, and over eight times the \$253 billion spent in 1980.<sup>2</sup> Given the prevention of health disorders seems considerably more desirable than the medical treatment of preventable disorders, exploring preventative options offers considerable economic promise.

Given the radical growth in costs, health care and medicine are in a much-needed re-engineering process. With these significant pressures in the health-care system there has been a rapid and high magnitude increase of interest in disease prevention and in programs that promote health and personal productivity. Some of these studies involve the use of explicit financial performance incentives for people to explore and engage in health-promoting behaviors. For example, Fernald, Hou, and Gertler (2008) perform an intervention with low-income, rural, Mexican adults, who received money contingent on positive changes in health behavior. Their results indicate significantly improved biometric measures for those in the intervention communities than for those in the control communities. Giné, Karlan and Zinman (2010) report a positive effect from offering cigarette smokers savings accounts in which they deposited funds

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<sup>1</sup> It was a bit of a surprise when conventional medicine itself was found to be the third-leading cause of death in America (Weingart et al. 2000).

<sup>2</sup> These figures are taken from Kaiser Foundation (2008), at [http://www.kaiseredu.org/topics\\_im.asp?imID=1&parentID=61&id=358](http://www.kaiseredu.org/topics_im.asp?imID=1&parentID=61&id=358).

over six months, after which participants would take a urine test for nicotine; if they failed, the money would be forfeited.<sup>3</sup>

Another approach is to pay people to simply attend sessions for a fixed rate of pay. Charness and Gneezy (2009) paid students at two universities to attend the gym nine times over a one-month period. After the payment period was over, they found significant improvement in gym-attendance rates; in addition, they found evidence of significant relative improvement in a number of biometric measures for the paid group as compared to the control group. Thus, it does not appear to be necessary to provide financial incentives based on measured performance to reap benefits from an intervention. In our study, we follow this approach and simply pay people in our intervention group for attending nine weekly sessions.

An alternative to a purely physiologically-based approach for effecting behavioral change is to purposefully activate and enhance the mind-body interface, the interaction of the psychological and physiological processes of the individual. An appreciable proportion of the enormous amount of money spent each year on the treatment of preventable diseases may be avoidable by teaching people about health self-reliance and encouraging the use of self-healing and stress mastery skills. It is widely understood that mind-body interventions like lifestyle planning, wellness coaching, behavioral change management and mind-body practices like Yoga, Tai Chi and Qigong have significant benefit on the promotion of well-being and the management and prevention of disease (Tindle et al. 2005; Wolsko et al. 2004). Behavioral interventions, even mild and routine exercise, have been found to have benefits that are equal to or better than drugs. One study found that exercise is as effective as pharmaceutical approaches

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<sup>3</sup> An example from the business world is Tangerine Wellness, a company that tries to help firms to lower health-care costs by rewarding employees who achieve and maintain a healthy weight; they report considerable success (see Tangerine Wellness 2008).

to depression (Science Daily 1999). Another found that the association between depressive symptoms and adverse cardiovascular events was largely explained by behavioral factors, particularly physical inactivity – physical activity is a remedial strategy for preventing depression and heart attacks (Whooley et al. 2008).

While an approach to wellness has not been the focus of many studies in economics, there is a rich base of literature that suggests that the economic benefits of health promotion are worthy of pursuit and that the return on investment on such programs is favorable. Some previous economics investigations (e.g., Goetzler and Ozminkowski 2008, Aldana 2001) have suggested that, on average, more than \$3 can be saved for every \$1 spent on average. James Heckman has written on the importance of developing both cognitive and socio-economic skills for maintaining both physical and mental health.<sup>4</sup> Respected physicians have written books extolling the benefits of cognitive-behavioral therapy (as apposed to medication) for depression and anxiety (Burns 1999), stressing the connection between emotions, wellness, and musculoskeletal pain (Sarno 1998), demonstrating that heart disease is reversible (Ornish 1990), and asserting that numerous medical conditions can be successfully treated and even prevented without drugs or surgery.

This paper reports the results of a pilot intervention under controlled conditions. The intent of our investigation was to demonstrate a tangible benefit either in attitudes towards wellness or in wellness outcomes *per se*. We facilitated students in a mind-body based wellness program in weekly meetings over a two-month period. Our goal was to investigate how individuals respond to information about wellness and to experiences with self-initiated health enhancing practices. The intervention explored the use of a ‘toolbox’ of processes for enabling

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<sup>4</sup> See, for example Heckman and Rubinstein (2001), Heckman, Stixrud & Urzua (2006) and Heckman (2008).

relaxation and stress reduction, enhancing personal energy, and expanding capacity for mental focus and learning. Our paper is perhaps the first study on what might be termed “wellness economics.”

The overall design of the intervention included wellness coaching and lifestyle planning with a focus on mind-body practice. In the coaching context, participants explored their areas of personal strength as well as areas they might wish to target for improvement. With guidance from the coaches they created and pursued both short and long term goals through personal lifestyle plans. The mind-body practices included breath practice, self-massage, light meditation, and simple, low stress body movements. Participants completed a questionnaire concerning their habits, attitudes and stress levels at the first and last sessions. In addition, we measured resting pulse rates at the beginning and end of both the first and last session.<sup>5</sup>

We did not expect to find significant biometric effects with a young and healthy group of participants (undergraduates at UCSB), but thought we might see improvements in attitudes towards wellness activities. However, we did indeed find evidence of significant reductions in pulse rate relative to the control group that was not exposed to the wellness program or the mind-body practices. The questionnaire results were more mixed, but nevertheless provided evidence of improved attitudes towards individual responsibility for health and wellness and better experiences over the two-month span with respect to depression, sleep difficulties, etc.

## **2. Study Design**

We recruited participants from a database consisting of students at the University of California at Santa Barbara who had expressed interest in participating in paid research

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<sup>5</sup> Resting heart rate, an indicator of autonomic nervous system tone, independently predicts coronary events in men (Kannel, Kannel, Paffenbarger, and Cupples 1987, Palatini and Julius 1997, King, Everett, Mainous, and Liszka 2006, Thayer and Lane 2007) and women (Hsia, Larson, Ockene, Sarto, Allison, Hendrix, Robinson, LaCroix, and Manson 2009).

experiments. This database was composed of people responding to a campus-wide e-mail message inviting people to register on a website for possible participation in research studies. As this notice was campus-wide, a great variety of academic majors were represented.

Invitations were sent by e-mail to potential participants, and respondents were assigned to one of two introductory meetings. These invitations mentioned attendance over multiple sessions, with earnings in line with the typical pay (which is around \$12-15 per hour) for experiments at UCSB. People who attended the introductory meeting for the control group were told that they would be paid \$10 for coming to this introductory meeting and \$15 for returning for final session eight weeks later) and that these sessions would take 45 minutes or less. People who attended the introductory meeting for the group to be trained in mind-body practices were told that they would be paid \$125 for attending that session and eight other weekly sessions of 75-90 minutes each, in which they would engage in some simple exercises that were demonstrated at the first session. They were also informed that the timing of the payment would be \$15 at the first session, \$45 at the fifth session, and \$65 at the ninth session.

Given the length of time between control-group sessions and the modest payment, it is not surprising that there was considerable attrition for this group, even though we did send e-mail reminders prior to the last session. Forty-three people came to the first session of the control group, and 24 of these people also came to the last session; there is no obvious pattern that predicts *ex ante* those who would come to both sessions and those who would not. We also experienced some attrition in the intervention group, primarily after the first or second session. Fifty-one people came to the initial session and 36 of these people completed the training. Once again, there is no obvious pattern that predicts *ex ante* those who would complete the training and those who would not, though there were likely added stresses due to the fact that students

may have reconsidered the commitment relative to their academic priorities. While we are aware of potential selection issues, we are comparing changes over time rather than levels, so that such selection issues should have less impact. At minimum, we are comparing changes for those people who voluntarily participated in our intervention to those people who were not afforded the opportunity to participate.<sup>6</sup>

Students in the control group were seated in a large classroom. Questionnaires were passed out and resting pulses were taken prior to the students filling out the questionnaire. After the questionnaires were completed, the resting pulses were taken once again.<sup>7</sup> With the wellness group, using the same classroom, we followed the same process in the first and last sessions, except that we added a selection of the mind-body practices after the questionnaires were completed, but before the resting pulses were taken for the second time. Two ‘wellness coaches’ served as facilitators at each of the sessions throughout the duration of the wellness program period of the trial, implementing an integration of health and wellness coaching (life-skills development) plus mind-body practices (functional enhancement skills).<sup>8</sup>

Participants were provided with a ‘Guide Book’ (Health Action 2008) with information on both wellness and life coaching and mind-body practices, in order to enhance awareness throughout the term of the intervention. In the weekly sessions, the group typically first gathered

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<sup>6</sup> We do not claim that people who are *ex ante* uninterested in such a program, but who are nevertheless induced to participate, will also benefit; however, we do feel that this is entirely possible.

<sup>7</sup> Due to logistical constraints in this minimally-funded pilot experiment, we did not measure the participants’ pulse rates individually. Instead, participants counted their pulse beats after the facilitator counted down to zero. While this could lead to measurement error or bias, we suspect that counting is not a difficult exercise for students and we see little reason to believe that deliberate errors were made. While students might guess our research hypothesis and might even be favorably inclined towards the facilitators, it would be difficult for participants to correctly pick pulse rates so that they declined during a session and particularly across the first and last sessions (as they are unlikely to recall their pulse measurements from two months prior), which, as shall be seen, are the strongest results. In any event, the more standard procedure of having a research assistant take the pulse rates (even with a mechanical device) may not be better, given that the research assistant either already knows or is well enough informed to guess the research hypothesis and has some interest in the experiment being successful.

<sup>8</sup> While the techniques described in this section are quite specific, they are representative of the wide range of wellness techniques that available, all of which incorporate essential operational elements that trigger increased physiological and psychological self-regulatory capacity.

as a whole and then broke into smaller groups (circles of 5-6 people). After the first assessment session, the meetings started with one of several mind-body practices (breath practice, self-massage, light meditation, and body movement), continued with the coaching and lifestyle planning and concluded with a relaxing mind-body practice using visualization or meditation. The breath practice used in the pre-post assessment sessions was reviewed and utilized briefly at each session. It was suggested that participants use this breath practice on a regular basis to manage stress, enhance sleep and prepare for tests, etc. In later sessions, the participants were encouraged to request favorite mind-body practices.

At each meeting the participants reviewed the “Circle of Life” (12 domains of life):

- Diet/Nutrition
- Exercise
- Stress Mastery
- Relationship
- Financial Wellbeing
- Work/Career
- Play/Creativity
- Health Care
- Environment/Nature
- Life Purpose
- Self-Esteem/Emotions
- Spirituality

Throughout the term of the study participants refined their awareness and activities of these areas of lifestyle focus by choosing intentions and goals and receiving support, encouragement and accountability from their peers. They utilized a process called the “Blue Print for Success” as a planning and accountability support tool. Each person had 5 - 10 minutes for reviewing the week’s progress and refining next ‘action steps’. This interactive group support is the foundation of the “life-skills development” component of the Wellness Coaching process.

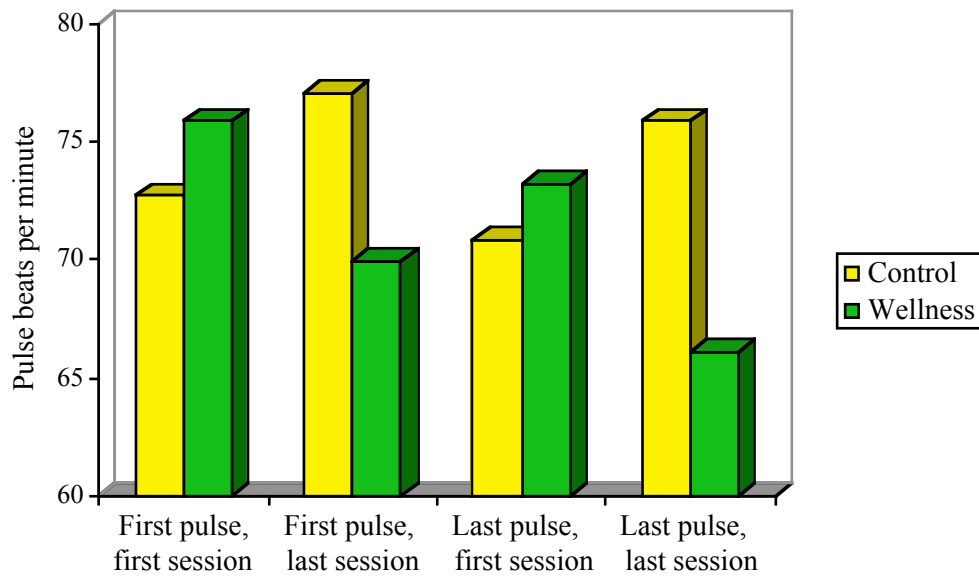


The questionnaires we used are presented in Appendix A. The first eight questions were concerned with the respondent's feelings vis-à-vis health care and disease prevention, while the next 21 questions addressed the respondent's experiences during the previous month or two. The final question (for the main treatment group only) involved an area of focus for the Circle of Life Coaching experience.

### 3. Results

Our most significant result is that resting pulse rates decreased significantly from the beginning of the program until the end for the wellness group as compared to the control. Figure 1 visually illustrates the average resting pulse rates for the first and last sessions of the control and wellness group, while Table 1 provides more detail.

**Figure 1: Average resting pulse rates**



**Table 1: Average resting pulse rates and changes**

Measure	Control Group (N=24)	Wellness Group (N=36)
First pulse, first session	72.71 (1.94)	75.86 (1.73)
First pulse, last session	77.08 (1.89)	69.92 (1.78)
Improvement	-4.37 (2.73)	5.94 (1.75)
Last pulse, first session	70.83 (2.10)	73.25 (1.84)
Last pulse, last session	75.88 (2.11)	66.08 (1.87)
Improvement	-5.04 (2.84)	7.17 (2.08)

Standard errors are in parentheses

One comparison is between the change in the first rest pulse over the two-month period for the students in the wellness group and in the control group. By itself, the improvement in this rest-pulse rate is statistically significant; since the average resting pulse rate actually *increased* over time for the control group, the comparison is even stronger. It is especially notable that the difference in the changes in the rest-pulse rate was 10.31 beats per minute for the first pulse measurement and 12.21 beats per minute for the last pulse measurement; these differences are not minor.

Comparing the difference in the individual changes in the wellness group to those in the control group, the Wilcoxon ranksum test (see Siegel and Castellan 1988) gives  $Z = 2.93$ ,  $p = 0.002$ , on the one-tailed test justified by our implicit hypothesis that the mind-body practice would lower the rest-pulse rate over time. A similar analysis of the last rest-pulse rate also shows a significant improvement over time in the main treatment, with the Wilcoxon ranksum test on individual changes across treatments gives  $Z = 3.06$ ,  $p = 0.001$ , one-tailed test. Thus, we

have strong statistical evidence of a biometric effect from the intervention protocol – wellness coaching for lifestyle planning and the implementation of mind-body practice.<sup>9</sup>

Regarding the impact of the mind-body practice on pulse rates over the course of a single session, when we compare the change in the wellness treatment to the change in the control treatment, we find no significant difference across treatments in the first session (the Wilcoxon ranksum test gives  $Z = 0.66$ ,  $p = 0.255$ , one-tailed test), but there is a significant difference in the difference across treatments in the last session ( $Z = 1.84$ ,  $p = 0.033$ , one-tailed test). As would be predicted if the benefits of the intervention (coaching plus mind-body practice) deepen over time, the decrease over the course of the session is larger in the final session of the intervention group than in the first session of this same group. The sign test on individual differences (see Siegel and Castellan 1988) gives  $Z = 1.73$ ,  $p = 0.042$ , one-tailed test).

We also run regressions on the changes across treatments in pulse rate within sessions and between the first and last sessions. These are reported in Table 2:

**Table 2: OLS Regressions for changes in pulse rate across treatments**

	First pulse, first – last session	Last pulse, first – last session	First - last pulse, first session	First - last pulse, final session
Wellness Treatment	10.319*** (3.091)	12.208*** (3.447)	0.736 (1.192)	2.625* (1.391)
Constant	-4.375* (2.394)	-5.042* (2.670)	1.875** (0.924)	1.208 (1.077)
N	60	60	60	60
R <sup>2</sup>	.162	.178	.007	.058

Standard errors are in parentheses; \*\*\* indicates significance at  $p = 0.01$ , \*\* indicates significance at  $p = 0.05$ , and \* indicates significance at  $p = 0.10$  (all two-tailed tests).

<sup>9</sup> Other statistical tests confirm this significance. For example, the Kolmogorov-Smirnov test of cumulative distributions (see Siegel and Castellan 1988) finds significance at  $p = 0.001$  for both comparisons.

The regressions confirm the patterns found using the nonparametric tests. The wellness intervention has a significant beneficial effect on the difference over time for both the first pulse rate and the last pulse rate in the sessions. There is no difference across treatments in the change in the pulse rate over the course of the first session, with a significant effect (with a one-tailed test) across treatments in the change in the pulse rate over the course of the last session

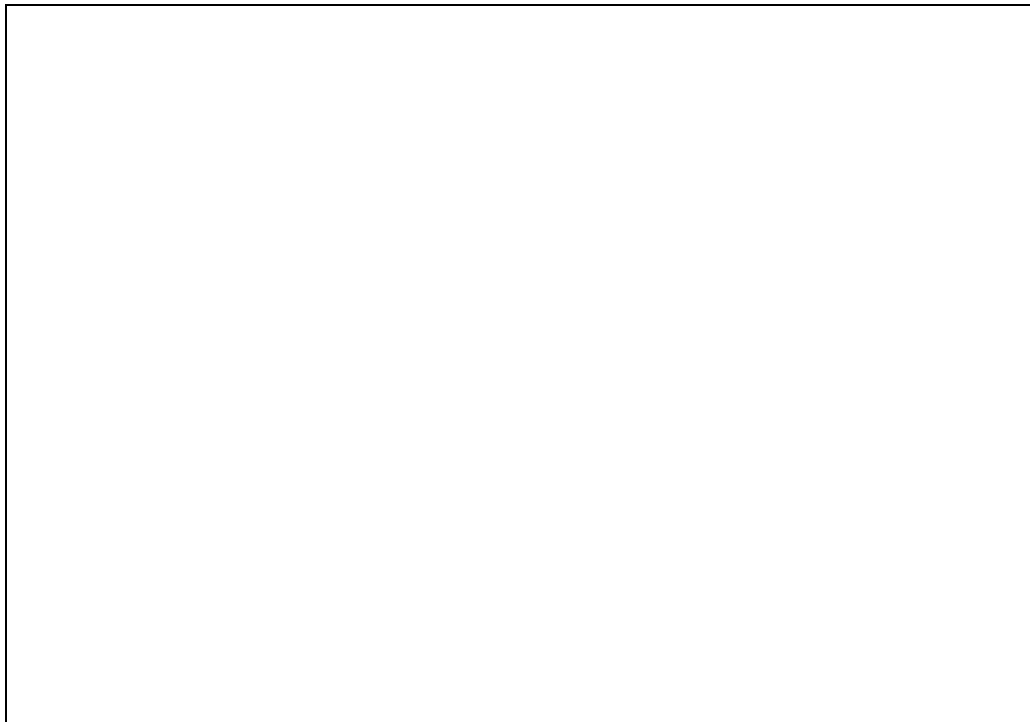
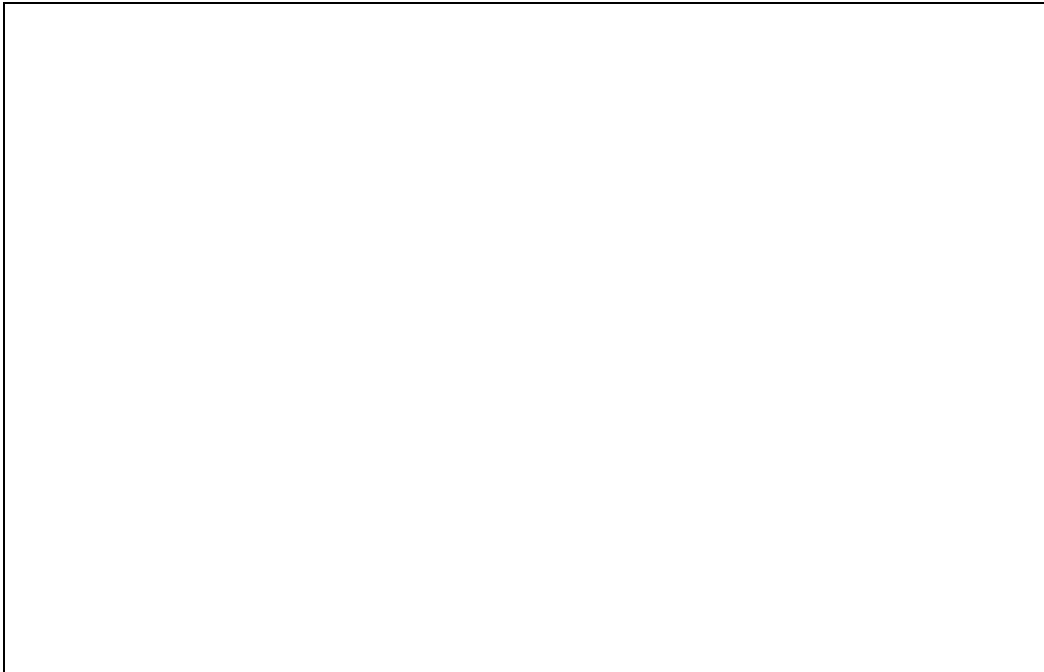
Thus, we found that a wellness intervention including lifestyle planning and mind-body practice is useful for lowering the resting pulse rate significantly more than in the control group both over the course of the two-month period and over the course of the final session. These findings suggest that when an individual applies such a breath practice, especially in a context where purposeful lifestyle planning and management is in place, it is likely that the individual will reduce his or her pulse rate – perhaps not just temporarily, but also sustainably. The implications of such skill development for health-risk reduction for are compelling.

In addition, we compiled the questionnaire responses, shown in detail in Appendix B. Rather than make comparisons for each individual question, we have created two indices. The first index, “attitudes”, compiles the responses (ranging from 1-7) to questions 1-6. These responses reflect attitudes towards individual responsibility for health as opposed to reliance on the medical intervention, with higher numbers reflecting the latter case. The second index, “experiences” was created by summing the responses (ranging from 0 to 4) to questions 9-22 and 24-29; it reflects the experiences (such as depression, sleep difficulties, and feeling unable to cope) of the individual respondents in the previous month or two, with higher numbers reflecting poorer experiences.<sup>10</sup>

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<sup>10</sup> We reversed the numbers attached to the responses to questions 12, 13, 16, 20, 26, and 27, so that lower numbers are more favorable for all questions in the index.

Figures 2 and 3 visually illustrate the average index values for attitudes and experiences, while Table 2 provides more detail and shows changes over time.



**Table 2: Average questionnaire index values**

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Index, group	First session	Last session	Difference
Attitudes (1-7), control group	3.42 (0.14)	3.63 (0.17)	0.21 (0.14)
Attitudes (1-7), wellness group	3.34 (0.14)	3.28 (0.16)	-0.06 (0.12)
Experiences (0-4), control group	1.78 (0.09)	1.71 (0.08)	-0.07 (0.07)
Experiences (0-4), wellness group	1.89 (0.08)	1.63 (0.07)	-0.25 (0.06)

Standard errors are in parentheses

We see only a minor decrease in the attitudes index for the wellness group, however, the more appropriate test is to compare the change to that of the control group. A Wilcoxon ranksum test across treatments on individual changes in the attitudes index indicates only a marginally-significant difference ( $Z = 1.39, p = 0.083$ , one-tailed test). The same test across treatments on individual changes in the experiences index indicates a more significant difference ( $Z = 2.14, p = 0.016$ , one-tailed test).<sup>11</sup> Overall, there were improvements in 17 of the 20 components in the experiences index for the wellness group, with major improvements in the number of times the respondent felt nervous or stressed, how often sleep was problematic, and the anxiety level. In addition, while we don't ask question 30 (satisfaction in the most urgent area of one's life) of the control group, there is a dramatic and significant improvement for the wellness group, from 3.96 to 6.53 on a 1-10 scale. In fact, there was improvement for 28 people and deterioration for only two people; this pattern is significant at  $p = 0.000$ .

It appears that there are indeed benefits for the students in the wellness group exploring lifestyle skills enhancement and mind-body practice, as measured by their experiences. It also appears that changes in attitudes may come more slowly than changes in experience.

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<sup>11</sup> Note that the experiences index improved over time for 25 people in the wellness group, while deteriorating for seven people in this group. By comparison, the experiences index improved over time for 11 people in the control group, while deteriorating for 12 people in this group.

We considered the question about exercise separately, as it doesn't scale with the other questions on experiences. We computed the number of minutes of reported weekly exercise by multiplying the number of times one exercised per week by the average length of time reported for each exercise session. Figure 4 shows the average weekly exercise minutes for both groups, while Table 3 provides more detail.



**Table 3: Exercise by Treatment**

Measure	Control Group	Wellness Group
Exercise, first session	131.7 (21.8)	175.7 (28.7)
Exercise, last session	127.0 (27.1)	211.6 (30.9)
Improvement	-4.7 (21.6)	35.9 (24.0)

The amounts of exercise are in minutes. Standard errors are in parentheses

The average time spent exercising per week decreased by 4.7 minutes for the control group over time. Given the proximity of final exams to the end of the sessions, it seems reasonable that this would be the case. On the other hand, we found a substantial increase of 35.9 minutes of weekly exercise for the participants in the wellness group in the time spent on

exercise. The difference in the change in exercise time is only marginally significant according to the Wilcoxon ranksum test on individual differences ( $Z = 1.55$ ,  $p = 0.060$ , one-tailed test). However, two other tests show solid statistical significance. First, the median test (see Siegel and Castellan 1988) for the change in exercise time over the two groups gives  $\chi^2 = 4.83$ ,  $p = 0.028$ . Second, since only 25% of the control group increased their exercise time, while 55% of the treatment group did so, the test of proportions (Glasnapp and Poggio 1985) finds a significant difference ( $Z = 2.23$ ,  $p = 0.013$ , one-tailed test) between these two populations.

Clearly we are speculating, yet it is entirely plausible that the intervention group may have determined (through the wellness coaching process) that increased exercise assists in stress management and even in focusing for academic study. However, given lifestyle and activity patterns are the root health status enhancement and a key disease risk factor, it is especially compelling that a this program would trigger an increase of physical activity at a time of especial stress.

#### **4. Discussion**

As we have found a marked decrease in resting-pulse rates for the wellness group relative to the change for the control group, this suggests that lifestyle planning and mind-body practice (combined and perhaps as separate interventions as well) are significantly promising for increasing the well-being and overall health. Due to the ease of implementation, these interventions have the potential for being disseminated across a wide variety of populations. These results are particularly strong given that undergraduate university students almost certainly have fewer health problems than the general populace. Since the amount spent annually on health care is so great, it follows that even tiny improvements will yield very large benefits.



We found that a group of relatively well, but stressed undergraduate students (the research program ended a week before final exams) were able to significantly shift their health status with a minimal wellness intervention. Through a low-cost wellness-coaching and mind-body practice regimen they learned to control their pulse rate, had significantly improved “experience” of physical and emotional wellbeing and, with no specific encouragement to do so, spontaneously increased their volume of weekly exercise. Our intent was to investigate the potential of a low-cost, group-based wellness intervention for improving health status and providing economic benefits. As the health aspect appears to have borne fruit, there is the real possibility that such interventions can have a substantial positive economic impact.

In order to assess the influence of health-improving behaviors on the economics of our society we present here some preliminary calculations and projections for medical savings based on the pilot results. The methodology involves a number of assumptions that will require further testing; however, in this case we have attempted to err on the conservative side to avoid inappropriate claims while emphasizing future potential – in wellness economics. For example, we have restricted our attention to what is medically defined as heart failure, rather than considering any of a multitude of other aspects of improvement in mental and physical health. In part, we felt that this would be a reasonable approach for addressing the larger economic challenges in health care, as heart disease is widely reported as having been the most expensive single cause of death for several decades. Our focus is simply to explore the cost savings potential for a population of those at risk for heart failure.<sup>12</sup>

Our key assumption is a widely respected one in cardiological research -- a heart that beats more frequently ages more quickly. A common benchmark for the age of a heart is the

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<sup>12</sup> According to the CDC: “Heart failure is a condition where the heart cannot pump enough blood and oxygen to meet the needs of other body organs. Heart failure does not mean that the heart has stopped beating, but that it actually fails and cells begin to die for lack of oxygen. See [http://www.cdc.gov/dhdsplibrary/fs\\_heart\\_failure.htm](http://www.cdc.gov/dhdsplibrary/fs_heart_failure.htm).

average pulse in the U.S., approximately 72 beats per minute. A heart that beats at 72 times per minute for a year is one heart year older. Data for 2004, from the Center for Disease Control and Prevention (2007), provides risks of heart failure for four different age ranges (0-44, 45-64, 64-84, and 85+). Using the data from the wellness group, we can model the aging of hearts in heart years (and the aging of participants in actual years). In this context we assume that the change in the heart rate observed at the end of the program remains constant throughout the remaining lifespan.<sup>13</sup> Using this information, we can estimate how long each person stays within each risk group, and then determine the likelihood that they will have at least one episode of heart failure during their life (expectancy 77.9 years, using 2004 data). Using the data from our findings, this gives a statistically-significant ( $p = 0.020$ , one-tailed test) decrease of seven percentage points (from the constant of 0.32 in the regression) in this likelihood.

According to an estimate by the American Heart Association, the direct cost for heart failure in the U.S. was \$29.6 billion in 2006 (Center for Disease Control and Prevention 2007). Applying the estimated seven-point decrease in probability to this figure, we calculate that there is a potential savings of slightly over \$2 billion from the reduction in the rate of heart failure in populations who learn to utilize lifestyle planning skills and some simple mind-body practices that are easy to learn and initiate.<sup>14</sup>

This projection assumes that the number of heart beats for an individual is the sole predictor of risk in the estimation of savings. There are of course a multitude of such factors. It is widely known that stress increases the risk for heart disease and that dietary factors as well have the influence of increasing risk for heart failure. In both wellness coaching and mind-body

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<sup>13</sup> While this assumption may be unwarranted, we point out that it is possible that continued self-practice will in fact widen this gap.

<sup>14</sup> We hasten to add that a reduction from heart failure would lead to an extended life span and a likely increase in other medical costs; in addition, such interventions would have a modest cost. Nevertheless, a more fit population would be expected to have reduced medical costs overall.

practice the areas of nutrition, exercise, and attention to neutralizing the negative effects of stress are key considerations. In the mind-body stress mastery aspect of the wellness intervention, practices that influence the autonomic nervous system have the potential to reduce the heart rate with a coincident effect of lowering blood pressure and expanding blood vessels, including the capillaries that deliver oxygen to the heart, brain, organs, and glands. These include breathing practices, gentle movements (as in Tai Chi, Qigong and Yoga), self-massage, meditation, visualization, and relaxation. Though still limited in this case just to heart disease, this is another factor that could reduce risk and therefore reduce the health care dollars unnecessarily spent on treating preventable diseases.

In the nutrition component of health literacy and capacity building, wellness coaching assists participants in implementing small but incremental nutritional changes. Diet and activity patterns are widely reported as a key cause of disease and death (Prentice 2004). Small changes, over time in the area of shifting nutritional habits and attitudes have the potential to reallocate funds that are wasted treating preventable diseases to better, more wellness oriented uses.

Our intention with this creative analysis is to interface the data of a controlled study with assumptions that leverage a glimpse of what is possible in wellness-based economics. It is apparent that these estimates for medical savings have great promise though we have explored only one category of health expenditures – heart disease.<sup>15</sup> In any case, it should be clear that the potential health and economic benefits from such interventions are quite large.

## **5. Conclusion**

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<sup>15</sup> For example, other benefits could include savings in resources such as physicians' time and the work time of patients.

Given the magnitude of the costs of health care and the fact that many expensive diseases are preventable, it appears to be worthwhile to explore a wide array of wellness options to complement conventional medical care and to begin to develop a paradigm for the economics of wellness. It is apparent that some portion, likely a significant portion, of medical expenses for treating preventable diseases could be eliminated. In the spirit of the emerging trend of positive returns on investment in corporate weight-loss programs and a recent field intervention to promote exercise, we have introduced a group of undergraduate students to wellness coaching and mind-body exercises such as breath practices, self-massage, meditation, and body movements. Given the increased interest of the most respected medical schools in alternative clinical approaches (Consortium of Academic Health Centers for Integrative Medicine 2009) and the interest in developing non-cognitive skills (in the lexicon of James Heckman), our intent was to demonstrate an improvement in the experience of well-being for our participants.

As a part of this project we began the development of a general set of assumptions that propose that health literacy and wellness-inducing activities not only have a positive influence on health status, but also that they exert a positive influence on economic health. In short, increases in wellness, health, and productivity, as well as the reallocation of funds typically spent on medical treatment for preventable illnesses into pro-active wellness-promotion activities and lifestyles, will have a significant beneficial influence on the economy. Stated more thoroughly, wellness activities could lead to increased health literacy, which in turn could lead to improved lifestyle attitudes and choices, better physical and mental health, and more self-reliant behavior.

We were gratified to find (relative to the control group) not only a significant improvement in the experiences index, but also a significant decrease in the rest-pulse rate and an increase in exercise over time. As in Charness and Gneezy (2009), success was achieved

without financial performance incentives, in some sense making the results more striking. Given that we found this effect on a presumably very healthy segment of the population, there appears to be considerable promise for such interventions with other, less healthy, groups. Positive results for this population would perhaps more clearly predict the long-term positive economic benefits; these include increased productivity and the reallocation of funds spent on the treatment of preventable diseases to more useful purposes.

Our pilot study has a number of limitations. The number of participants in this study is small. We do not have measurements of economic outcomes. Finally, there are many moving parts in our intervention, and the degree to which each part of the intervention drives the observed changes is unclear. Further work is needed to disentangle these factors, varying each of the components of the intervention systematically. Nevertheless, we view our study as a first step in examining the potential for important improvements in biometric and economic outcomes from wellness activities, with substantial benefits for society.

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8. If you feel stressed or depressed, which of these are you likely to do (check all that apply)?

- a. Exercise \_\_\_\_\_
- b. Meditate \_\_\_\_\_
- c. Journal \_\_\_\_\_
- d. Talk to a close friend or family member \_\_\_\_\_
- e. Talk to an advisor/counselor \_\_\_\_\_
- f. See a physician \_\_\_\_\_
- g. Take prescription medication \_\_\_\_\_
- h. Consume alcohol or recreational drugs \_\_\_\_\_
- i. Consume “junk” food or eat mindlessly \_\_\_\_\_
- j. Watch TV \_\_\_\_\_
- k. Listen to loud music - like rock \_\_\_\_\_
- l. Listen to mellow, peaceful, relaxing music \_\_\_\_\_
- m. Read spiritual writings \_\_\_\_\_
- n. Read self help books \_\_\_\_\_

9. In the last month, how often have you been upset because of something that happened unexpectedly?

- Never 0
- Almost Never 1
- Sometimes 2
- Fairly Often 3
- Very Often 4

10. In the last month, how often have you felt that you were unable to control important things in your life?

- Never 0
- Almost Never 1
- Sometimes 2
- Fairly Often 3
- Very Often 4

11. In the last month, how often have you felt nervous and “stressed”?

- Never 0
- Almost Never 1
- Sometimes 2
- Fairly Often 3
- Very Often 4

12. In the last month, how often have you felt confident about your ability to handle your personal problems?

- Never 0
- Almost Never 1
- Sometimes 2
- Fairly Often 3
- Very Often 4

13. In the last month, how often have you felt that things were going your way?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

14. In the last month, how often have you found that you could not cope with all things you had to do?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

15. In the last month, how often have you been able to control irritations in your life?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

16. In the last month, how often have you felt that you were on top of things?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

17. In the last month, how often have you been angered because of things that happened that were out of your control?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

18. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

19. In the last month, how often have you felt that you have not had enough energy?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

20. In the last month, how often have you given yourself some quiet time?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

21. In the last month, how often have you felt depressed?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

22. In the last month, how often has your sleep been less than satisfactory or problematic?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

23. In the past **two** months, how many times per week have you engaged in regular physical exercise?

Zero	0
One	1
Two	2
Three	3
Four or more	4

How much time per session, on average? \_\_\_\_\_

24. In the past **two** months, how many times have you seen a doctor?

Zero	0
One	1
Two	2
Three	3
Four or more	4

25. In the past **two** months, how often have you used counseling services?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

26. In the past **two** months, how often have you bought or used “self-help” products such as DVDs, CDs, books, etc.?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

27. In the past **two** months, how often have you bought or used “self-help” products such as teas, essential oils, herbal formulas, etc.?

Never	0
Almost Never	1
Sometimes	2
Fairly Often	3
Very Often	4

28. In the past **two** months, regarding studies, work, and activities, which of the following is most accurate for you?

No difficulties	0
Thoughts and feelings of incapacity	1
Loss of interest in activity	2
Decrease in actual activity	3
Stopped working because of illness	4

29. In the past **two** months, regarding your anxiety level, which of the following is most accurate for you?

No difficulties	0
Subjective tension and irritability	1
Worry about minor matters	2
Felt anxious often	3
Felt anxious most of the time	4



## Appendix B – Questionnaire responses

### Summary Statistics for Questionnaire Responses – Wellness Group

Question	First session	Last session
1. Responsible for health (doctor = 7)	2.14 (0.17)	2.39 (0.21)
2. Public policy	3.86 (0.30)	4.28 (0.32)
3. Individual rights and responsibilities	2.58 (0.20)	2.86 (0.26)
4. Broken bone	4.78 (0.30)	4.69 (0.31)
5. Recurring stress headaches	3.06 (0.27)	2.67 (0.25)
6. Frequent insomnia	3.64 (0.26)	2.78 (0.25)
7. Enthusiasm about new practices (very = 7)	5.92 (0.18)	5.44 (0.22)
9. Number of times upset in last month	2.00 (0.16)	1.61 (0.15)
10. Number of times unable to control things	1.97 (0.18)	1.50 (0.14)
11. Number of times nervous and “stressed”	2.69 (0.14)	2.11 (0.16)
12. How often confident in last month (never = 0)	2.81 (0.15)	2.86 (0.13)
13. How often things going your way	2.22 (0.13)	2.72 (0.15)
14. How often could not cope	1.83 (0.19)	1.50 (0.16)
15. How often not able to control irritations	2.64 (0.14)	2.72 (0.14)
16. How often felt on top of things	2.44 (0.17)	2.56 (0.16)
17. How often angered by things out of your control	1.92 (0.19)	1.53 (0.17)
18. How often difficulties piling too high	1.64 (0.18)	1.28 (0.17)
19. How often not enough energy	1.86 (0.20)	1.89 (0.15)
20. How often given yourself quiet time	2.42 (0.19)	2.89 (0.15)
21. How often depressed	1.56 (0.17)	1.36 (0.13)
22. How often sleep problematic	2.19 (0.21)	1.83 (0.19)
23. Minutes of exercise per week (past 2 months)	175.7 (28.7)	211.6 (30.9)
24. How many times seen doctor	0.64 (0.17)	0.75 (0.19)
25. How many times used counseling services	0.39 (0.16)	0.33 (0.15)
26. How often bought self-help books, etc. (2 months)	0.17 (0.10)	0.36 (0.13)
27. How often bought self-help teas, etc. (2 months)	0.56 (0.17)	0.67 (0.16)
28. How often work difficulties (no difficulties = 0)	1.14 (0.13)	1.00 (0.16)
29. Anxiety level (no difficulties = 0)	1.89 (0.19)	1.33 (0.18)
How satisfied in area of life	3.96 (0.28)	6.53 (0.29)

Standard errors are in parentheses. N = 36

### Summary Statistics for Questionnaire Responses – Control Group

Question	First session	Last session
1. Responsible for health (doctor = 7)	1.96 (0.21)	2.12 (0.25)
2. Public policy	3.88 (0.38)	3.71 (0.34)
3. Individual rights and responsibilities	2.46 (0.24)	3.38 (0.36)
4. Broken bone	4.96 (0.37)	5.04 (0.37)
5. Recurring stress headaches	3.46 (0.40)	3.67 (0.38)
6. Frequent insomnia	3.79 (0.43)	3.83 (0.37)
7. Enthusiasm about new practices (very = 7)	5.63 (0.25)	5.75 (0.23)
9. Number of times upset in last month	1.92 (0.17)	1.62 (0.16)
10. Number of times unable to control things	2.08 (0.22)	1.71 (0.19)
11. Number of times nervous and “stressed”	2.46 (0.17)	2.33 (0.17)
12. How often confident in last month (never = 0)	2.83 (0.16)	2.96 (0.18)
13. How often things going your way	2.29 (0.18)	2.75 (0.19)
14. How often could not cope	1.62 (0.23)	1.62 (0.21)
15. How often not able to control irritations	2.67 (0.17)	2.88 (0.16)
16. How often felt on top of things	2.33 (0.18)	2.58 (0.21)
17. How often angered by things out of your control	1.79 (0.21)	1.50 (0.18)
18. How often difficulties piling too high	1.33 (0.20)	1.21 (0.13)
19. How often not enough energy	1.96 (0.19)	2.17 (0.19)
20. How often given yourself quiet time	2.50 (0.17)	2.41 (0.16)
21. How often depressed	1.58 (0.22)	1.25 (0.21)
22. How often sleep problematic	1.54 (0.18)	1.88 (0.23)
23. Minutes of exercise per week (past 2 months)	131.7 (21.8)	127.0 (27.1)
24. How many times seen doctor	0.50 (0.19)	0.54 (0.16)
25. How many times used counseling services	0.08 (0.06)	0.21 (0.10)
26. How often bought self-help books, etc. (2 months)	0.17 (0.10)	0.12 (0.09)
27. How often bought self-help teas, etc. (2 months)	0.33 (0.14)	0.38 (0.13)
28. How often work difficulties (no difficulties = 0)	0.92 (0.19)	0.83 (0.21)
29. Anxiety level (no difficulties = 0)	1.67 (0.23)	1.62 (0.24)

Standard errors are in parentheses. N = 24