



Vermont Wellness Literature Summary Report

Analysis of Evidence Based Literature on the Design and Effectiveness of Wellness and Health Promotion Programs

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**Submission Date:** August 13, 2012

# Vermont Wellness Literature Review

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## 1. Background

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Facing rising health care spending, the nation has broadened its focus on disease management as well as programs that target wellness and prevention. The health care reform law known as the Patient Protection and Affordable Care Act (PPACA) greatly reflects this trend in its expansion of regulatory authority and stipulation of the organizations accountable for developing a plan to address wellness priorities. PPACA also expands the role of emerging structures in the prevention sphere, with the Health Benefit Exchange identified as one mechanism required to implement wellness programs.

In the most recent Vermont Department of Health report, *Chronic Disease in Vermont: An Overview*,<sup>1</sup> authors note that Vermont has an aging population, with nearly one-fifth of the population over 65 and one-third of Vermonters are 55 or older. Chronic disease and risk factors for chronic disease represent a growing problem, with heart disease and obesity on the rise in the state. Indeed, heart disease accounts for 9% of hospital inpatient admissions, and represents the second leading cause of death (23%).

Individuals who do not engage in adequate physical activity, who smoke, have poor nutrition habits, and/or who are obese are at increased risk for high blood pressure, type 2 diabetes, heart disease, stroke, kidney disease, some forms of cancer, arthritis, and chronic obstructive pulmonary disease. In fact, more than 75 percent of high blood pressure cases and 20 percent of cancers in women and 15 percent of cancers in men can be attributed to obesity.<sup>2</sup>

The medical care costs of obesity in the United States are staggering. In 2008 dollars, these costs totaled about \$147 billion. People who were obese had medical costs that were \$1,429 higher than the cost for people of normal body weight, as well as being associated with decreased productivity and chronic absenteeism.<sup>3</sup> The potential financial impact to states and employers makes prioritizing and promoting effective programs essential.

Prevention and wellness are poised to take a larger role in the state of Vermont, with exciting initiatives already underway. The evidence supporting program “success” and the measurement of the effectiveness of wellness initiatives, however, is not standardized. Measures including cost effectiveness, clinical outcomes, and return on investment are not uniformly determined, and thus make the ability to generalize from specific programs challenging.

Some of the most compelling information regarding cost savings generated by wellness programs is in workplace, or employer-based programs. The 2011 Kaiser Family Foundation and Health Research and Educational Trust annual survey of employer health benefits found that 67% of companies with three or more employees that offer health benefits also offer at least one wellness program.<sup>4</sup> A review of studies looking at return on investment (ROI) found an annual direct cost reduction of 2% to 4%, translating into an ROI of 1:1.5 to 1:3 for health promotion programs.<sup>5</sup> In addition, other studies document benefits in indirect cost savings, including productivity and absenteeism.

While almost all wellness programs are voluntary, employers are offering incentives to encourage participation, with studies indicating that financial incentives prompt greater participation. Increasingly, however, employers are also using financial penalties, primarily in the form of increased premiums, for those that do not choose to participate in wellness programs.

The importance of developing and implementing effective wellness programs will be paramount in the setting of rising health care costs and increasing burden of chronic disease. The manner and context in which the program is implemented, how its success is measured, and the health outcomes should all be considered in constructing a responsible wellness framework. The rising cost trends and detrimental

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impact of poor population health have thrust prevention and wellness to the forefront of the political discussion at both the state and national level.

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### 2. Responding to the Political Climate

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While both the PPACA and Vermont regulations and statutes recognize the role of wellness and health promotion programs in containing costs, the Vermont framework is more ambitious and more detailed with respect to wellness than is the PPACA. This section will briefly outline key wellness provisions in the PPACA and Vermont frameworks, with particular emphasis on Vermont's stronger provisions.

The two policy frameworks treat wellness quite differently with respect to certification of Qualified Health Plans (QHPs) eligible to participate in the Exchange. The PPACA sections on certification do not specify wellness programs as a criterion, but Act 48 does so explicitly: among other factors, "promotion of high-quality care, prevention, and wellness" by a health plan must inform the certification.<sup>6</sup> Similarly, the PPACA assigns no role to wellness programs in the plan quality ratings that Exchanges will have to apply in the future (though later federal rulemaking on the rating system will likely do so). Act 48 makes wellness a key feature of the rating system planned for Vermont, going so far as to call the Vermont system a "quality and wellness rating."<sup>7</sup>

Policies toward the use of plan- and member-level incentives to promote wellness also differ. At the health plan level, the PPACA lays out a broad vision for incentives for wellness programs through payment methodologies, but with no details provided until future rulemaking.<sup>8</sup> Act 48 expands the PPACA vision by adding goals of cost containment, improved health outcomes, and member satisfaction to language on plan payment incentives.<sup>9</sup>

With respect to member-level incentives, while both the PPACA and Vermont regulation H-2008-05 (Rule 8-05) have the same language directing that incentives be made available to all similarly situated individuals, Vermont more strictly regulates aspects of incentives that potentially discriminate based upon health status. Rule 8-05 states that incentives (such as premium discounts or other member rewards) may only be based on program participation, not on "an individual achieving a specified health status."<sup>10</sup> Rule 8-05 also limits the total monetary value of member incentives to a maximum of 20 percent of premium cost.<sup>11</sup> In addition, Rule 8-05 allows plans to offer split benefit designs, with basic and preferred benefit levels. Continued enrollment in the preferred benefit level is contingent upon member participation in wellness activities, such as annual health risk assessments and care management plans.<sup>12</sup> The PPACA language on potential health status discrimination is less strict. Incentives can be based on health status, provided that their monetary value does not exceed 30 percent of the premium cost. Moreover, the maximum allowable value may be raised to 50 percent of the premium cost at the federal government's discretion (through the HHS, Labor, and Treasury Departments.)<sup>13</sup>

Finally, Act 48 contains a provision allowing (though not mandating) the Exchange to offer wellness programs to insurers outside the exchange, and directly to employers.<sup>14</sup> The PPACA does not address the possibility of Exchange-sponsored wellness programs (though given the emphasis on state flexibility throughout the PPACA framework, there is no reason to suppose they would be disallowed.) Providing stand-alone wellness programs would give Vermont a unique opportunity to pursue its vision of wellness and health promotion beyond the Exchange's functions in regulating participating health plans.

### 3. Objectives

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The literature review report seeks to inform Vermont regarding program components and possible wellness models; clarify the role of incentives in engagement and behavior change; identify potential challenges and key lessons learned; and clarify implications for various wellness strategies. As stated in the University of Massachusetts Medical School (UMass) contract with the State of Vermont, the goal of the work performed is to:

...conduct a broad environment scan and literature review of the design and effectiveness of wellness programs, including both individual level wellness programs and population-based or panel management-based wellness programs. The Contractor will summarize the evidence that describes the return on investment of wellness programs from the perspective of anticipated savings to both the health care system and the employer.

This report focuses on the published evidence behind wellness and health promotion, while a separate report will incorporate the results of an environmental scan for concise recommendations regarding wellness integration for Vermont's health exchange.

The specific questions addressed by the review include:

1. What interventions have been demonstrated to be successful in improving the wellness of individuals and populations?
2. What is the cost effectiveness and return on investment (ROI) for wellness programs and how is it calculated?
3. What is the role of incentives in encouraging engagement and participation and in motivating behavioral change?

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### 4. Methodology

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#### 4.1. Search Strategy

To identify potentially relevant evidence-based literature, three databases were searched (PubMed, Medline, and OVID) along with a review of wellness literature previously used to inform the development of the MassHealth Wellness Program in 2007. The reference lists of retrieved articles were also reviewed for potential inclusion in the literature review. A number of search terms were used to conduct the literature review, for example: *"wellness and cost saving," "financial incentives and weight loss," "effects of diet and physical activity," "cost effectiveness and health promotion programs," "return on investment and health promotion," "substance abuse screening and health promotion;" "electronic health intervention for physical activity."*

#### 4.2. Selection Criteria

Several criteria were used for study selection: 1) relevance to 9 wellness domains: 8 domains offered as examples in the PPACA (smoking cessation, healthy lifestyle, physical activity, weight management, stress management, diabetes prevention, heart disease prevention, and nutrition) with the addition of an alcohol and drug abuse prevention domain; 2) free full text available; 3) published in the last 10 years; 4) English language; 5) published in the U.S.; 6) RCT or study with a comparison group or meta-analysis; 7) sample size >50.

The following exclusion criteria were applied to further narrow the list of potential studies: 1) conducted outside of the U.S.; 2) non-English publications; 3) studies that required payment and/or a subscription

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to access the complete, full-text article. Refer to Appendix A: *Flow Chart of Literature Selection Criteria* for a complete overview of the literature review selection process.

### 4.3. Data Extraction

Potentially eligible studies were retrieved by screening the literature titles and abstracts against inclusion criteria. Each study was assessed for appropriateness of design and the quality of the study. Data relating to the population studied, sample size, intervention characteristics, outcome measures, and major conclusions were extracted and summarized in Appendix B: *Summary of Wellness Literature*.

### 4.4. Study Quality Criteria

Study quality was rated using the Institute for Clinical Systems Improvement (ICSI) evidence grading system (Table 1). Primary reports constitute studies with new data collection, while secondary reports synthesize or reflect upon collections of primary reports. Primary reports are assigned a letter (A, B, C, or D) based on the design type and secondary reports are assigned a designation of M, R, or X.<sup>15</sup>

**4.4.1. Table 1: Institute for Clinical Systems Improvement Evidence Grading System**

Primary Reports:		Secondary Reports:	
A	randomized, controlled trial	M	meta-analysis
B	cohort study		systematic review
C	case-control study		decision analysis
	study of sensitivity and specificity of a diagnostic test		cost-effectiveness analysis
	nonrandomized trial with concurrent or historical controls	R	consensus statement
	population-based descriptive study		consensus report
D	cross-sectional study		narrative review
	case series		
	case report	X	medical opinion

### 4.5. Limitations

This literature review has a few noted limitations. With regard to study selection, the review is limited by the number of published studies that met the criteria and only included those studies that are available free-text, English-only, and published within the last 10 years. Furthermore, the studies included in this review often relied on self-reported data (eg. activity, fruit and vegetable intake, etc) which may produce unreliable information. Some constraints on the utility of the findings with multi-modal interventions were also observed in that it is difficult to elicit the contribution of individual components of an intervention on effectiveness and in changing health outcomes.

Another limitation noted is the potential selection bias given the focus of the reviews and study design. Wellness programs, by their nature, are usually voluntary and hence introduce volunteer bias wherein participants are a self-selected group which may have a higher level of physical functioning and be more motivated to participate in a wellness program. This literature review attempted to minimize this potential bias by incorporating mostly randomized control trials with a control group to test the efficacy of the treatment, or nonrandomized trials with primarily concurrent controls. There was only a single

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cohort study included without a comparison group, but the cohort used baseline participation rates in a prior year.

Finally, the measure of ROI and financial impact data is not standardized, hence the cost-effectiveness and ROI data from the literature review may be difficult to interpret. However, a recent large meta-analysis was included to draw across the heterogeneous studies for improved reliability of data. The cost analysis studies, however, may have constrained generalizability since the studies evaluated wellness and health promotion programs from large employers which are more likely to have the resources necessary for the economies of scale to achieve and demonstrate positive ROI.

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## 5. Results

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### ***5.1. Description of Included Studies***

The results of the process for focusing the number of studies to be included in this review are displayed in Appendix A. A total of twenty-six articles met the selection inclusion criteria. The majority of research reports were primary randomized clinical trials (Class A, n=16), with only one cohort study (Class B, n=1), five nonrandomized trials with concurrent controls (Class C, n=5), and four systematic reviews or meta-analyses which represented a total of 155 studies (Class M, n= 4). A description of the articles included in the literature review including methods, intervention information, outcome measures used and major conclusions is provided in Appendix B.

An overview of the wellness topics highlighted in each of the twenty-six articles is displayed in Appendix C: *Summary of Articles by Wellness Domain, Incentive Program, and Intervention Site*. The majority of studies focused on weight management (n=18) followed by physical activity (n=13). Articles on alcohol and drug abuse (n=4) and diabetes prevention (n=5) were less common topics of focus. Appendix C also indicates if the study included and analyzed the use of incentives (n=5), and whether the program was an employer-based (n=12) or community-based program (n=12) or both (n=2). For the purpose of this review, a community-based program may have been conducted by an academic or clinical center, but recruited participants from the community at large.

### ***5.2. Description of the population studied***

The number of participants in each study ranged from 57 to 2,000. One meta-analysis<sup>41</sup> of 47 RCTs included a sample size of 8,538 patients while another<sup>26</sup> evaluated HRA data from 89,746 participants. Overall, study participants in the literature review were adults between the age of 18 and 64. Two of the twenty-six studies had a specific population focus on age and ethnicity: Rejeski W, et al (2011) studied older adults 60 to 79 years of age while Ockene J, et al (2012) evaluated a community-based program on diabetes for Spanish speaking Latinos. While race and ethnicity were a selection factor for one study, other studies such as Alexander G, et al (2010) oversampled for Black and Latino participants in the study methodology. In general, participants were recruited through worksite wellness programs, participation in health risk assessments, as well as via community-based programs and attendance at health fairs.

Program inclusion criteria varied in each study and depended on the focus of the intervention. For example, the inclusion criteria for the 18 studies focusing on weight management recruited overweight and obese adults with a BMI of 25-40. While volunteer bias for wellness studies had been mentioned as a limitation, certain studies included in this review also focused on participants who were overweight and had self-reported mobility limitations. Appendix B describes the population studied and sample size in detail for each of the 26 studies included in the literature review.

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### 5.3. Effectiveness of Interventions

A wide variety of interventions have been shown to positively affect the health and wellness of both individuals and populations. We have grouped the intervention types into multi-component interventions and computer-assisted interventions.

#### 5.3.1. Multi-Component Interventions

Nine of the studies<sup>16, 17, 18, 19, 20, 21, 22, 23,24</sup> were designed as multi-component behavioral interventions focusing on a variety of wellness topics including nutrition, physical activity, tobacco cessation, substance abuse, weight management, stress management, and diabetes prevention. Table 2: *Characteristics of Multi-Component Interventions Reporting Positive Outcomes* provides specific detail about the wellness activities, study design, and sample size of these nine articles.

The most commonly used components were a combination of:

- Face to face information session (individual or group) and online website;<sup>18,22,23</sup>
- Telephone counseling and face to face intervention sessions;<sup>24</sup>
- Group and individual sessions;<sup>20</sup>
- Group and individual sessions with feedback and educational information;<sup>17</sup>
- Group and/or individual, and telephone sessions;<sup>16</sup>
- HRA, individualized feedback, telephone coaching, social networking and web-communication tools;<sup>19</sup>
- Telephone and web-based.<sup>21</sup>

All nine studies offered small financial incentives and low cost supplies (e.g. educational materials, pedometers, videos) to participants related to the intervention. One study<sup>18</sup> offered a \$50 gift voucher to be spent at a local sporting good store to the worksite team with the highest mean percentage weight loss. Another study<sup>20</sup> offered \$25 and \$50 cash at baseline and 6-month follow-up assessment. However, the authors did not explicitly assess the effectiveness of these incentives; rather they were provided as compensation or bonuses for enrollment and participation in the intervention.

In terms of the effectiveness of multi-component interventions, Appendix B provides information on the outcome measures used for each study, and the statistically significant change in the control group versus the intervention group from baseline assessment. The literature indicates that the use of more than one intervention component is effective at changing behavior and positively affects individual outcomes such as weight loss, change in BMI, reduction in HbA1c, etc. Combining wellness topics (e.g. diet and physical activity and physical activity and weight loss) can result in successful outcomes and increase the chance of sustaining the behavior change over time.<sup>16, 17</sup>

Identifying the most successful combination of intervention components is difficult since the literature varies widely in focus and intervention design strategies. In general, the studies indicate that all types of counseling or coaching sessions (e.g. via telephone, online, individual, group) when used in combination with social support and personalized feedback yield the most successful health outcomes.<sup>16-23</sup> For example, Byrne D, et al (2011) concluded that the smoking rates from a comprehensive workplace health promotion program decreased from 11.5% in 2003 to 8.2% in 2009. The authors attribute this rate decrease to personalized smoking cessation support through a quit smoking cessation program that consisted of medical resources for nicotine replacement, coordination with primary care providers, one to one coaching, group counseling, and self-help tool-kits.<sup>19</sup>

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Another successful study which used multiple interventions, Rejeski W, et al (2011), randomized older functionally compromised participants in either an education-only (control) group, a physical activity-only group, or a combination weight loss-physical activity group.<sup>17</sup> The comprehensive lifestyle weight loss and physical activity program included group support, advice, and skills training as well as individual sessions incorporating feedback and reinforcement. The combined program resulted in a greater change from BMI 6 months from baseline (-7.9 kg/m<sup>2</sup>), as opposed to the control group (-0.8 kg/m<sup>2</sup>) and physical activity-only group (-0.5 kg/m<sup>2</sup>).<sup>17</sup> The study concluded that both weight loss and physical activity must be targeted together over physical activity alone to increase mobility in older adults with either cardiovascular disease (CVD) or cardiometabolic dysfunction.

Self-efficacy and motivation may also potentially affect the use of one strategy over the other. For example, Zbikowski S, et al (2008) found that participants who had a lower confidence in quitting smoking were more likely to use the web-based services rather than the telephone option. Motivation may also be enhanced by team or group-based supports. In Morgan P, et al's study (2012) indicates that intervention effectiveness of a worksite weight-loss program can be enhanced through supportive-type strategies used to affect outcomes. Specifically, the focus of social support from team members increased the commitment and motivation to change health behaviors.<sup>18</sup>

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**5.3.1.1. Table 2: Characteristics of Multi-Component Interventions Reporting Positive Outcomes**

Article	Category of Wellness Activities(s)	Study Design	Sample Size	Outcome Measure(s)	Months From Baseline	Change in Control Group	Change in Intervention Group
Goodpaster B, et al, 2010. <sup>16</sup>	Diet and physical activity behavior modification program delivered via group, individual, and telephone	Single Blind RT	N= 67 (I-diet & initial physical activity)  N=63 ( I- diet & delayed physical activity)	Change in weight	6 months	N/A- 2 Group RT	Diet and Initial Activity - 10.9kg  Diet and Delayed Activity -8.2kg
					12 months		Diet and Initial Activity - 12.1kg  Diet and Delayed Activity -9.9kg
Rejeski W, et al, 2011. <sup>17</sup>	Physical activity and weight loss behavior modification program delivered via group, individual, and educational sessions	RCT	N= 97 (PA-I)  N= 98 (WL+PA- I)  N= 93 (SA-C)	Time to complete 400-m walk	6 months	-13.1 seconds	PA: -25 seconds WL+PA: -30.2 seconds
					18 months		-13.6 seconds
				Change in BMI	6 months	-0.8 kg/m <sup>2</sup>	PA: -0.5 kg/m <sup>2</sup> WL+PA:-7.9 kg/m <sup>2</sup>
					18 months		-0.9 kg/m <sup>2</sup>
Morgan P, et al, 2012. <sup>18</sup>	Worksite weight loss behavior modification program delivered via face-face information sessions and online	RCT	N= 65 (I)  N=45 (C)	Change in weight	14 weeks	0.3 kg	-4.0 kg
				Change in BMI	14 weeks	0.1 kg/m <sup>2</sup>	-1.3 kg/m <sup>2</sup>
				Absenteeism, leave	14 weeks	5.1 hr	-3.1 hr

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**5.3.1.1. Table 2: Characteristics of Multi-Component Interventions Reporting Positive Outcomes**

Article	Category of Wellness Activities(s)	Study Design	Sample Size	Outcome Measure(s)	Months From Baseline	Change in Control Group	Change in Intervention Group
Byrne D, et al, 2011. <sup>19</sup>	Worksite tobacco cessation, physical activity, and weight management behavior modification program delivered via HRA, individualized feedback, telephonic coaching, social networking; web-communication tools	Cohort Study	N= 3745 (Total)	Smoking	Assessments in 2003 and 2009	N/A	2003: 8.8% 2009: 5.3%
				Physical inactivity	Assessments in 2003 and 2009	N/A	2003: 26.8% 2009:11.3%
				High stress	Assessments in 2003 and 2009	N/A	2003: 10.5% 2009: 5.8%
				BMI	Assessments in 2003 and 2009	N/A	2003: 27.6±7.3 kg/m <sup>2</sup> 2009: 27.6± 6.5 kg/m <sup>2</sup>
Ockene I, et al, 2012. <sup>20</sup>	Diabetes prevention, nutrition and physical activity community program delivered via individual and group sessions	RCT	N= 162 (I)  N=150 (C)	Weight reduction	1 Year	0.63 lbs	-2.5 lbs
				Reduction in HbA1c	1 Year	-0.04%	-0.10%
				BMI	1 Year	0.11 kg/m <sup>2</sup>	-0.40 kg/m <sup>2</sup>
Zbikowski S, et al, 2011. <sup>21</sup>	Tobacco cessation and stress management program delivered in the community via the telephone and web	RCT	N= 400 (Phone-I) N=399 (Web-I) N= 399 (Phone-Web-I)	Self-reported utilization of phone	6 Months	N/A	5+ calls: Phone: 51% Web: 2.8% Phone-Web: 48.6%
				Self-reported utilization of web	6 months	N/A	5+ logins: Phone: N/A Web: 23.3% Phone-Web (13.5%)

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**5.3.1.1. Table 2: Characteristics of Multi-Component Interventions Reporting Positive Outcomes**

Article	Category of Wellness Activities(s)	Study Design	Sample Size	Outcome Measure(s)	Months From Baseline	Change in Control Group	Change in Intervention Group
				Self-reported utilization of Varenicline	6 months	N/A	Phone: 67.7 days Web: 60.6 days Phone-Web: 61.5 days
Kypri K, et al, 2008. <sup>22</sup>	Alcohol and drug treatment behavior modification program in the community delivered via web-based screening, group and telephone sessions	RCT	N=114 (single dose e-SBI-I) N=122 (multi dose e-SBI-I) N= 124 (C)	Total consumption	6 months	28.5 episodes	Single dose e-SBI: 21 episodes Multi dose e-SBI: 22 episodes
					12 months	30 episodes	Single dose e-SBI: 26 episodes Multi dose e-SBI: 21 episodes
				Frequency of drinking	6 months	4 days	Single dose e-SBI: 3 days Multi dose e-SBI: 3 days
					12 months	4 days	Single dose e-SBI: 4 days Multi dose e-SBI: 4 days
Svetkey L, et al, 2008. <sup>23</sup>	Community-based weight loss and heart disease management behavior modification program delivered by interactive personal or technology-based intervention	RCT	N= 342 (Personal-contact-I) N=348( Interactive-tech-I ) N=342 ( C)	Change in weight from entry (phase 1)	30 months	-2.9 kg	Interactive-tech: -3.3kg Personal-contact: -4.2kg
				Change in weight from randomization (phase 2)	30 months	5.5 kg	Interactive-tech: 5.2kg Personal-contact: 4.0kg

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### 5.3.2. Computer-Technology Interventions

Interventions in seven<sup>25,26,27,28,29,30, 31</sup> of the twenty-six articles focused exclusively on characteristics and potential effectiveness of using computer technology in health promotion programs. Table 3: *Characteristics of Computer Technology Interventions Reporting Positive Outcomes* provides additional detail of the category of wellness activities, study design, and sample size of these articles. Of note, Norman et al (2007) is a systematic review of ehealth interventions and does not represent primary data, but serves as a useful review of the different types of published ehealth interventions.<sup>30</sup>

Three studies were behavior modification programs conducted at the worksite<sup>26,27,28</sup> and focused on stress reduction, weight loss, physical activity, and overall healthy lifestyle. In one study Ovbiosa-Akinbosoye et al (2011) used health risk assessment (HRA) data to examine the factors associated with weight loss and maintenance as a result of a comprehensive worksite wellness program over the long-term.

Six of the seven computer-technology studies were designed as a behavior modification program and incorporated interactive multimedia learning sessions that integrate elements such as self-assessments, simulation tools, videos and educational materials, tailored to the individual user.<sup>25, 27, 28, 29,31</sup> Additional modalities of these interventions include:

- Online coaching and “webinars”<sup>27</sup> via the internet;
- Combination of multimedia lessons with self-monitoring and automated computer feedback;<sup>25,</sup>
- Combination of online website multimedia lesson with individualized feedback and email coaching;<sup>31</sup>
- Online data collection methods via assessment surveys, food diaries.<sup>25, 27</sup>

Similar to multi-component interventions, determining the most successful and effective computer-technology strategies depends on the design and purpose of the wellness program. However, the literature indicates positive outcomes associated with using online, web-based, and digital media as a strategy for changing health behaviors. Table 3 provides a high-level summary of the outcome measures and associated changes in control and intervention groups from baseline.

In general, findings from the literature suggest that computer-technology wellness programs that are enhanced with interactive multimedia lessons, personalized feedback, self-monitoring, and coaching are more effective strategies that yield significant outcomes. One study, Wing R, et al (2010), demonstrated that adding more interactive lessons with self-assessments and automated feedback greatly increased the average weight loss and the percentage of participants losing 5% or more of their starting weight.<sup>25</sup>

Personalized feedback is a key factor in the effectiveness of technology-based interventions. In a study targeting increased fruit and vegetable intake by Alexander G, et al (2010), the introduction of a general website alone stimulated improved intake. However, the addition of tailored website content taking into account participant food preferences and supplemented with motivational emails, results showed statistically significant increased fruit and vegetable intake over the course of a year up 2.8 servings per day.<sup>31</sup>

Another study, focusing on the use of podcasts<sup>29</sup> to promote weight loss determined that podcasting is likely to be successful in changing outcomes, over more basic digital media strategies, when designed to increase participant’s self-efficacy, knowledge about how to achieve weight loss, and enacting dietary changes for both weight loss and improved nutrition.<sup>29</sup>

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Developing a health promotion or wellness program may be expensive in terms of time and money and the program inevitably relies on strong participation levels in order to achieve successful outcomes. Computer-based programs, as demonstrated in the literature may be more cost-effective and less administratively burdensome<sup>28,36</sup> than in-person programs. Furthermore, web-based programs offer participants a stronger sense of interactivity, user appeal, and engagement compared with more traditional modes of delivery. Computer-based programs also offer a sense of anonymity which may allow users to feel more comfortable participating in a wellness program as well as easier access to important health and wellness information, coaching, and support.<sup>28</sup>

Continuing to find new and innovative ways of structuring wellness interventions is important, and future studies should examine if, and how the use of emerging technologies such as hand-held digital media, wireless devices, and podcasts changes health outcomes and the costs associated with health promotion programs.<sup>29, 30</sup>

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**5.3.2.1. Table 3: Characteristics of Computer Technology Interventions Reporting Positive Outcomes**

Article	Category of Wellness Activities(s)	Study Design	Sample Size	Outcome Measure	Months From Baseline	Change in Control Group	Change in Intervention Group
Wing R, et al 2010. <sup>25</sup>	Physical activity and weight loss behavior modification program delivered via the internet in a community setting	RCT	Study 1: N= 89 (I) N= 90 (C)  Study 2 ( <i>intervention group included behavioral strategies</i> ): N=82 (I) N= 46 (C)	Weight loss	12 weeks	Study 1: 1.4±2.9 kg  Study 2: 1.4±2.7 kg	Study 1: 2.0±2.8 kg  Study 2: 3.5±3.8 kg
				Participants losing >5% of initial weight	12 weeks	Study 2: 1.4±3.0%	Study 2: 3.1±3.7%
Ovbiosa-Akinbosoye O, et al, 2011. <sup>26</sup>	Worksite weight management, stress reduction, and physical activity HRA program via the internet	Quasi-Exper. Design	N=89, 746	Change in body weight	1 Year	N/A	Age 39-47: 0.078kg Age 48-56: 0.711kg Age 57+: 1.601kg
				Systolic blood pressure	1 Year	N/A	-1.88 mm/Hg
				Total Cholesterol	1 Year	N/A	-7.01 mg/dl
				Change in Waist	6 months	Women: 0.26	Women: -0.99 in
Bennett J, et al, 2011. <sup>27</sup>	Worksite physical activity, diet, weight and heart disease management behavior modification program delivered via the internet	RCT	N= 72 (I)  N=73 (C)	Self-reported attitude toward healthy diet	6 months	-0.02 (on a 12 item Health Behavior Questionnaire)	0.23 (on a 12 item Health Behavior Questionnaire)
				Self-reported symptom of distress	6 months	0.3 (on a 15 item scale measuring frequency of stress symptoms)	-3.52 (on a 15 item scale measuring frequency of stress symptoms)
				Knowledge	3 months	0.15 (on a 22 item scale)	0.86 (on a 22 item scale)

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**5.3.2.1. Table 3: Characteristics of Computer Technology Interventions Reporting Positive Outcomes**

Article	Category of Wellness Activities(s)	Study Design	Sample Size	Outcome Measure	Months From Baseline	Change in Control Group	Change in Intervention Group
						measuring knowledge)	measuring knowledge)
Billings D, et al, 2008. <sup>28</sup>	Worksite stress management and healthy lifestyle behavioral modification program delivered via the internet	RCT	N= 309	Attitudes towards psychological help	3 months	-0.39 (on a 10 item scale)	0.64 (on a 10 item scale)
				Stress	3 months	-0.31 (on the Symptoms of Distress Scale)	-1.49 (on the Symptoms of Distress Scale)
				Binge drinking	3 months	-0.09 ( on a 6 item response questionnaire)	0.35 ( on a 6 item response questionnaire)
Turner-McGrievy, G, 2009. <sup>29</sup>	Community-based weight loss behavior modification program delivered via podcast	RCT	N=41 (I)	Change in Weight	12 weeks	-0.3 kg	-2.9 kg
			N=37 (C)	Change in BMI	12 weeks	-0.1 kg/m <sup>2</sup>	-1.0 kg/m <sup>2</sup>
Alexander G, et al 2010. <sup>31</sup>	Nutrition: Increased Fruit and vegetable intake delivered via website with and without email counseling	RCT	Total N=2,513 Arm 1(C)=836 Arm 2 (I)=839 Arm 3 (I)=838	Fruit and Vegetable intake <ul style="list-style-type: none"> <li>16 item report</li> </ul>	1 year	Arm 1: +2.38	Arm 2: +2.68 Arm 3: +2.8

## Vermont Wellness Literature Review

### 5.4 Evidence for Financial Impact and Return on Investment (ROI)

Accurate measurement of wellness program impact poses a challenge because there is no single industry standard for measuring ROI on wellness programs. Two types of ROI are frequently estimated, “hard ROI” using direct medical costs only, and “soft ROI” using productivity gains from factors such as reduced absenteeism or attempting to work with a brief illness or chronic condition, also known as presenteeism.

Because of the challenge in estimating ROI, two alternate measures of financial impact are commonly used. The measures include:

- (1) Cost trend analysis: the difference between the employer’s projected health care cost trend without a wellness program, versus the actual trend with the program in place. The goal is a rise no more than inflation and is often benchmarked with similar companies within a specific industry.
- (2) Health risk ratio analysis: this approach determines the percentage of a population with low vs. high health risks and how the proportions of risk within the population change over time. This approach often uses both biometric data (blood pressure, cholesterol, and BMI) as well as the HRA (exercise levels, reported stress, tobacco use).

Both forms of ROI as well as the two alternate measures of financial impact were used in the wellness studies reviewed.

Six studies<sup>32, 33, 34, 35, 36,,38</sup> assessed the impact of health promotion and wellness programs on financial impact and return on investment. Four of these studies analyzed workplace wellness programs while two<sup>36,38</sup> conducted interventions at community sites. The article by Pelletier is a systematic review building upon a database of 200 studies reviewed in a previous work, that shows 27 newer studies between 2008-2010 with data that suggests positive clinical and cost-effectiveness in all studies.<sup>33</sup> Use of an HRA to collect data and participation in online, group or individual health sessions are the most commonly used components incorporated into a comprehensive worksite wellness programs. One study<sup>38</sup> examined the cost associated with an incentivized weight loss program while another article<sup>36</sup> compared the cost effectiveness of an in-person versus computer-based intervention.

In examining the impact of wellness programs on medical spending, the literature suggests that health care costs either decreased or increased more slowly for those who participated in a wellness program.<sup>32, 35, 36,38</sup> Return on investment was calculated in three studies<sup>32,34,35</sup> by dividing savings estimates by program savings. The findings from one article<sup>32</sup> state that the four year-savings of an employee worksite wellness program of \$1,335,524 compared with program expenses of \$808, 403 yielded a \$1.65 ROI for every dollar spent on the program. In an evaluation of Johnson and Johnson’s<sup>34</sup> health promotion programs on health risks and costs, ROI was compared to the outcomes of non-company employees working in companies similar in industry and size to Johnson and Johnson. The average annual per employee savings in 2009 were \$565, generating an ROI of \$1.88-\$3.92 saved for every dollar spent on the program<sup>34</sup>. In terms of savings, Johnson and Johnson experienced a 3.7% lower average annual growth in medical costs compared to the comparison group.<sup>34</sup>

An evaluation of an employee wellness program from Highmark Inc. compared employees enrolled in three different wellness program options: participation in HRA only, completion of HRA and participation in health sessions (online, individual or group); completion of HRA and use of the fitness center<sup>32</sup>. The study determined savings in health care expenditures by determining growth curve analysis based on a comparison of the medical claims of participants vs. non-participants. Compared with those not participating in the employee wellness program, participants in all three groups had

## Vermont Wellness Literature Review

lower annual health care expenditure increases, with a savings of \$176.47. The greatest differences between participants and non-participants are found in inpatient expenditures of \$181.78 per person per year in savings.<sup>32</sup>

Another factor to take into account is that the financial impact of a wellness program may take time to be demonstrated. A recent meta-analysis of the literature on the cost and savings associated with workplace wellness programs<sup>35</sup> of 32 large employers calculated both soft and hard ROI based on standardized costs and benefits of each program to annual figures in 2009 dollars (which assumes a linear distribution of both cost and benefits over time.) Savings were calculated as the difference between treatment and comparison groups after the intervention subtracted from the difference between the groups before the intervention. This analysis concluded that medical costs fell about \$3.27 for every dollar spent on wellness programs over three years. The impact of the wellness programs on absenteeism was also examined in this study by monetizing absentee days using the average hourly wage rate (in 2009) of \$20.49. Similar to medical costs, absentee day costs decreased by \$2.73 for every dollar spent over two years.

Three articles provided specific information on the program costs associated with health promotion and wellness programs.<sup>32,36,38</sup> In those studies, direct program costs associated with delivering the intervention included labor/personnel costs, on-line costs, and cost of materials (e.g. pedometer, calorie counting book). Incentive costs related to the intervention, if offered, were included in the cost of equipment.

Labor/personnel costs were assessed similarly in two of the three studies: estimating the time spent out of work and costs associated with intervention activities (e.g. attendance at training sessions).<sup>36,38</sup> Participant costs were calculated in one study<sup>36</sup> by using travel time for attendance at in-person sessions based on the mean road trip distance for a subset of 20% of the sample. Travel time was then converted to cost using median wage rates. Two of the three studies concluded that although the direct costs were higher in the intervention groups, the cost effectiveness outcomes associated with the program were larger than controlled, non-intervention groups.<sup>36,38</sup>

The calculation of wellness program expenses of a comprehensive employee health promotion program in one study<sup>32</sup> was a bit more unique than the other literature in that per participant costs were estimated by dividing total costs by total number of employees and applying those costs to participants who used the programs. This included the per employee costs of on-line and group programs, individual sessions, health risk assessments, use of the fitness facility, and educational materials and newsletters. The detail on the specific calculations used (if described in the literature) as well as specific ROI and cost savings is included in Table 4 -*Cost Effectiveness and ROI of Wellness Programs As Demonstrated in the Literature Review*.

A comparison of the costs associated with online versus in-person delivery in the literature indicates that computer-based programs may potentially be more cost effective than traditional models. For example, in-person intervention models usually require costly program components such as professional health coaches and speakers, printing and distribution costs associated with education materials, participant travel costs, personnel time, and other administrative costs.<sup>28</sup>

It is important to keep in mind, however, that since investments in wellness programs are long-term, employers and administrators may experience a lag between improvements and health savings<sup>33</sup>. Therefore, longer-term economic analyses are necessary to fully understand costs and savings.

The potential cost-effectiveness of incorporating incentives into a health promotion of wellness program is an important consideration in program design, especially for employers and other groups in a position to offer discounts or bonuses. Monetary incentives tied directly to a specific behavioral outcome may be

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more feasible from an employer's perspective since they do not require start-up costs, and incentives are only given to employees for achieving a targeted health outcome.<sup>37</sup> This strategy in contrast with behavioral incentives (e.g. counseling) and environmental incentives (e.g. on-site nutritional services) may require larger financial investments.<sup>37</sup>

## Vermont Wellness Literature Review

**5.4. Table 4-Cost Effectiveness and ROI of Wellness Programs As Demonstrated in the Literature Review**

Article	Category of Wellness Activities(s)	Study Design	ROI Calculation	Demonstrated ROI	Cost Savings Calculation	Demonstrated Cost Savings
Naydeck B, et al, 2008. <sup>32</sup>	Healthy lifestyle worksite wellness program	Nonrandomized trial with concurrent or historical controls	Estimated by dividing 4 year savings estimate by wellness program expenses.	\$1.65 for every dollar spent on the program	Defined by growth curve analysis: comparison of medical claims for participants versus non-matched participants. The difference was used to define savings	\$176 in health care expenses per person per year lower for participants; \$182 lower for inpatient expenses.  Total 4 year savings: \$1,335,524
Henke R, et al, 2011. <sup>34</sup>	Healthy lifestyle worksite wellness program	Nonrandomized trial with concurrent or historical controls	Estimation of the average adjusted annual costs per employee minus expected costs (assuming the same annual growth rate as the comparison/control group).  These per year savings were then divided by \$144, the average per employee annual cost of employer health and well-being (cited in other literature)	\$1.88-\$3.92 saved for every dollar spent on Johnson and Johnson's wellness program	Estimated the difference in medical care costs growth over time between Johnson and Johnson employees and the comparison group employees	\$565 in 2009 dollars
Baicker K, et al 2010. <sup>35</sup>	Healthy lifestyle worksite wellness program	Cost-Effectiveness Analysis and Meta-Analysis	Not Applicable (N/A)-calculated ROI based on data from the 15 articles studied in the literature review	\$3.27 for every dollar spent on wellness programs	Costs and benefits were standardized to annual figures in 2009; calculated savings as the difference between treatment and comparison groups	\$358

# Vermont Wellness Literature Review

**5.4. Table 4-Cost Effectiveness and ROI of Wellness Programs As Demonstrated in the Literature Review**

Article	Category of Wellness Activities(s)	Study Design	ROI Calculation	Demonstrated ROI	Cost Savings Calculation	Demonstrated Cost Savings
Krukowski R, et al, 2011. <sup>36</sup>	Community-based weight management intervention	RCT	N/A ROI not calculated	ROI not calculated	This study compared cost effectiveness between in-person versus internet-based intervention.	The discounted incremental cost effectiveness ratio was calculated per life year gained (LYG):  \$7,177 LYG for in-person group \$2,160 LYG for the internet modality
Lahiri S, et al 2012. <sup>38</sup>	Incentivized weight management worksite wellness	Nonrandomized trial with concurrent or historical controls	N/A ROI not calculated	ROI not calculated	The cost effective ratio (CER) was calculated as the incremental cost of the program divided by the incremental weight loss by each group;  Net-cost of the intervention = direct cost of the intervention incurred by the employer – avoided cost of absenteeism and presenteeism	CER for incentivized group: \$25.5 per pound of weight loss compared with \$58.2 per pound of weight loss for control group.  Net savings for incentive group: \$35,680; \$25,983 for control group

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### 5.5 The Impact of Using Incentives

Although the majority of articles in the literature review incorporated financial incentives into the intervention design, only five<sup>19, 37, 38, 39, 40</sup> specifically assessed the effectiveness of using incentives in changing health behavior and increasing participation in wellness programs. Two of the studies<sup>39, 40</sup> were conducted in the community, and three<sup>19, 37, 38</sup> were conducted at the work place. The topics of these incentive programs focused mainly on smoking cessation<sup>19, 40</sup> and weight management.<sup>37, 38, 40</sup> With the exception of one study that incented the completion of health risk assessment data of employees participating in a worksite wellness program,<sup>19</sup> the incentive program interventions targeted behavior changes in participants.

The study design and structure of the incentive programs varied widely in the literature. One study<sup>40</sup> compared non-incentive participants to those who received health promotion information plus incentives while another<sup>39</sup> focused on the use of a lottery-based versus a deposit contract approach. This monetary deposit from a participant strategy was also used by another study<sup>38</sup> to examine the effect of an education program with and without the use of incentives. Lastly, author Finkelstein E, et al (2008) and his colleges assessed the impact of different increments of monetary rewards and the timing of the incentives tied to weight loss.

Regardless of the structure of the program, the literature indicates that incentives did result in modest behavior outcome changes in participants as indicated in Table 5-*Characteristics of Interventions Using Incentives Reporting Positive Outcomes* as well as increased engagement in wellness programs. The seven year experience of a comprehensive workplace health promotion program at Vanderbilt University “Go for the Gold” found that before the incentive program, the annual HRA completion rate was less than 24%. Annual completion rates increased to 68% in the first year incentives were introduced and continued to increase to 80% years 4 through 7.<sup>19</sup> In another study, enrollment rates for an incentive-based smoking cessation trial were higher in the intervention incentive-group (15.4%) than the control, non-incentivized group (5.4%).<sup>40</sup> Incentive-group participants also experienced considerably higher program completion rates (10.8%) than the control group (2.5%) and cessation within the first six months after enrollment (20.9% versus 11.8%).<sup>40</sup>

However, there is insufficient evidence in the literature regarding persistent change. The review recommends building incentives into wellness programs to help increase participation and enrollment.<sup>35</sup> However, more research is needed over the long term to evaluate the effectiveness of incentives contributing to sustained changes in health behaviors.<sup>37, 38, 40</sup>

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**5.5. Table 5 Characteristics of Interventions Using Incentives Reporting Positive Outcomes**

Article	Category of Wellness Activities(s)	Study Design	Incentives Offered	Outcome Measure(s)	Months From Baseline	Change in Control Group	Change in Intervention Group
Volpp K, et al, 2009. <sup>40</sup>	Smoking cessation behavior modification program	RCT	\$100 for completion \$250 for smoking cessation within 6 months \$400 for smoking cessation for an additional 6 months	Smoking cessation after enrollment	9-12 months (initial cessation reported at 3-6 months)	5.0%	14.7%
					15-18 months (initial cessation reported at 3-6 months)	3.6%	9.4%
				Rate of program participation	6 months	5.4%	15.4%
				Program completion	6 months	2.5%	10.8%
Volpp K, et al, 2008. <sup>39</sup>	Weight management behavior modification program	RCT	Lottery Incentive Group- were eligible for a daily prize of \$3/d  Deposit-contract Group could receive \$0-\$252  Both Groups received an additional bonus of \$20 for each monthly weigh-in attended; \$50 for losing more than 20 lbs at the end of the 4 months	Weight loss	16 weeks	-3.9 lb	-13.1 lbs (lottery incentive group) and -14.0 lbs (deposit contract incentive group)
Lahiri S, et al, 2012. <sup>38</sup>	Worksite weight management behavior modification program	Non-randomized trial with concurrent or historical controls	\$10 per pound or pound and a half of weight loss with additional incentives of \$260 for maintaining weight-loss.  Participants could also voluntarily deposit between \$0-\$80) were matched by the program for meeting program goals (total \$340)	Change in weight	16 weeks	-2.2lbs	-7.4lbs

# Vermont Wellness Literature Review

**5.5. Table 5 Characteristics of Interventions Using Incentives Reporting Positive Outcomes**

Article	Category of Wellness Activities(s)	Study Design	Incentives Offered	Outcome Measure(s)	Months From Baseline	Change in Control Group	Change in Intervention Group
Finkelstein E, et al, 2007. <sup>37</sup>	Worksite weight management behavior modification program	RCT	\$0, \$7 or \$14 depending on the incentive payout schedule  Participants received an additional \$5 for attending 3 month weigh-in	Weight loss	3 months	No Control Group: 3 group RCT	3 Months: Back Loaded Group- (no incentives) 2 lbs  Front Loaded Group- 4.73 lbs  Steady Payment Group – 2.87 lbs
Byrne D, et al, 2011. <sup>19</sup>	Worksite tobacco cessation, physical activity, and weight management behavior modification program with use of incentives	Cohort Study	\$20 for completion of the HRA	Rate of participation	Assessments at 2003 and 2009	N/A	2003: 68%  2009: 80%

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### 6. Discussion

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In this review we addressed three specific questions: 1) what interventions work, 2) what is the return on investment of different interventions and 3) what is the role of incentives in promoting wellness program participation, adherence and positive results?

We found that for our study criteria, behavior modification programs are the most common type of wellness program intervention. In addition behavior modification programs produce successful health outcomes in participants, particularly when enhanced with training, counseling, personalized feedback and self-monitoring whether in person or electronically.<sup>16-18, 31</sup> Interventions that incorporate multiple behaviors and component strategies (e.g. a diet and physical activity program delivered via group sessions, online interactive tools, and telephone follow-up) yield the most successful changes in health behaviors.<sup>16,21, 22, 23, 24, 25, 26,41</sup> In comparing online and computer-based versus in-person strategies, we found that internet-based interventions may have significant practical advantages over more traditional, in-person interventions.<sup>36</sup>

Financial incentives had positive effects on participation in wellness activities, adherence to wellness regimes and health outcomes, although their effect is generally short (on average between 3-6 months).

Finally we found that wellness programs are cost-effective and can produce a return-on-investment for both worksite and community-based wellness programs, but it can be a longer term investment, with a time frame that extends beyond 2 years.<sup>32-6, 38</sup>

In the context of planning for a Health Benefit Exchange, the findings presented above suggest important opportunities for the Vermont Health Benefit Exchange. First, the Exchange has the chance to prescribe wellness program content offered on its website, e.g. education, self-help tools, and specific topics. The Exchange also has the opportunity to deliver content through the web as well as encouraging the delivery of wellness programs in other settings by virtue of its purchasing power.

#### **6.1. Possible Roles for an Exchange - Wellness Content**

A Health Benefit Exchange has a unique chance to deliver wellness content on multiple topics. The PPACA suggests the following areas as essential: smoking cessation, healthy lifestyle, physical activity, weight management, stress management, diabetes prevention, heart disease prevention, and nutrition.

In addition to topic, content also refers to the message to be delivered, e.g. why the topic is important, the impact of the topic on health, description of tools that can be used to make positive changes. The content of a message depends in part upon the stage of change to be affected (e.g. moving an individual from pre-contemplation to contemplation). The Stages of Change Model, first described by James Prochaska and Carlo DiClemente<sup>42, 43</sup> and refined over the years, describes five (sometimes six) stages of change: Precontemplation – no thought of change, contemplation – thinking about change, preparation – actively acquiring the skills to make changes, action – making change, and maintenance – sustaining change. A sixth stage of relapse is sometimes described as well. Moving from one stage to another requires different tools and supports.

Transitioning an individual from the pre-contemplation to contemplation stage usually requires education to raise awareness of the importance of wellness and of behavior change. In terms of content, an Exchange might incorporate a health risk assessment tools into its web portal as a first step towards awareness of the need for change. Several studies described above successfully used risk assessments to identify individuals in need of interventions and then to track the success of the interventions. A Health BenefitExchange might also provide targeted educational materials about specific topics for

## Vermont Wellness Literature Review

customers accessing the website. For example, Wing et al and Bennett et al successfully used web-delivered educational strategies to change behavior. Although the typical method of distributing print media has not been shown to be particularly effective, the dissemination of information via the web appears to be successful, especially among younger individuals.

An individual moving into the preparation stage seeks tools and skills to help make the necessary behavior modifications. The largest category of interventions covered in this review incorporated behavior modification into their programs, e.g. health coaching, tobacco cessation, weight management, stress management, etc. Behavior modification techniques give individuals the skills to make changes and sustain those changes. Meaningful change will not occur by sitting in front of a computer surfing the web, but requires an individual to modify their lifestyle. Four of the interventions reviewed here used interactive multimedia learning sessions to teach behavior modification skills tailored to an individual's situation.

The action stage involves trying out the change behavior. Maintenance requires sustaining new behaviors. The interactive programs described above included tracking tools such as online diaries and surveys to assist the individual in making the change. An Exchange might consider whether such programs could be incorporated into the web portal.

### ***6.2. Possible Roles for an Exchange – Wellness Delivery***

In addition to web-based vehicles for delivering wellness programs, the proposed Vermont Health Benefit Exchange has other means to convey wellness content. For example, through decisions about the design of the basic benefit packages, the Exchange could encourage the use of behavior modification programs. Packages that incorporate access to behavior modification programs could be more highly weighted in the rating process than those without similar access. Or incentives, such as reduced cost-sharing, could encourage prospective buyers to choose packages with more comprehensive wellness program access.

The Exchange has great potential to enhance, promote, and synergize with current Vermont health promotion and wellness initiatives. Specifically, the Exchange could promote wellness programs by presenting links to selected websites that have wellness materials and programs “endorsed” by the Exchange. These links could also potentially channel greater access and participation in Vermont initiatives (regional or state) that are underutilized or to enhance marketing.

The Exchange's purchasing power could also provide the leverage for health plans and employers to engage in vendor risk-based contracts that encourage greater accountability. For instance, the Exchange could be a mechanism by which to help health plans and/or employers negotiate more sizeable and demanding guarantees from vendors regarding level of participation, outcomes reporting, and member satisfaction.

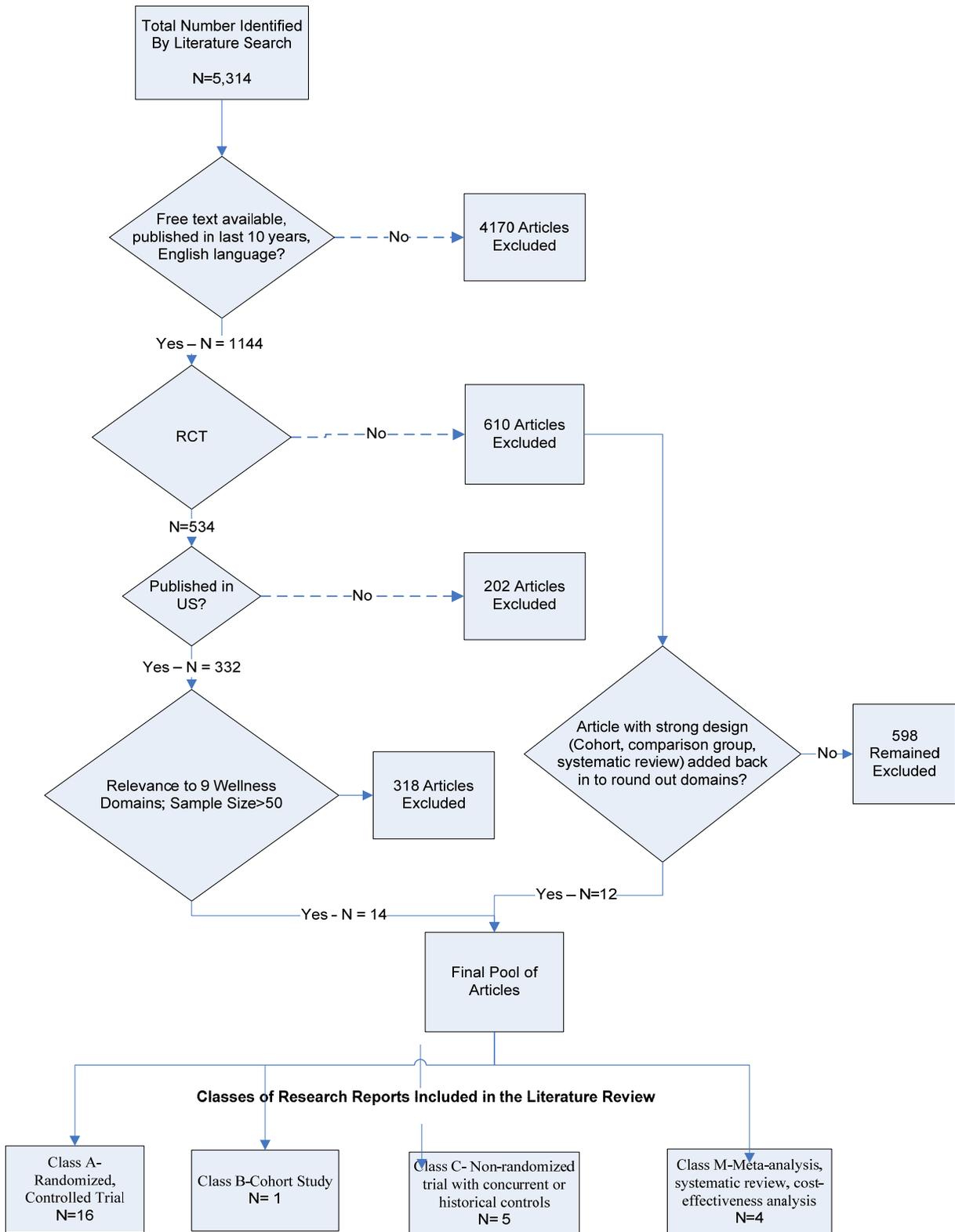
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## **7. Conclusion**

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This literature search identified several types of intervention types, modes of delivery and strategies that demonstrated positive, cost-effective health outcomes. A Health Benefit Exchange will be positioned to both implement proven wellness strategies as well as encourage the offering and use of wellness programs through its purchasing power.

Appendix A- Flow Chart of Literature Search Criteria:



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### Appendix B: Summary of Wellness Literature

Citation Alexander G, McClure P, Calvi J , et. al. "A randomized clinical trial evaluating online interventions to improve fruit and vegetable consumption," American Journal of Public Health, 100(2): 319-326, 2010.		Type of Study: Class A- Randomized, controlled trial	Wellness Domains: Nutrition, healthy lifestyle support
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>2513 participants ages 21-65 enrolled in 5 health plan sites in cities across 5 states.</p> <p>Arm 1(C)=836 Arm 2 (I)=839 Arm 3 (I)=838</p>	<p>Participants were recruited from a random group of insured within 5 health plan sites and were randomized into 1 of 3 arms of the Making Effective Nutritional Choices (MENU) Study:</p> <ul style="list-style-type: none"> <li>• Arm 1: Untailored online program (Control);</li> <li>• Arm 2: Tailored, online dietary intervention program to increase vegetable and fruit intake; and</li> <li>• Arm 3 : Same tailored program from Arm 2 with additional motivational interviewing counseling via email.</li> </ul> <p>Each arm had 4 intervention sessions at weeks 1, 3, 13, 15 after enrollment and each session core content along with illustrations and links to more details or supplemental content (serving sizes, fruit and vegetable recipes, short video and audio files to reinforce text).</p> <p>Arm 3 had additional email counseling provided by staff with 2 additional hours of training around motivational techniques</p>	<ul style="list-style-type: none"> <li>• Self-reported fruit and vegetable consumption (standardized to portion size and amount using 2 item and 16 item validated tools) at baseline, 3, 6, and 12 months.</li> </ul>	<ol style="list-style-type: none"> <li>1. Overall baseline mean fruit and vegetable intake was 4.4 servings per day.</li> <li>2. Average servings increased by more than 2 servings across all study arms (P&lt;.001), with the greatest increase (+2.8 servings) among participants of arm 3 with the additional tailored intervention and motivational interviewing compared with control</li> </ol>

# Vermont Wellness Literature Review

## Appendix B: Summary of Wellness Literature (Continued)

<b>Citation:</b> <a href="#">Baicker, K., Cutler, D., Song, Z.</a> "Workplace wellness programs can generate savings," Health Affairs, 29(2): 1-8, 2010.		<b>Type of Study-</b> Class M- cost-effectiveness analysis and meta-analysis		<b>Wellness Domain:</b> All wellness domains	
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions		
32 original studies of employee wellness programs from predominantly large firms (more than 1,000 workers) with well-defined interventions, treatment and comparison groups.	<ul style="list-style-type: none"> <li>Health risk assessment used as baseline assessment in 80% of studies and participating was almost always voluntary</li> <li>Self-help education materials (40% of studies)</li> <li>Individual counseling (40% of studies)</li> <li>Classes, seminars, group activities led by a trainer (35% of studies)</li> <li>Incentives (most commonly bonuses and reimbursements for program participation) used in 31% of studies</li> </ul>	Weight loss and fitness Smoking cessation Multiple risk factors (stress management, back care, nutrition, alcohol consumption, blood pressure, and preventive care) Health care costs (22 studies) Absenteeism (22 studies)	<ol style="list-style-type: none"> <li>Medical costs fall by approximately \$3.27 for every dollar spent on wellness programs (over 3 years).</li> <li>Absenteeism costs fall about \$2.73 for every dollar spent (over 2 years).</li> <li>The average calculated ROI across the 15 studies that reported program costs was \$3.37.</li> <li>Design of a wellness program is not one size fits all: corporate culture, the structure of incentives, and the flow of program participation, for example, are likely to affect ROI.</li> </ol>		

# Vermont Wellness Literature Review

## Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Bennett, J., Broome, K., Schwab-Pillely, A., &amp; Gilmore, P.</a> "A web-based approach to address cardiovascular risks in managers," Journal of Occupational, Environmental Medicine, 53 (8):911-918, 2011.		Type of Study- Class A, randomized controlled trial	Wellness Domain Heart disease prevention, weight management, stress management, healthy lifestyle, physical activity
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
145 managers from 8 large organizations (1,200-47,000 employees)	<ul style="list-style-type: none"> <li>• <u>Intervention group (n=72)</u>: received Web-based health development program for managers (worksite-related intervention) with the goal to reduce risk of cardiovascular disease. Managers required to complete a minimum of 10 hours over 6 months.</li> <li>• Health and Leadership topics in the training included:               <ul style="list-style-type: none"> <li>▪ Taking action to improve their own healthy lifestyles</li> <li>▪ Being a health role model to others at work</li> <li>▪ Supporting workplace wellness programs</li> <li>▪ Continually assessing one's own health</li> <li>▪ Improving work conditions for self and associates</li> <li>▪ Continuous improvement</li> </ul> </li> <li>• <u>Control group (n=73)</u>: No program training or activities</li> </ul>	<ul style="list-style-type: none"> <li>• Diet (attitudes and practice)</li> <li>• Exercise</li> <li>• Perceived mental health</li> <li>• Biometric measures (BMI, waist circumference, body fat percentage)</li> </ul>	<ol style="list-style-type: none"> <li>1. The intervention was associated with improvements in dietary attitudes, ability to eat a healthy diet, physical activity, and reductions in mental distress symptoms:</li> <li>2. The intervention was not associated with significant weight loss.</li> <li>3. Women, but not men, experienced reductions in average waist circumference by the 6 month follow-up assessment.</li> <li>4. Authors note that the 6 month timeframe may not be enough time to learn and implement behavior changes; experience measurable weight loss.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Billings, D., Cook, R., Hendrickson, A., Dove, D.</a> "A web-based approach to managing stress and mood disorders in the workforce," Journal of Occupational Environmental Medicine, 50:960-968, 2008.		Type of Study- Class A, randomized controlled trial	Wellness Domain- stress management, alcohol and drug abuse prevention, healthy lifestyle
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
309 working adults from a major technology company recruited from a company list service and from attendance at a worksite health fair	<ul style="list-style-type: none"> <li>▪ <u>Intervention group</u>: Received a web-based, multimedia health promotion program designed to help working adults manage stress, prevent mood problems, and seek early identification and treatment of anxiety and depression. Program included four sections: stress management, depression, anxiety and treatment.</li> <li>▪ Participants in the web-condition group were given access to the program for 3 months and were encouraged to review sections of Stress and Mood Management program that correspond to their personal health needs</li> <li>▪ <u>Control group</u>: wait list</li> <li>▪ All participants completed self-reported surveys at baseline and after 3-months and were paid \$30 for each set of surveys and were entered into a raffle for a \$500 prize.</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge, attitude, and self-efficacy;</li> <li>• Stress and mood;</li> <li>• Healthy drinking;</li> <li>• Work productivity</li> </ul>	<ol style="list-style-type: none"> <li>1. Compared to controls, experimental participants who used the web-based program showed reductions on measures of stress and binge drinking;</li> <li>2. Participants in the experimental group increased their understanding of the signs and symptoms of anxiety and depression; how to prevent early symptoms from getting worse.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Byrne, D., Goetzel, R., McGown, P., et. al.</a> "Seven-year trends in employee health habits from a comprehensive workplace health promotion program at Vanderbilt University," Journal of Occupational Environmental Medicine, 53(12): 1372-1381, 2011.		Type of Study- Class B- cohort study	Wellness Domains: tobacco cessation, physical activity, weight management
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
3745 Vanderbilt University employees participating in an incentive-based worksite wellness program in each of 7 years between 2003-2009.	<ul style="list-style-type: none"> <li>▪ Go For The Gold (GFTG), a tiered web-based health and wellness incentive program:               <ul style="list-style-type: none"> <li>○ Tier 1: completion of an HRA</li> <li>○ Tier 2: completion of a self-directed lifestyle management tool for setting goals (Wellness Action Log). Participants receive credit for number of actions completed.</li> <li>○ Tier 3: viewing of an annual educational video on health risks and completing pre and post-tests.</li> </ul> </li> <li>▪ Upon completion of tier 3, up to \$20 per month is added to employee's paycheck</li> <li>▪ Additional personalized coaching was available depending on individual's risk</li> <li>▪ Comparison group of non-participants was used for analysis.</li> </ul>	Physical activity BMI Smoking Seat belt use Alcohol use Job satisfaction Lipid levels Blood pressure Fruit and vegetable intake	<ol style="list-style-type: none"> <li>1. Consistent participants in the GFTG program significantly reduced health risks (smoking, unhealthy weight, physical inactivity) over 7 year study period.</li> <li>2. Percent of employees exercising one or more days a week increased by 6.4 percentage points in the first year after GFTC; after 7 years the net increase rate was 10.7 percentage points.</li> <li>3. Smoking rate for participating employees decreased 0.5 percentage points per year or 3.3% from 11.5% in 2003 to 8.2% in 2009.</li> <li>4. Incentives were motivators to enroll and participate in the programs:</li> <li>5. Before the incentive program, participation in the GFTG Program was less than 24%</li> <li>6. Participation rates increased to 68% in the first year incentives were offered; 80% 4-7 years after the program started.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Finkelstein, E., Linnan, L., Tate, D., Birken, B.</a> , "A pilot testing the effect of different levels of financial incentives on weight loss among overweight employees," Journal of Occupational Environmental Medicine, 49: 981-989, 2007.		Type of Study: Class A, randomized controlled trial	Wellness Domains: Weight management, incentives
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
207 overweight and obese employees from one university and three community colleges in North Carolina.	<ul style="list-style-type: none"> <li>▪ Participants were randomized to 3 groups with weight measurements at baseline, 3 months, and 6 months:                             <ul style="list-style-type: none"> <li>○ Back Loaded Group: received no cash incentive</li> <li>○ Front Loaded Group-received \$14 for each percentage point of weight lost from baseline</li> <li>○ Steady Payment Group- participants receive \$7 for each percent of weight lost.</li> </ul> </li> <li>▪ To minimize the risk that participants may lose weight in unhealthy ways, participants were given information on ways to achieve weight loss and were monitored with appropriate outreach as necessary.</li> <li>▪ Payments were structured so that all participants had equal ability to obtain the incentives during the study period.</li> </ul>	Weight loss	<ol style="list-style-type: none"> <li>1. Incentives had an impact on weight loss and participation with the larger financial incentive resulting in greater short-term weight loss</li> <li>2. At 3 months those with no financial incentive lost an average of 2 pounds (Back Loaded group), Steady Payment group participants lost an average of 3 pounds, and those in the \$14 group (Front Loaded group) lost an average of 4.7 pounds.</li> <li>3. The odds of achieving a clinically significant 5% weight loss were 5.4 times greater for those in the Front Loaded (\$14) group than for those in the non-incentive group.</li> <li>4. Between baseline and 6 months when financial incentives were equalized, weight losses were similar across groups.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Goodpaster, B., DeLany, J., Otto, A. et. al.</a> "Effects of diet and physical activity interventions on weight loss and cardiometabolic risk factors in severely obese adults," Journal of the American Medical Association, 304(16):1795-1802, 2010.		Type of Study: Class C- Single-blind randomized trial	Wellness Domains: Weight management, physical fitness, nutrition, heart disease prevention, diabetes prevention, healthy lifestyle support
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
130 participants aged 35-55, severely obese (Class II-BMI 35-39.9, or Class III-BMI 40+) without diabetes.	<ul style="list-style-type: none"> <li>▪ Lifestyle intervention on weight-loss including diet and physical activity delivered with a combination of group, individual, and telephone contacts.</li> <li>▪ Participants were randomized into 2 groups:                             <ul style="list-style-type: none"> <li>○ initial physical activity-received diet and physical activity for entire 12 months;</li> <li>○ delayed physical activity-identical dietary intervention, but delayed physical activity for 6 months.</li> </ul> </li> <li>▪ Participants received financial compensation to counteract costs associated with participation in the study; were offered low-cost supplies related to the intervention (e.g. exercise videos, pedometer).</li> <li>▪ Small incentives were awarded for meeting targeted behavioral goals.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Changes in weight</li> <li>▪ Other health outcomes: waist circumference, visceral abdominal fat, hepatic fat content, blood pressure and insulin (fasting and insulin resistance)</li> </ul>	<ol style="list-style-type: none"> <li>1. Initial-activity group lost more weight in the first 6 months compared with the delayed-activity group (10.9kg vs.8.2kg)</li> <li>2. Weight-loss at 12 months was similar in the 2 groups (12.1 kg vs. 9.9kg).</li> <li>3. Other health outcomes: waist circumference, visceral abdominal fat, hepatic fat content, blood pressure and insulin (fasting and insulin resistance) were reduced in both groups.</li> <li>4. The combination of diet and physical activity (either early in the program or deferred) promoted greater weight loss and increased likelihood of maintaining weight over time.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation <a href="#">Henke, R., Goetzel, R., McHugh, J., Issac, F.</a> , "Recent experience in health promotion at Johnson and Johnson: Lower health spending, strong return on investment," Health Affairs, 30(3):490-499, 2011.		Type of Study: Class C-Nonrandomized trial with concurrent or historical controls	Wellness Domains: healthy lifestyle, nutrition, weight management, heart disease prevention, tobacco cessation, physical activity, stress management
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>Active, full-time employees ages 18-64 from Johnson and Johnson and comparison companies.</p> <p>32,478 US employees from Johnson and Johnson</p> <p>473,213 participants from 16 comparison companies</p>	<ul style="list-style-type: none"> <li>▪ Comprehensive employer wellness program offered by Johnson and Johnson with five components:               <ol style="list-style-type: none"> <li>1. Health education</li> <li>2. linkage to related employee programs</li> <li>3. supportive physical and social environment</li> <li>4. integration of worksite program into organizational structure</li> <li>5. worksite screening programs with follow-up and treatment.</li> </ol> </li> <li>▪ Johnson and Johnson offers:               <ul style="list-style-type: none"> <li>○ on-site fitness centers</li> <li>○ reimbursement for exercise expenditures</li> <li>○ pedometer program</li> <li>○ Weight-Watchers membership</li> <li>○ healthy cafeteria choices</li> <li>○ on-line weight management tools</li> <li>○ lifestyle management</li> <li>○ computerized coaching program (in blood pressure management, tobacco cessation and blood lipid control)</li> </ul> </li> <li>▪ Sixteen comparison companies (473,213 employees) with similar industry profile and size to Johnson and Johnson, with and without wellness programs. Only four of the sixteen comparison companies had similarly comprehensive programs.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Medical and drug costs from 2002 – 2008 for employees from Johnson and Johnson versus the comparison companies.</li> <li>▪ Risk reduction: Presence of 9 health risks among Johnson and Johnson employees versus comparison companies – 2002-2007: obesity, high blood pressure, high cholesterol, physical inactivity, poor nutrition, excessive alcohol consumption, tobacco use, depression, and high stress</li> </ul>	<ol style="list-style-type: none"> <li>1. Multi-faceted, comprehensive worksite programs can produce a positive ROI. Average annual per employee savings were \$565 in 2009 dollars producing an ROI equal to a range of \$1.88-\$3.92 saved for every dollar spent by Johnson and Johnson on the program.</li> <li>2. Johnson and Johnson experienced a 3.7 % lower average annual growth in medical costs compared to the comparison group.</li> <li>3. Johnson and Johnson employees, compared to other companies, had a lower average predicted probability of being at high risk for 6 of the 9 health risks examined: high blood pressure, high cholesterol, obesity, tobacco use, physical inactivity, and poor nutrition.</li> <li>4. Most favorable trends were for obesity and tobacco cessation</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Krukowski, R., Tilford, J., Harvey-Berino, J., West, D.</a> "Comparing behavioral weight-loss modalities: Incremental cost-effectiveness of an internet-based versus an in person condition," <i>Obesity</i> , 19 (8): 1629-1635, 2011.				Type of Study- Class A, randomized controlled trial	Wellness Domain- weight management
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions		
323 participants from Burlington, Vermont and Little Rock, Arkansas who were overweight or obese (BMI 25-50), over the age 18, able to walk for exercise, and had access to a computer.	<ul style="list-style-type: none"> <li>▪ <u>In-person intervention</u> (n=161): 60 minute group sessions at the clinical site.</li> <li>▪ <u>Internet intervention</u> (n=162): 60 minute virtual group sessions in the form of an interactive "chat" on a secure website; all interaction was done electronically.</li> <li>▪ <u>Content of intervention:</u> Both treatment arms offered the same behavioral weight control program content including dietary and physical activity goals; strategies to achieve targeted changes and goals, and daily self-monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Change in BMI</li> <li>▪ Payer costs for 6 month intervention – sum of direct costs</li> <li>▪ Participant costs (travel time)</li> </ul>	<ol style="list-style-type: none"> <li>1. Weight loss differed significantly between interventions (p&lt; .01) with a greater mean weight loss achieved in the in-person group than in the internet group.</li> <li>2. The internet group had lower intervention costs relative to the in-person group. The total cost of conducting the in-person intervention was \$706 per person, compared to \$372 per person in the internet-delivered intervention; the difference was due to increased travel costs of \$158 per person.</li> <li>3. The discounted incremental cost effectiveness ratio was \$2,160 per life year gained (LYG) for the internet modality relative to no intervention/no weight loss; \$7,177 LYG for the in-person group.</li> <li>4. Participant time costs are important expenditures of medical and behavioral interventions. When included in an economic evaluation of a behavioral weight loss intervention, internet-based weight loss delivery may be a more cost-effective approach to obesity treatment.</li> </ol>		

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Kypri, K., Langley, J., Saunders, J, et.al.</a> "Randomized controlled trial of web-based alcohol screening and brief intervention in primary care," Archives of Internal Medicine, 168(5):530-536, 2008		Type of Study- Class A, randomized controlled trial	Wellness Domain- Alcohol screening
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>975 students attending a university health care services, 17-29 years of age who screened positive for hazardous drinking</p> <p>Of the 599 students who scored in the hazardous or harmful range, 576 (300 of whom were women) consented to the trial and were randomized to one of the 3-arms of the RCT.</p>	<ul style="list-style-type: none"> <li>▪ 3-armed RCT on web-based screening and brief intervention (e-SBI) for harmful drinking:               <ul style="list-style-type: none"> <li>○ Participants in the <u>control</u> group (n=124) received only an informational pamphlet</li> <li>○ Participants in the <u>single-dose e-SBI group</u> (n=114) received a web-based motivational intervention with personalized feedback</li> <li>○ Participants in the <u>multi-dose e-SBI group</u> (n=122) received a web-based motivational intervention and personalized feedback at 1 and 6 months</li> </ul> </li> <li>▪ Computerized e-SBI involves 2-3 minutes of screening and 10-15 minutes of assessment and personalized feedback based on motivational interviewing practices</li> <li>▪ Participants were surveyed at baseline and at 6 and 12 months post baseline.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Frequency of drinking;</li> <li>▪ Typical occasion quantity;</li> <li>▪ Total volume;</li> <li>▪ Frequency of very heavy episodes;</li> <li>▪ Personal, social, and legal consequences of episodic drinking;</li> <li>▪ Consequences related to academic performance;</li> <li>▪ AUDIT score at 12 months.</li> </ul>	<ol style="list-style-type: none"> <li>1. In general, participants who received e-SBI reported statistically significantly less alcohol and fewer problems at 6 and 12 months compared with the control group based on AUDIT scores, total volume consumed, and in consequences related to academic performance.</li> <li>2. The provision of additional sessions in the multi-dose e-SBI intervention did not increase the efficacy of e-SBI.</li> <li>3. In general, an electronic or computerized SBI intervention is an effective in reducing hazardous alcohol consumption; it may provide for easier patient use, accessibility and lower cost.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Lahiri, S., Faghri, P.</a> "Cost-effectiveness of a workplace-based incentivized weight loss program," Journal of Occupational Environmental Medicine, 54(3):371-377, 2012.		Type of Study: Class C-Nonrandomized trial with concurrent or historical controls	Wellness Domains: Weight management, healthy lifestyle, diabetes prevention, incentives
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>72 overweight and obese healthcare workers who completed the Behavioral Weight Management Program (BWMP).</p> <p>35 incentivized</p> <p>37 non-incentivized</p> <p>Program costs of the weight loss management program for incentivized and non-incentivized control sites were calculated based on the costs associated with labor, equipment, and materials</p>	<ul style="list-style-type: none"> <li>▪ Worksites where the BWMP was implemented were assigned at the group level to either:               <ul style="list-style-type: none"> <li>○ non-incentivized sites (control group)</li> <li>○ incentivized sites.</li> </ul> </li> <li>▪ Basic Incentive Plan:               <ul style="list-style-type: none"> <li>○ The program paid participants incentives (\$10 per pound or pound and a half of weight loss) with additional incentives for maintaining weight-loss; total amount \$260.</li> <li>○ Participants could also voluntarily deposit an amount (between \$0 and \$80); were matched each dollar by the program for meeting weight loss goals- total \$340. Deposits would be lost if weight-loss goals were not met.</li> </ul> </li> <li>▪ Participants completed questionnaires at baseline and after the follow-up period to assess outcomes and sustainability of the program.</li> <li>▪ Participants received an action plan that encouraged reflection on lifestyle &amp; ways to change and were provided with information about weight-loss options, healthy eating, and increased physical activity.</li> <li>▪ 1 hour sessions were held with each participant to review the action plan, set weight-loss goals; to distribute personal logs to record diet &amp; exercise.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Weight change pre and post intervention.</li> <li>▪ Behavioral responses to incentives</li> </ul>	<ol style="list-style-type: none"> <li>1. Weight change from the BWMP was statistically significant at the incentivized sites (-7.4lbs) than at non-incentivized sites (-2.2lbs).</li> <li>2. Participants in the incentivized sites lost 5.2 lbs more body weight than those at the non-incentivized sites.</li> <li>3. The incentive sites experienced a lower cost effectiveness ratio (CER) per pound of weight as opposed to non-incentivized site (\$25.5 for the incentive sites and \$58.1 for the non-incentivized sites).</li> <li>4. The direct costs of the BWMP at the incentivized site were more significant compared to the non-incentivized sites. However the more expensive programs resulted in larger weight losses.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">McKary, J., Lynch, K., Shepard, D., Pettinatti, H.</a> "The effectiveness of telephone-based continuing care for alcohol and cocaine dependence," Archives of General Psychiatry, 62:199-207, 2005.		Type of Study- Class A, randomized controlled trial	Wellness Domain: Alcohol and drug (treatment)
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
359 patients with DSM-IV cocaine or alcohol dependence at the time of entrance to treatment who had completed a 4 week intensive outreach program (IOP).	<ul style="list-style-type: none"> <li>▪ Participants at a community site and at a Veterans Affairs site were randomized into three groups. Each group had a baseline assessment and follow-up occurring at 3, 6, 9, 12, 18; 24 months post-baseline.</li> <li>▪ <u>Standard Continuing Care</u> (n=122): patients received 2 group sessions per week; included a combination of addiction counseling and 12-step recovery practices</li> <li>▪ <u>Individualized Relapse Prevention</u> (n=135): patients received 1 individual RP session and 1 group session per week; a treatment manual and structured modules used to guide</li> <li>▪ <u>Telephone-based Continuing Care</u> (n=102): participants had 1 initial face-to-face session; completed 1 15-minute telephone call per week. A workbook was used to structure the calls. Telephone participants were also offered a weekly support group to assist in transitioning from clinic-based to telephone-based treatment.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Self-report of alcohol and cocaine use</li> <li>▪ Negative consequences of substance use (Inventory of Drug Use Consequences Tool)</li> <li>▪ Cocaine urine toxicological examination</li> </ul>	<ol style="list-style-type: none"> <li>1. Telephone counseling, a less resource intensive intervention than either standard care or relapse prevention, produced higher rates of <u>total</u> abstinence over 24 months than those receiving standard follow-up (P&lt;.05.).</li> <li>2. However, individuals with high scores on a composite risk indicator (co-morbid alcohol and cocaine dependence and poor progress during the initial intensive program) had better total abstinence if they received the standard intervention.</li> <li>3. On percentage of days abstinent or negative consequences of substance use, the telephonic intervention did not differ from the other two interventions.</li> <li>4. On average, patients in telephonic intervention received approximately half as much therapeutic time during continuing care compared to those in relapse prevention or standard.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Morgan, P., Collins, C., Plotnikoff, R., et. al.</a> "The impact of a workplace-based weight-loss program on work-related outcomes in overweight male shift workers," Journal of Occupational Environmental Medicine, 54(2):122-127, 2012.		Type of Study- Class A- randomized controlled trial	Wellness Domains: Weight management, physical activity nutrition
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
110 overweight and obese men (body mass index between 25 and 40) aged 18-65 recruited from the same heavy-industry company	<ul style="list-style-type: none"> <li>▪ 65 individuals in 7 workplace teams were randomized to the POWER intervention and 45 to the control</li> <li>▪ Workplace POWER (Preventing Obesity Without Eating like a Rabbit) program consisted of 4 components:               <ul style="list-style-type: none"> <li>○ face-face information session providing: basic weight loss education; a</li> <li>○ study web-site where men were asked to report their weight and submit regular on-line eating and exercise diaries;</li> <li>○ resources consisting of a weight loss handbook, a web-site users guide;</li> <li>○ pedometer.</li> </ul> </li> <li>▪ Incentive - Competitive team approach. The team with the highest percent of weight loss received a \$50 dollar voucher to be spent at a local sporting equipment store</li> </ul>	<ul style="list-style-type: none"> <li>▪ Change in body weight at 14-week follow-up.</li> <li>▪ Quality of life assessed using the 12-Item Short Form Health Survey</li> <li>▪ Workplace productivity assessed by Work Limitations Questionnaire (WLQ)- designed to measure the degree to which health problems interfere with job performance</li> <li>▪ Absenteeism</li> <li>▪ On the job injuries</li> </ul>	<ol style="list-style-type: none"> <li>1. POWER intervention resulted in weight-loss in overweight employees and improved health-related quality of life and workplace productivity.</li> <li>2. Reduction in injuries and absenteeism</li> <li>3. Authors did not comment on relationship to incentive to outcomes.</li> </ol>

# Vermont Wellness Literature Review

## Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Naydeck, B., Pearson, J., Ozminkowski, R., et. al.</a> "The impact of the highmark employee wellness programs on 4-year healthcare costs," Journal of Occupational Environmental Medicine, 50:146-156, 2008.		Type of Study: Class C- Nonrandomized trail with concurrent or historical controls	Wellness Domains: Healthy lifestyle support; physical fitness; weight management; stress management; tobacco cessation
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>1892 employees –under 65, had medical claims coverage through a Highmark Plan for at least 9 months before taking an HRA, had total health care claims for any given study year that did not exceed \$100,000, participated in company’s wellness program and completed an HRA.</p> <p>Employees were matched and further divided into 3 types of wellness programs:</p> <ul style="list-style-type: none"> <li>▪ Participation in HRA only (n= 338),</li> <li>▪ Completion of HRA &amp; participation in online, group or individual health sessions (n=522)</li> <li>▪ Completion of HRA and used fitness center (n=1031).</li> </ul>	<p>ROI of Highmark comprehensive health promotion program offering:</p> <ul style="list-style-type: none"> <li>▪ health risk assessments (HRAs),</li> <li>▪ on-line programs (in nutrition, weight and stress management &amp; tobacco cessation),</li> <li>▪ on-site classes (in nutrition and stress reduction),</li> <li>▪ individual coaching (in nutrition and tobacco cessation),</li> <li>▪ telephonic counseling for tobacco cessation,</li> <li>▪ biometric screenings;</li> <li>▪ varied 6-8 wk campaigns to increase fitness participation and awareness of disease prevention strategies.</li> </ul> <p>Highmark wellness program participants and non-participants matched at baseline on factors known to contribute to higher health care costs using a sophisticated matching technique; were further categorized into participation in 3 types of wellness programs.</p>	<ul style="list-style-type: none"> <li>▪ Savings in health care expenditures defined by growth curve analysis. Compared medical claims for participants versus matched non-participants. The difference was used to define savings.</li> <li>▪ ROI was determined by calculating expense for each wellness program component and contrasting that expense to estimated savings obtained from the growth models. (ROI ratio- subtracting program costs from s savings)</li> </ul>	<ol style="list-style-type: none"> <li>1. Health care costs grew slowly for wellness participants for each of the 3 types of programs compared with matched non-participants (interpreted as savings)</li> <li>2. Differences were only statistically significant for those who used an HRA and fitness center (\$151.36 in savings)</li> <li>3. Compared with non-participants, participants had lower annual health care expenditure increases (savings of \$176.47) with the greatest differences between participants and non-participants found in inpatient expenditures (\$181.78 per person per year in savings).</li> <li>4. After subtracting wellness program expense from estimated savings, established a net savings of \$1,335,524 over 4 years, program costs of \$808,403 yielding an estimated ROI of \$1.65.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

<b>Citation:</b> <a href="#">Norman, G., Zabinski, M., Adams, M., et. al.</a> "A review of eHealth interventions for physical activity and dietary behavioral change," American Journal of Preventive Medicine, 33(4):336-345, 2007.		<b>Type of Study-</b> Class M- systematic review	<b>Wellness Domain:</b> physical activity, nutrition, weight management
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>49 eHealth studies published between 2000 and 2005 that included an intervention for physical activity and/or dietary behaviors or focused on weight loss, used RCT or Quasi-experimental design, and measured behavioral outcomes.</p>	<ul style="list-style-type: none"> <li>▪ Physical activity interventions (13 studies) with delivery modes of website plus email, website only, email only, computer-automated phone system, CD ROM.</li> <li>▪ Dietary behavior interventions (16 studies) with delivery modes of websites, computer programs, interactive multi-media, email, interactive phone technology.</li> <li>▪ Combined interventions for physical activity, dietary behaviors, and weight loss (20 studies) with delivery modes of websites, computers or kiosks, or email.</li> </ul>	<p>Increased physical activity</p> <p>Dietary intake</p> <p>BMI</p>	<ol style="list-style-type: none"> <li>1. Mode of intervention delivery (internet vs. face-to-face):</li> <li>2. Few of the reviewed studies compared programs delivered through eHealth technology vs. face-to-face; of those who did suggest that participants may not be ready to rely on just computerized programs.</li> <li>3. The authors suggest that eHealth programs may be most favorable for implementing certain intervention tasks (e.g. conducting assessments and providing information as a resource)</li> <li>4. Targeting single vs. multiple behaviors: studies show conflicting information</li> <li>5. Two of the studies reviewed observed no benefit when concurrently targeting physical activity and diet compared with targeting diet alone, while another study showed that simultaneous targeting was more effective than sequentially targeting these behaviors.</li> <li>6. Multiple behavior interventions may have excessive content for users, with further studies using combinations and sequencing of targets needed.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Ockene, I., Tellez, T., Rosal, Milagros, et. al</a> " Outcomes of a Latino community-based intervention for the prevention of diabetes: The Lawrence Latino diabetes prevention project," American Journal of Public Health, 102(2):336-342, 2012.		Type of Study- Class A, randomized control trial	Wellness Domains: Diabetes prevention, nutrition, physical activity
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
312 Latino participants from Lawrence, MA who were at high risk for type 2 diabetes.	<p><u>Intervention group</u> (n=162) received:</p> <ul style="list-style-type: none"> <li>▪ Lifestyle intervention that included:               <ul style="list-style-type: none"> <li>○ individual sessions (conducted in participants' homes) and</li> <li>○ group sessions (conducted at community center where participants had easy access)</li> <li>○ Participants received culturally designed health and educational materials about</li> <li>○ Nutrition</li> <li>○ Goal setting and self-monitoring</li> <li>○ Participant given demonstrations on healthy cooking methods and how to record steps walked with pedometers.</li> </ul> </li> </ul> <p><u>Control group</u> (n=150) received usual care.</p> <ul style="list-style-type: none"> <li>▪ Participants received \$25 cash incentives at baseline and at 6 months; \$50 at the 1 year assessment visit.</li> </ul>	<ul style="list-style-type: none"> <li>▪ <u>Primary:</u> Weight loss and HbA1c at baseline and at the end of year 1</li> <li>▪ <u>Secondary:</u> Fasting lipids, glucose, insulin concentrations; blood pressure; dietary assessment; physical activity measurements; quality of life and depression scores at baseline and at the end of year 1.</li> </ul>	<ol style="list-style-type: none"> <li>1. Compared with the control group the lifestyle intervention group experienced a weight reduction of -2.5 (vs. 0.63); a reduction in HbA1c of -0.10 (vs.-0.04%).</li> <li>2. Insulin resistance improved in the intervention group compared with the control group (-0.36 vs. -0.06).</li> <li>3. Lifestyle intervention incorporating dietary modification and physical activity produced an average weight loss of 5.6 kilograms at 1 year; reduced the incidence of diabetes by 58%</li> <li>4. Statistically significant improvement in HbA1c and insulin resistance among participants was noted after the 1 year study period</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Ovbiosa-Akinbosoye, O., Long, D.</a> , "Factors associated with long-term weight loss and weight maintenance," <i>Journal of Occupational Environmental Medicine</i> , 53(11): 1236-1242, 2011.		Type of Study- Class C-quasi-experimental design	Wellness Domains: Weight management, stress management, physical activity
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
89,746 participants in a worksite wellness program administered by Online Health between 2005 and 2010 and who were overweight and obese.	<ul style="list-style-type: none"> <li>▪ Weight loss and management intervention that included monetary and non-monetary rewards.</li> </ul> <p>Comprehensive worksite wellness program included:</p> <ul style="list-style-type: none"> <li>▪ weight management- telephonic consultations with health coaches; use of an internet coaching portal to allow for self-directed educational and behavior tracking &amp; secure message interactions with health coaches</li> <li>▪ nutrition coaching assistance- personalized services targeting meal plans and weight goals</li> <li>▪ physical activity- counseling on various ways to incorporate exercise and increase levels of physical fitness.</li> <li>▪ Other: blood pressure management, cholesterol, management, and stress management.</li> </ul>	<p>Change in body weight at 1 year follow-up and compared to baseline</p> <p>Blood pressure and lipid levels</p> <p>Nutrition, stress and exercise levels were assessed as principle predictors of weight loss.</p>	<ol style="list-style-type: none"> <li>1. Participation in a comprehensive wellness program was associated with an average mean loss of 6.8% of initial body weight.</li> <li>2. Self-reported improvements in nutrition and reductions in psychosocial stress were positively associated with weight loss at 1 year.</li> <li>3. Self-reported reduced stress predicted the likelihood of successful weight loss, the amount of pounds lost, as well as percent of body-weight lost.</li> <li>4. Increased exercise not associated with weight loss.</li> <li>5. BP and lipid levels improved among the weight loss group.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation <a href="#">Pelletier, K.</a> , "A review and analysis of the clinical and cost-effectiveness studies of comprehensive health promotion and disease management programs at the worksite-Update VIII 2008-2010," Journal of Occupational Environmental Medicine, 53 (11): 1310-1331, 2011.		Type of Study: Class M, systematic review	Wellness Domains: all domains
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>27 studies focusing on clinical and cost outcomes research focusing on worksite wellness programs published between 2008 to 2010.</p> <p>Comprehensive search conducted that included: MEDLINE, ERIC, ADI, EDGAR, CARL, Inform, Lexis-Nexis databases and direct inquiries to worksite researches and corporate medical directors</p>	<ul style="list-style-type: none"> <li>▪ Of the 27 studies referenced, 26 had experimental designs including 7 randomized control trials.</li> </ul> <p>Example intervention designs included:</p> <ul style="list-style-type: none"> <li>▪ Assessment of health risks based on a health risk assessment</li> <li>▪ Weight management and physical activity</li> <li>▪ Stress reduction</li> <li>▪ Worksite health promotion program</li> <li>▪ Online program with educational materials</li> </ul>	<p>Clinical and cost-effectiveness in published literature on health promotion</p>	<ol style="list-style-type: none"> <li>1. Health promotion programs over the long term may experience a delay between demonstrated improvements in health and savings in medical expenditures.</li> <li>2. Providing incentives (monetary or non-financial) motivate participants to participate in a health promotion or wellness program.</li> <li>3. Economic analyses from the health and wellness programs included in the review indicate that there is strong evidence for average reductions in sick leave, and health plan costs.</li> <li>4. Use of technology (e.g. web-based programs, handheld personal computers, text-messaging, podcasting) is more convenient and accessible to participants than more traditional intervention strategies.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Rejeski, W, Goff, D, Barron, L, et. al.</a> , "Translating weight loss and physical activity programs into the community to preserve mobility in older, obese adults in poor cardiovascular health," Archives of Internal Medicine, 171(1): 880-886, 2011.				Type of Study: Class A-randomized, controlled trial	Wellness Domains: Physical fitness, weight management, heart disease prevention, nutrition
Population Studied	Intervention Information	Outcome Measures Used	Major Conclusions		
288 participants aged 60-79: physically limited who were overweight or obese and had either CVD or cardiometabolic dysfunctions	<ul style="list-style-type: none"> <li>▪ Lifestyle, weight-loss and physical activity intervention; participants were randomized to one of three interventions:</li> <li>▪ Physical Activity (PA) intervention- 48 sessions in 2 phases (intensive and maintenance). The 6 month intensive phase involved counseling sessions in a mix of 3 group sessions and 1 individual session.</li> <li>▪ Weight Loss (WL) and Physical Activity (PA) (WL+PA) intervention- 48 sessions involved the PA program model conjunction with dietary WL</li> <li>▪ Successful Aging (SA) education intervention-18 educational sessions focusing on how participants can take charge of their health. The SA intervention <u>did not</u> provide participants supervision for physical activity or weight loss.</li> <li>▪ The 400-m walk test was the measurement of mobility (MWT)</li> </ul>	<p><u>Primary:</u> Time to complete a 400-m walk in seconds</p> <p><u>Secondary:</u> Effects of treatments on weight loss, level of physical activity, and adverse events</p>	<ol style="list-style-type: none"> <li>1. The results indicate that physical activity in combination with weight loss is more successful in improving mobility in participants with CVD than physical activity alone.</li> <li>2. Although the PA group improved their performance at 6 months in comparison to the SA, this benefit disappeared by 18 months.</li> <li>3. PA and SA participants experienced small decreases in weight (1.0%) whereas the WL+PA group lost 8.5% of weight at 6 months and retained this level at 18 months.</li> </ol>		

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Svetkey, L., Stevens, V., Brantley, P., et al.</a> "Comparison of strategies for sustaining weight loss," JAMA,12;299(10):1139-48, 2008.		Type of Study- Class A, randomized controlled trial	Wellness Domain- weight management, heart disease prevention
Population Studied	Intervention Information	Outcome Measures Used	Major Conclusions
1,032 overweight or obese adults from Duke University, Johns Hopkins University, Pennington Biomedical Research Center, and Kaiser Permanente Center for Health Research.	<ul style="list-style-type: none"> <li>▪ Phase 1: a group-based behavioral intervention. Trained interventionists led 20 weekly sessions over a 6 month period &amp; identified specific goals for each participant</li> <li>▪ Phase 2-Participants <u>who completed phase 1 and met criteria</u> for phase 2 were randomized to 1 of 3 groups:</li> <li>▪ A <u>self-directed group</u> (n=342): minimal intervention - printed materials with diet and physical activity recommendations;</li> <li>▪ An <u>interactive-technology group</u> (n=348): unlimited access to a web-site designed to support weight loss maintenance with personal goal setting and action plans; educational modules, a bulletin board to facilitate social support and email reminders to log on.</li> <li>▪ A <u>personal-contact intervention group</u> (n=342): case management approach with monthly person-to-person guidance and support with review of self-reported weight and progress towards goals</li> </ul>	<p><u>Primary Outcome</u>: Changes in weight during phase 2.</p> <p><u>Secondary Outcome</u>: change in weight from entry (start of phase 1 to the end of the study).</p>	<ol style="list-style-type: none"> <li>1. All groups regained weight in phase 2: 5.5 kg in the self-directed group, versus 4.0 kg in the personal-contact group.</li> <li>2. Participants in the interactive-technology and personal-contact groups experienced significantly less weight gain during the 24 month follow-up of phase 2 than the self-directed group.</li> <li>3. A sizeable number of participants in each treatment group sustained clinically significant weight loss during phase 2: 41.8% maintained at least 4kg of weight loss compared with entry weight.</li> <li>4. The weight loss proportion was higher in the personal-contact group than in the self-directed group.</li> <li>5. Monthly brief personal-contact sessions provided a modest benefit in sustaining weight loss whereas the internet-based intervention provided early but transient benefit.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Turner-McGrievy, G., Campbell, M., Tate, D., Truesdale, K., et. al.</a> "Pounds off digitally study: A randomized podcasting weight loss intervention," American Journal of Preventive Medicine, 37(4): 263-269, 2009.		Type of Study- Class A, randomized controlled trial	Wellness Domain- weight management, nutrition
Population Studied	Intervention Information	Outcome Measures Used	Major Conclusions
78 participants with BMI 25-40 in the Raleigh-Durham, NC area.	<ul style="list-style-type: none"> <li>▪ Intervention group (n=41): received 24 episodes a weight loss podcast based on social cognitive theory (SCT) (enhanced podcast) for 12 weeks. Enhanced podcast emphasized nutrition and exercise information in achieving a healthy weight.</li> <li>▪ Control (n=37): received 24 episodes of currently available podcast included discussions on how to lose weight; focused on using cognitive restructuring to avoid over eating in order to achieve a healthy weight.</li> <li>▪ Both groups were given a book with calorie and fat gram amounts in popular foods.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Weight measured at baseline and follow-up</li> <li>▪ Assessment of perception of the podcast intervention Participants completed questionnaires at 12 weeks that assessed knowledge of weight-loss, food intake; physical activity.</li> </ul>	<ol style="list-style-type: none"> <li>1. Enhanced podcast group participants had a greater decrease in weight (-2.9±3.5 kg) vs.- 0.3±2.1 kg in the control group; in BMI (1.0±1.2kg/m<sup>2</sup> vs. -0.1± 0.7 kg/m<sup>2</sup>).</li> <li>2. Participants in the enhanced group reported greater satisfaction with the intervention compared with the control group</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation <a href="#">Umpierre, D., Ribeiro, P., Kramer, C., et. al.</a> "Physical activity advice only or structured exercise training and association with HbA1c levels in type 2 diabetes," Journal of the American Medical Association, 305(17):1790-1799, 2011.		Type of Study: Class M, systematic review and meta-analysis	Wellness Domains: physical fitness, weight management, nutrition, diabetes prevention
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
47 RCTs (8,538 patients) of at least 12 weeks' duration that evaluated the ability of structured exercise training or physical activity advice to lower HbA1c.	<p><u>Exercise training</u></p> <ul style="list-style-type: none"> <li>▪ Aerobic exercise training: 490 patients in 20 studies received structured aerobic exercise training</li> <li>▪ Structured resistance training: 182 patients in 4 studies received resistance training</li> <li>▪ Combined aerobic/resistance training: 261 patients in 7 studies.</li> </ul> <p>Control: 825 patients over the 23 unique studies</p> <p><u>Physical activity advice</u></p> <ul style="list-style-type: none"> <li>▪ With dietary co-intervention: 2126 patients in 12 studies received both dietary and physical activity advice</li> <li>▪ Physical activity advice alone: 291 patients in 14 studies.</li> </ul> <p>Control: 3538 patients in 24 unique studies</p>	Change in hemoglobin A1c in type 2 diabetes.	<ol style="list-style-type: none"> <li>1. Exercise training, either aerobic training or resistance training or a combination was associated with a decline in HbA1c level of -0.67%.</li> <li>2. Exercise duration of more than 150 minutes per week was associated with a greater reduction in HbA1c (0.89%) than structured exercise of 150 minutes or less per week (0.36% reduction in HbA1c).</li> <li>3. Interventions on physical activity advice (24 studies) were associated with lower HbA1c levels (-0.43%) compared with controlled participants.</li> <li>4. Physical activity alone did not yield changes in HbA1c levels. However combined physical activity and dietary advice was yielded a decrease in HbA1c of -0.58%.</li> </ol>

## Vermont Wellness Literature Review

### Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Volpp, K., John, L., Troxel, A., et. al.</a> "Financial incentive-based approaches for weight loss," Journal of the American Medical Association, 300(22): 2631-2637, 2008.		Type of Study: Class A, randomized, controlled trial	Wellness Domains: Weight management, incentives
Population Studied	Intervention Information	Outcome Measures Used	Major Conclusions
57 participants aged 30-70 with a body-mass index of 30-40	<p>Weight-loss intervention with incentives- participants had a 1 hour one-one consultation with a dietician covering strategies for diet and weight-loss.</p> <p>Participants in the incentive groups self-reported weight-loss via phone and received text-message feedback on how much money was earned based on weight-loss targets.</p> <p>Incentives were only awarded to participants at the monthly weigh-in if weight on the clinic scale met specified goal targets.</p> <p>Participants were randomized to 3 weight loss plans: monthly weigh-ins (control group), a lottery incentive program, or a deposit contract:</p> <ul style="list-style-type: none"> <li>▪ Lottery-based: participants played a lottery and received earnings if they achieved or lost more weight. Lottery-based participants were eligible for a daily lottery prize with an expected value at \$3/d &amp; potential large pay-offs (1 in 100 chance of winning \$100 and a smaller payoff- 1 in 5 chance of winning \$10</li> <li>▪ Deposit Contract: participants invested their own money, which they lost if they failed to achieve weight goals. Deposit contract participants could win \$0-\$252 depending on how much they invested.</li> </ul>	<p><u>Primary:</u> weight loss after 16 weeks</p> <p><u>Secondary:</u> weight loss after 7 months</p>	<ol style="list-style-type: none"> <li>1. Mean weight loss at 16 weeks was greater in each of the incentive groups: 13.1 lb for the lottery group, 14.0 lb for the deposit contract group vs. 3.9 lbs for the control group.</li> <li>2. About half of both incentive groups met the 16 lb target weight loss: 47.4% in the deposit contract group and 52.6% in the lottery group versus the control group, 10.5%.</li> <li>3. Net weight loss between the enrollment in the study and at the end of 7 months was larger in the incentive groups (9.2 lb for the lottery group and 6.2 lb for the deposit contract); but the differences were not statistically significant.</li> <li>4. Although gaining weight at the end of the incentive intervention, incentive participants weighed less at 7 months than at the start of the study.</li> </ol>

# Vermont Wellness Literature Review

## Appendix B: Summary of Wellness Literature (Continued)

Citation <a href="#">Volpp, K., Troxel, A., Pauly, M., et. al.</a> "A randomized, controlled trial of financial incentives for smoking cessation," The New England Journal of Medicine, 360(7): 699-709, 2009.		Type of Study: Class A-Randomized, controlled trial	Wellness Domains: Tobacco cessation; healthy lifestyle support; incentives
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>878 employees of a multinational company stratified according to worksite, heavy vs. non-heavy smoking, and income:</p> <p><u>Non-Incentive Group:</u> 442 employees received information on smoking cessation programs</p> <p><u>Incentive Group:</u> 436 employees received information about smoking cessation plus financial incentives</p>	<p>Participants were randomized into 1 of 2 groups:</p> <ul style="list-style-type: none"> <li>▪ <u>Non-Incentive Group:</u> participants received either information about community-based smoking cessation resources within 20 miles of worksite &amp; standard health benefits provided by the company (e.g. coverage for physician visits; bupropion prescribed to promote tobacco cessation)</li> <li>▪ <u>Incentive Group:</u> participants received information about programs plus financial incentives:                             <ul style="list-style-type: none"> <li>○ \$100 for completing a smoking cessation program</li> <li>○ \$250 for cessation of smoking 6 months after initial cessation, confirmed by a biochemical test</li> <li>○ \$400 for abstinence for an additional 6 months after initial cessation, confirmed by a biochemical test</li> </ul> </li> <li>▪ All participants were contacted 3 months after enrollment and were interviewed to assess smoking behavior; received additional incentives (\$20 per interview)</li> </ul>	<ul style="list-style-type: none"> <li>▪ <u>Primary:</u> smoking cessation at 9 or 12 months after enrollment, depending on whether initial cessation was reported at 3 or 6 months</li> <li>▪ <u>Secondary:</u> smoking cessation within the first 6 months after enrollment and rates of participation in and completion of smoking cessation programs.</li> </ul>	<ol style="list-style-type: none"> <li>1. Smoking cessation rates among employees who were given both information about cessation programs and financial incentives to quit smoking were significantly higher than rates among employees who given program information but no financial incentives.</li> <li>2. The incentive group had higher rates of smoking cessation than the information-only group 9-12 months after enrollment (14.7% vs. 5.0% for the control group); and at 15-18 months (9.4% vs. 3.6% for the control group.)</li> <li>3. Rate of participation in a smoking cessation program was significantly higher in the incentive group: at 15.4% vs. 5.4% for the control group.</li> <li>4. A higher number of incentive-group participants completed a smoking cessation program (10.8% vs. 2.5%).</li> </ol>

# Vermont Wellness Literature Review

## Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Wing, R., Crane, M., Thomas, G., et. al.</a> , “Improving weight loss outcomes of community interventions by incorporating behavioral strategies,” American Journal of Public Health, 100(12): 2513-2519, 2010.		Type of Study: Class A, randomized, controlled trial	Wellness Domains: Physical fitness, weight management, healthy lifestyle support
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>Enrollment in the Shape-Up RI weight-loss competition; Over the age of 18 with BMI of 25kg/m<sup>2</sup></p> <ul style="list-style-type: none"> <li>• Study 1- 179 participants</li> <li>• Study 2-128 participants</li> </ul>	<ul style="list-style-type: none"> <li>▪ Internet-based community program that used team-based competition to encourage increased physical activity and weight loss.</li> <li>▪ Participants enrolled in teams and had the opportunity to compete on steps walked, minutes of activity and weight loss.</li> <li>▪ 2- part study:                             <ul style="list-style-type: none"> <li>▪ Study 1- weekly lessons teaching behavioral strategies for changing diet and exercise to Shape-Up RI participants for potential improvement in weight loss results.</li> <li>▪ Participants were randomly assigned to 1 of 2 groups (standard Shape-Up RI or SURI +lessons)</li> <li>▪ Study 2- Shape-Up Enhanced-combination of multimedia lessons plus increased monitoring and automated computer feedback on behavior changes and weight loss.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <u>Primary</u>: Weight loss at 12 weeks</li> <li>• <u>Secondary</u>: calories expended in physical activity, frequency of self-weighing, adherence to other prescribed behavioral strategies</li> </ul>	<ol style="list-style-type: none"> <li>1. Adding multimedia lessons, self-monitoring and automated feedback significantly increases the average weight loss achieved and the percentage of participants losing 5% or more of their starting weight.</li> <li>2. The results of study 1 indicate that weight losses and the number of participants losing 5% of their starting weight were slightly greater among the SURI+lessons group than the standard intervention.</li> <li>3. The Shape-Up enhanced intervention in combination with the 3 program components produced an average weight loss of 3.5kg compared with 1.4 kg for the standard intervention (study 1).</li> <li>4. Participants also reported greater increases in physical activity, self-weight management, and other healthy weight strategies.</li> <li>5. Results from the Shape-Up enhanced intervention suggest that recommendations from the multimedia lessons increased adherence to healthy weight behaviors; automatic feedback increased the number of lessons viewed and use of the recommended healthy behaviors.</li> </ol>

# Vermont Wellness Literature Review

## Appendix B: Summary of Wellness Literature (Continued)

Citation: <a href="#">Zbikowski, S., Jack, L., McClue., et. al.</a> "Utilization of services in a randomized trial of testing phone-and web-based interventions for smoking cessation," Nicotine and Tobacco Research, 13 (5):319-327, 2011.		Type of Study-Class A, randomized controlled trial	Wellness Domain Tobacco cessation, stress management
Population Studied and Sample Size	Intervention Information	Outcome Measures Used	Major Conclusions
<p>1,198 participants from Group Health in Washington and Idaho.</p> <p>Comprehensive Medication Program and Support Services (COMPASS) smoking trial randomized participants into 3 treatment programs:</p> <ul style="list-style-type: none"> <li>Phone group (n= 400)</li> <li>Web group (n=399)</li> <li>Phone-web group (n= 399)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participants randomized to phone (n=400), web (n=399), or an integrated phone-web (n=399) treatment in conjunction with varenicline (Chantix)</li> <li>▪ After randomized to treatment, participants received a 12-week supply of Chantix, a printed quit-guide, access to a support line, and participated in a brief phone-based orientation.</li> <li>▪ Participants were required to set a quit date (via web or via phone) in order to receive their prescription</li> <li>▪ Participants in the <u>phone</u> group received 5 one-to-one phone counseling sessions initiated by a tobacco treatment specialist/Quit Coach.</li> <li>▪ Participants in the <u>Web</u> group had access to an interactive website with tools and targeted content based on progress with quit process.</li> <li>▪ Participants in the <u>phone-Web</u> group received up to 5 one-to-one sessions and had access to the interactive web-site.</li> </ul>	<p><u>Primary:</u> self-reported abstinence at 6 months</p> <p><u>Secondary:</u> Utilization of treatment interventions</p>	<ol style="list-style-type: none"> <li>1. One third of the entire cohort was quit at 6-month follow-up with no difference by treatment group.</li> <li>2. Concurrent use of Chantix was associated with increased abstinence in all groups (significant)</li> <li>3. Among the phone and phone-Web groups, both number of calls and duration of calls were positively associated with abstinence.</li> <li>4. Among the Web group, length of time online was associated with abstinence.</li> </ol>

## Vermont Wellness Literature Review

### Appendix C-Summary of Articles by Wellness Domain, Incentive Usage, and Intervention Site

Article	Tobacco Cessation	Healthy Lifestyle Support	Physical Activity	Weight Mgt	Nutrition	Stress Mgt	Alcohol and Drug Abuse	Diabetes Prev'nt'n	Heart Disease Prev'nt'n	Incentives	Employer Based Program	Community Based Program
Alexander G, et al, 2010.		X			X							X
Baicker K, et al, 2010.	X	X	X	X	X	X	X	X	X	X	X	
Bennett J, et al, 2011.		X	X	X		X			X		X	
Billings D, et al, 2008.		X				X	X				X	
Byrne D, et al, 2011.	X		X	X							X	
Finkelstein E, et al 2007.				X						X	X	
Goodpaster B, et al, 2010.		X	X	X	X			X	X			X
Henke R, et al, 2011.	X	X	X	X	X	X			X		X	
Krukowski R, et al, 2011				X								X
Kypri K, et al, 2008.							X					X
Lahiri S, et al, 2012.		X		X				X		X	X	
McKary J, et al, 2005.							X					X
Morgan P, et al, 2012.			X	X	X						X	

## Vermont Wellness Literature Review

### Appendix C-Summary of Articles by Wellness Domain, Incentive Usage, and Intervention Site

Article	Tobacco Cessation	Healthy Lifestyle Support	Physical Activity	Weight Mgt	Nutrition	Stress Mgt	Alcohol and Drug Abuse	Diabetes Prev'nt'n	Heart Disease Prev'nt'n	Incentives	Employer Based Program	Community Based Program
Naydeck B, et al, 2008.	X	X	X	X		X					X	
Norman G, et al, 2007.			X	X	X						X	X
Ockene I, et al, 2012.			X		X			X				X
Ovbiosa-Akinbosoye O, et al, 2011.			X	X		X					X	
Pelletier K, et al, 2011.											X	
Rejeski W, et al, 2011.			X	X	X				X			X
Svetkey L, et al, 2008.				X					X			X
Turner-McGrievy, G, 2009.				X	X							X
Umpierre D, et al, 2011.			X	X	X			X			X	X
Volpp K, et al, 2008.				X						X		X
Volpp K, et al, 2009.	X	X								X	X	
Wing R, et al 2010.		X	X	X								X
Zbikowski S, et al, 2011.	X					X						X

## Vermont Wellness Literature Review

### Appendix C-Summary of Articles by Wellness Domain, Incentive Usage, and Intervention Site

Article	Tobacco Cessation	Healthy Lifestyle Support	Physical Activity	Weight Mgt	Nutrition	Stress Mgt	Alcohol and Drug Abuse	Diabetes Prev'nt'n	Heart Disease Prev'nt'n	Incentives	Employer Based Program	Community Based Program
<b>TOTAL (of 26 Articles)</b>	6	10	13	18	10	7	4	5	6	5	14	14

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- <sup>7</sup> ACA, Section 1311(c)(3); Act 48, §1805(5).
- <sup>8</sup> ACA, Section 1311(g).
- <sup>9</sup> Act 48, amending 18 V.S.A. §9377.
- <sup>10</sup> Vermont Rule H-2008-05, Department of Banking, Insurance, Securities and Health Care Administration, Section 3 (b) (iv).
- <sup>11</sup> *Ibid.*, Section 3 (d).
- <sup>12</sup> *Ibid.*, Section 4.
- <sup>13</sup> ACA, Section 1201 (amending Section 2705 of Public Health Service Act).
- <sup>14</sup> Act 48, §1803(c)(2).
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## Vermont Wellness Literature Review

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