



## Enhanced life functioning: Initial efficacy of a theoretical approach to integrate multiple health behavior interventions in young adults

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### ABSTRACT

**Objectives.** We propose a new theoretical model that integrates health interventions targeting multiple health behaviors around a common framework of enhancing life functioning. We then test an enhanced life functioning message against an enhanced physical health message in increasing participants' perceived importance of engaging in multiple health behaviors.

**Methods.** 94 undergraduate participants were exposed to either an enhanced life functioning message or an enhanced physical health message and then completed measures of health behavior importance and benefits associated with enhanced life functioning importance in the spring of 2008 at Rutgers University.

**Results.** Results indicate the efficacy of an enhanced life functioning message in increasing participants' perceived importance of engaging in multiple health behaviors. Moreover, the effect of an enhanced life functioning message on perceived health behavior importance is mediated by perceived importance of the benefits associated with enhanced life functioning.

**Conclusions.** Emphasizing enhanced life functioning as an outcome of engaging in multiple health behaviors increases the perceived importance of performing multiple health behaviors, which may influence the performance of multiple health behaviors.

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Positive health behaviors are the most efficient ways to reduce chronic disease morbidity and mortality (Salovey et al., 2000). Tobacco use, high-fat diet, and physical inactivity are three behaviors that contribute to the most preventable causes of disease and death in the US (National Center for Health Statistics, 1997). There is mounting evidence that multiple-behavior interventions have the potential to impact public health on a greater level than single-behavior interventions (Nigg et al., 2002). Yet, how best to target multiple health behaviors is unknown (Nigg et al., 2002; Prochaska and Sallis, 2004).

Recent worksite intervention studies have combined several intervention components (i.e., practical integration) to influence the performance of multiple health behaviors (Engbers et al., 2005; Matson-Koffman et al., 2005; Swinburn et al., 1999). However, practically integrated interventions are not uniformly successful; for example, interventions targeting both exercise behavior and dietary behavior do not necessarily result in changes in physical activity, dietary fat intake, or body mass index (Maes et al., 1998). Further, interventions targeting seemingly unrelated health behaviors (e.g., occupational health and safety and dietary behavior) have been

inconsistent in effecting change in outcome variables (Sorensen et al., 2002). This may be due to the fact that improving occupational health and safety and improving nutrition seem to be disparate goals, which suggests that a better approach would integrate behavioral goals around a common theme. We posit that one of the weaknesses of multiple-behavior interventions is that while the intervention components are integrated on a *practical* level, they are not integrated on a *theoretical* level.

### Enhanced life functioning approach and multiple health behavior interventions

We propose a new theoretical framework that emphasizes enhanced life functioning to increase participants' perceived importance of performing multiple health behaviors. By incorporating an *enhanced life functioning framework*, specifically focusing on the superordinate goal of improved performance of the activities of daily living (e.g., role function in workplace, duties at home, leisure time with family and leisure time with friends), we propose that all health behaviors are organized around a relevant desired outcome (Altshuler et al., 2002). Moreover, the perceived importance of the benefits of behavior change may be increased.

The enhanced life functioning approach is both novel and theoretically justified by recent research in message framing and

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multiple health behavior interventions. Framing messages in terms of improved physical and social functioning may encourage multiple health behaviors. Rothman and Salovey (1997) posit that the relative effectiveness of a gain-framed (i.e., message emphasizing benefits associated with performing behavior) or loss-framed (i.e., message emphasizing potential problems associated with not performing behavior) appeal depends on whether a behavior serves an illness detecting or a health-affirming function. Specifically, health-affirming behavior can be conceived as a relatively safe behavioral alternative that maintains one's current healthy status. Because people prefer less risky options when presented with gain-framed information (Rothman et al., 1993), interventions targeting multiple health behaviors should emphasize the benefits of engaging in the behaviors (e.g., enhanced functioning) to encourage multiple health behaviors.

Additionally, research in multiple health behavior change suggests the utility of a global health approach (Noar et al., 2008). Noar et al. (2008) propose using higher order constructs (e.g., general health) that predict particular health-related attitudes to promote specific health behaviors. Similarly, Prochaska (2008) recommends higher order constructs as a promising approach to further researchers' understanding of how multiple health behaviors are related and increase intervention impact. Interventions consistent with this approach exist for individuals with chronic illness and demonstrate the utility of higher order constructs (i.e., chronic illness management) in encouraging multiple illness management behaviors (for a review, Goldstein et al., 2004). However, fewer interventions consistent with this approach exist for healthy individuals (Noar et al., 2008).

#### Present study

This study aims to provide empirical support for an enhanced life functioning approach to encourage multiple health behaviors in young adults. Younger adults are a population in which multiple risk factors (e.g., smoking, inactivity, poor diet, and excessive alcohol consumption) are prevalent (Pronk et al., 2004; Raitakari et al., 1995). Encouraging multiple health behaviors in a younger population has the added value of promoting habitual health behavior during a time when health behaviors may be subject to change due to peer influence (Lau et al., 1990). Consequently, health may be enhanced in later adulthood as a result of earlier consistent health behavior performance (Aarts et al., 1997).

In the present study, undergraduates were randomly assigned to one of two health message conditions (i.e., enhanced life functioning or enhanced physical health). We expected the message emphasizing enhanced life functioning (compared to physical health) to increase the perceived importance of practicing multiple health behaviors via an increase in the perceived importance of benefits associated with enhanced life functioning.

## Method

#### Participants and procedure

Ninety-four undergraduate students (69% women) recruited from the psychology participant pool participated in the study. Of these, 43 (46%) were White/European American, 27 (29%) were Asian/Asian American, 8 (8.5%) were Black/African American, 10 (10.5%) were Latino/Hispanic American, 2 (2%) identified as Multiracial/Mixed, and 4 (4%) identified as "Other." Average age was 19.45 years ( $SD=1.36$ ). Participants were told that they would evaluate previously used health behavior advertisements. Participants then completed the manipulation check, health behavior importance, and importance of enhanced life functioning benefits questionnaires described below.

## Materials

#### Health messages

We constructed two different health messages, both with a gain-frame. The experimental condition utilized an enhanced life functioning message emphasizing improved ability to optimally perform activities of daily living (e.g., activities related to school, work, and social relationships), and the control condition utilized an enhanced physical health message emphasizing improved biological indicators of health (e.g., blood pressure, cholesterol levels, and weight; see Appendix A). We chose health messages due to the success of previous research utilizing health messages (for a review, Suggs, 2006). Moreover, health messages have practical applications allowing for rapid and widespread interventions through public health media campaigns (Donohew et al., 1994; Helme et al., 2007).

#### Manipulation check

Items queried the extent to which the message emphasized various components of enhanced life functioning and enhanced physical health. Subsequent items queried the extent of emphasis on improved performance of daily activities, improved performance of activities related to school, work, and social relationships, improved indicators of physical health, and improved blood pressure, cholesterol levels, and weight. We constructed both an enhanced life functioning emphasis scale and enhanced physical health emphasis scale with 3 items each. In the present sample, both the life functioning emphasis scale and physical health emphasis scale demonstrated good internal reliability (Cronbach's  $\alpha=0.73$  and  $0.87$ , respectively).

#### Health behavior importance

Participants completed questions regarding the importance of performing multiple health behaviors during the next six months (e.g., "How important is it for you to eat a healthier diet during the next six months"; adapted from Conner and Sparks, 1996). Participants indicated on a scale of 1 (not at all) to 7 (extremely) how important it was to eat a healthier diet, exercise regularly, effectively manage stress, obtain adequate sleep, and avoid abusing alcohol. These five items comprised a health behavior importance scale (Cronbach's  $\alpha=0.64$ ).

#### Importance of enhanced life functioning benefits

Participants completed questions regarding the importance of the benefits associated with enhanced life functioning (e.g., "How important of a benefit is enhanced life functioning"). Participants indicated on a scale of 1 (not at all) to 7 (extremely) the perceived importance of the following benefits: enhanced life functioning, improved performance of daily activities, and improved performance of activities related to school, work, and social relationships. These three items comprised a life functioning benefits importance scale (Cronbach's  $\alpha=0.79$ ).

#### Statistical analyses

We utilized an independent samples *t*-test to check our manipulation of message emphasis between conditions. We computed descriptive statistics and correlations between the main variables of interest. To test the impact of an enhanced life functioning message on health behavior importance and examine a possible condition by gender interaction, we performed a 2 (condition) by 2 (gender) univariate analysis of variance (ANOVA). To test perceived importance of benefits associated with enhanced life functioning as a mediator, we first performed an independent samples *t*-test between conditions with perceived importance of benefits associated with enhanced life functioning as the dependent

variable. We then utilized a series of regression analyses to test whether all conditions of mediation were met.

## Results

### Manipulation check

Participants in the life functioning condition indicated that their message emphasized life functioning ( $M = 5.70$ ,  $SD = 0.86$ ) more than participants in the physical health condition [ $M = 4.70$ ,  $SD = 1.27$ ;  $p < 0.001$ ]. Likewise, participants in the physical health condition indicated that their message emphasized physical health ( $M = 5.87$ ,  $SD = 1.08$ ) more than participants in the life functioning condition ( $M = 3.85$ ,  $SD = 1.49$ ;  $p < 0.001$ ). Thus, the messages appropriately emphasized either enhanced life functioning or enhanced physical health.

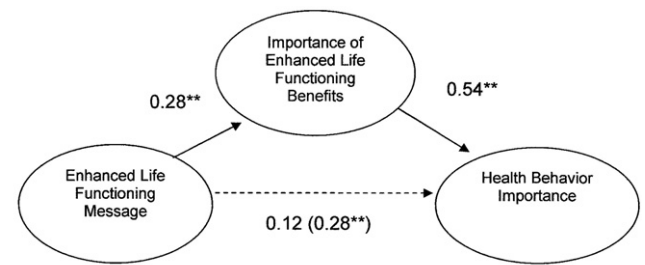
### Descriptive statistics

Descriptive statistics according to the condition for the main study variables are presented in Table 1. Correlational analysis revealed significant associations between health behavior importance and importance of enhanced life functioning benefits in the enhanced life functioning ( $r = 0.44$ ,  $p < 0.001$ ) and enhanced physical health ( $r = 0.61$ ,  $p < 0.001$ ) conditions. Moreover, gender was significantly correlated with health behavior importance ( $r = 0.33$ ,  $p < 0.05$ ) in the enhanced physical health condition.

### Main analyses

We performed a 2 (condition: life functioning, physical health)  $\times$  2 (gender: men vs. women) ANOVA. Participants in the life functioning condition ( $M = 5.82$ ,  $SD = 0.71$ ) compared to participants in the physical health condition ( $M = 5.31$ ,  $SD = 1.09$ ) indicated greater levels of health behavior importance ( $p < 0.01$ ). Moreover, women ( $M = 5.77$ ,  $SD = 0.87$ ) compared to men ( $M = 5.26$ ,  $SD = 0.94$ ) indicated greater levels of health behavior importance ( $p < 0.01$ ). However, ANOVA did not reveal a significant interaction between condition and gender ( $p = 0.23$ ) suggesting that the influence of an enhanced life functioning message on health behavior importance does not depend on the recipient's gender.

We performed an independent samples  $t$ -test between conditions with the importance of life functioning benefits as the dependent variable. Participants in the life functioning condition ( $M = 6.15$ ,  $SD = 0.73$ ) indicated greater importance of enhanced life functioning



\*\* =  $p < 0.01$

**Fig. 1.** Mediation of an enhanced life functioning message and perceived importance of engaging in multiple health behaviors by perceived importance of benefits associated with enhanced life functioning. All values are standardized regression coefficients. An enhanced life functioning message significantly predicted health behavior importance ( $p < 0.01$ ). However, the standardized regression coefficient between an enhanced life functioning message and health behavior importance was nonsignificant ( $p = 0.18$ ) when controlling for perceived importance of enhanced life functioning benefits. Thus, 0.28 is the uncontrolled standardized regression coefficient while 0.12 is the controlled standardized regression coefficient between an enhanced life functioning message and health behavior importance. 94 participants were exposed to either an enhanced life functioning message or an enhanced physical health message and then completed measures of health behavior importance and benefits associated with enhanced life functioning importance in the spring of 2008 at Rutgers University.

benefits compared to participants in the physical health condition ( $M = 5.66$ ,  $SD = 0.99$ ;  $p < 0.01$ ).

We then tested the perceived importance of enhanced life functioning benefits as a mediator of the relationship between an enhanced life functioning message and health behavior importance utilizing regression analyses (Baron and Kenny, 1986). As Fig. 1 illustrates, the standardized regression coefficient between an enhanced life functioning message and health behavior importance was nonsignificant when controlling for perceived importance of enhanced life functioning benefits ( $\beta = 0.12$ ,  $p = 0.18$ ). The other conditions of mediation were also met: an enhanced life functioning message significantly predicted health behavior importance ( $\beta = 0.28$ ,  $p < 0.01$ ) and perceived importance of enhanced life functioning benefits significantly predicted health behavior importance ( $\beta = 0.54$ ,  $p < 0.001$ ). The Sobel test confirmed that perceived importance of enhanced life functioning benefits carried the effect of an enhanced life functioning message on health behavior importance ( $p < 0.01$ ).

## Discussion

This research presented an enhanced life functioning approach to theoretically integrate multiple health behavior interventions for young adults. Furthermore, results supported the efficacy of an enhanced life functioning frame compared to an enhanced physical health frame in increasing participants' perceived importance of engaging in multiple health behaviors. Further analysis supported perceived importance of benefits associated with enhanced life functioning as a mediator of this relationship. When participants are exposed to an enhanced life functioning message, participants perceive the benefits of enhanced life functioning as more important and performance of multiple health behaviors as more important.

The life functioning approach emphasizes the more immediate benefits of health behaviors, which may increase behavior performance. According to behavioral economics, delayed outcomes are less effective in maintaining behavior because the value of a delayed outcome is discounted as a function of the delay in its delivery (Bickel and Vuchinich, 2000). Research on preference reversal suggests that an immediate positive stimulus that promotes an individual's long-term goal would be effective in guiding behavior toward the desired outcome (for a review, see Simpson and Vuchinich, 2000). Thus,

**Table 1**  
Descriptive statistics.

| Enhanced life functioning                        |        |      |      |                          |
|--|--------|------|------|--------------------------|
| Variable   | n = 55 | M    | SD   | Range                    |
| Health behavior importance                       | 55     | 5.82 | 0.71 | 4.00–7.00<br>(1.00–7.00) |
| Importance of enhanced life functioning benefits | 55     | 6.15 | 0.73 | 3.33–7.00<br>(1.00–7.00) |
| Enhanced physical health                         |        |      |      |                          |
| Variable   | n = 39 | M    | SD   | Range                    |
| Health behavior importance                       | 39     | 5.31 | 1.09 | 3.00–7.00<br>(1.00–7.00) |
| Importance of enhanced life functioning benefits | 39     | 5.66 | 0.99 | 3.33–7.00<br>(1.00–7.00) |

94 participants were exposed to either an enhanced life functioning message or an enhanced physical health message and then completed measures of health behavior importance and benefits associated with enhanced life functioning importance in the spring of 2008 at Rutgers University.

emphasizing immediate improvements in functioning can serve to facilitate healthful behavior by making the immediate outcome (i.e., enhanced functioning) valued and concordant with the delayed outcome (i.e., good health).

Moreover, research in the domain of persuasion suggests that messages that make psychological sense will be processed in-depth and be persuasive (Petty et al., 2005). Because the message of enhanced life functioning is easily understandable, it is likely to be persuasive especially for populations like young adults for whom enhanced life functioning may be more relevant than physical health. Furthermore, by emphasizing enhanced life functioning, young adults may be more likely to recognize improvement in their functioning and attribute these improvements to their engagement in multiple health behaviors. Because functional changes play a major role in behavior adoption, the enhanced life functioning approach can be “self-supportive” such that functional changes will positively reinforce multiple health behavior performance (Leventhal et al., 2005). Moreover, encouraging appropriate outcome expectations elicits positive emotional states, which can reinforce behavioral change (Wilson, 1980).

#### Study limitations and strengths

The findings of this study may be limited to younger populations although theoretically, we believe similar interventions could be successful in older adults. Future research plans include replicating the pattern of findings from this study in more diverse populations such as a population of older adults for whom life functioning and physical health may be equally salient. The size of the sample is also a limitation. Future research will include larger samples. While the sample size may limit confidence in the findings, the general rule that smaller samples make it more difficult to reach statistical significance suggests otherwise.

Furthermore, this research relies on a self-report measure of perceived importance of engaging in multiple health behaviors as an outcome variable. Future research should assess message impact on actual health behavior performance. Importantly, Noar et al. (2008) posit the utility of higher order constructs even in the absence of direct evidence of specific health behaviors outcomes when the assessed outcome is known to predict behavior. In their case, they discussed health-related attitudes. In the present study, we assessed perceived importance of engaging in health behavior and perceived benefits of such actions, both of which have been shown to predict health behavior (for reviews, Conner and Sparks, 1996; Janz et al., 2002; Monahan, 1995; Sheeran and Abraham, 1996). Using the stages of change framework, increasing individuals' perceptions of the importance of multiple health behaviors may be a crucial component in transitioning individuals from contemplating multiple health behaviors to preparing for actual behavioral change (Prochaska, 1994; Prochaska et al., 1992; Rothman, 2000).

This line of research is the first to posit and test the efficacy of an enhanced life functioning message to encourage multiple health behavior performance. Additionally, as multiple health behavior interventions become increasingly common (Nigg et al., 2002; Prochaska and Sallis, 2004), this work provides empirical support for a viable theme to organize intervention components for young adults, which may also hold promise for other populations. The enhanced life functioning framework successfully integrates principles of message framing, higher order construct use, behavioral economics, and persuasion to increase perceptions of the importance of performing multiple health behaviors.

#### Conclusions

We propose and test a new theoretical approach that emphasizes practical integration of behavior change interventions around the

framework of enhanced life functioning to facilitate health behavior. This approach differs from the traditional health promotion programs by focusing on healthy, young adult populations and integrating multiple health behaviors. Organizing multiple health behavior interventions around the theme of enhanced life functioning has the potential to overcome some of the current limitations of multiple health behavior interventions by theoretically integrating intervention components.

#### Conflict of interest statement

The authors declare that there are no conflicts of interest.

#### Appendix A

##### Enhanced life functioning message

If you practice multiple health behaviors, you will enhance your daily functioning. For example, by eating healthy, exercising regularly, and practicing stress-reduction techniques, you can improve your ability to optimally perform activities of daily living (e.g., activities related to school, work, and social relationships).

##### Enhanced physical health message

If you practice multiple health behaviors, you will enhance your physical health. For example, by eating healthy, exercising regularly, and practicing stress-reduction techniques, you can improve your biological indicators of health (e.g., blood pressure, cholesterol levels, and weight).

#### References

- Aarts, H., Paulussen, T., Schaalma, H., 1997. Physical exercise habit: on the conceptualization and formation of habitual health behaviors. *Health Educ. Res.* 12, 363–374.
- Altshuler, L., Mintz, J., Leight, K., 2002. The life functioning questionnaire (LFQ): a brief, gender-neutral scale assessing functional outcome. *Psychiatry Res.* 112, 161–182.
- Baron, R.M., Kenny, D.A., 1986. The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J. Pers. Soc. Psychol.* 51, 1173–1182.
- Bickel, W.K., Vuchinich, R.E. (Eds.), 2000. Reframing health behavior change with behavioral economics. Lawrence Erlbaum Associates, Mahwah, NJ.
- Conner, M., Sparks, P., 1996. The theory of planned behaviour and health behaviours. In: Conner, M., Norman, P. (Eds.), *Predicting Health Behavior: Research and Practice with Social Cognition Models*. Open University Press, Buckingham, UK, pp. 121–162.
- Donohew, L., Palmgreen, P., Lorch, E.P., 1994. Attention, sensation seeking, and health communication campaigns. *Am. Behav. Sci.* 38, 310–332.
- Engbers, L.H., van Poppel, M.N., Chin A Paw, M.J., van Mechelen, W., 2005. Worksite health promotion programs with environmental changes: a systematic review. *Am. J. Prev. Med.* 29, 61–70.
- Goldstein, M.G., Whitlock, E.P., DePue, J., 2004. Multiple behavioral risk factor interventions in primary care. *Am. J. Prev. Med.* 27, 61–79.
- Helme, D.W., Donohew, R.L., Baier, M., Zittleman, L., 2007. A classroom-administered simulation of a television campaign on adolescent smoking: testing an activation model on information exposure.
- Janz, N.K., Champion, V.L., Strecher, V.J., 2002. The health belief model. In: Glanz, K., Rimer, B.K., Lewis, F.M. (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice*, 3<sup>rd</sup> Ed. Jossey-Bass, California, pp. 45–66.
- Lau, R.R., Quadrel, M.J., Hartman, K.A., 1990. Development and change of young adults' preventive health beliefs and behavior: influence from parents and peers. *J. Health Soc. Behav.* 31, 240–259.
- Leventhal, L., Cameron, L., Leventhal, E.A., Ozakinci, G., 2005. Do messages from your body, your friends, your doctor, or the media shape your health behavior? In: Brock, T.C., Green, M.C. (Eds.), *Persuasion*. Sage Publications, Inc., California, pp. 195–224.
- Maes, S., Verhoeven, C., Kittel, F., Scholten, H., 1998. Effects of a Dutch work-site wellness-health program: the Brabantia Project. *Am. J. Public Health* 88, 1037–1041.
- Matson-Koffman, D.M., Brownstein, J.N., Neiner, J.A., Greaney, M.L., 2005. A site-specific literature review of policy and environmental interventions that promote physical activity and nutrition for cardiovascular health: what works? *Am. J. Health Promot.* 19, 167–193.
- Monahan, J.L., 1995. Thinking positively: using positive affect when designing health messages. In: Maibach, E., Parrott, R.L. (Eds.), *Designing Health Messages: Approaches from Communication Theory and Public Health Practice*. Sage Publications, Inc., California, pp. 81–98.

- National Center for Health Statistics, 1997. Top ten US population causes of death. *Mon. Vital Sta. Rep.* 45, 40–43.
- Nigg, C.R., Allegrante, J.P., Ory, M., 2002. Theory-comparison and multiple-behavior research: common themes advancing health behavior research. *Health Educ. Res.* 17, 670–679.
- Noar, S.M., Chabot, M., Zimmerman, R.S., 2008. Applying health behavior theory to multiple behavior change: considerations and approaches. *Prev. Med.* 46, 275–280.
- Petty, R.E., Cacioppo, J.T., Strathman, A.J., Priester, J.R., 2005. To think or not to think: exploring two routes to persuasion. In: Brock, T.C., Green, M.C. (Eds.), *Persuasion*. Sage Publications, Inc., California, pp. 81–116.
- Prochaska, J.O., 1994. Strong and weak principles for progressing from pre-contemplation to action on the basis of 12 problem behaviors. *Health Psychol.* 13, 47–51.
- Prochaska, J.O., 2008. Multiple health behavior research represents the future of preventive medicine. *Prev. Med.* 46, 281–285.
- Prochaska, J.J., Sallis, J.F., 2004. A randomized controlled trial of single versus multiple health behavior change: promoting physical activity and nutrition among adolescents. *Health Psychol.* 23, 314–318.
- Prochaska, J.O., DiClemente, C.C., Norcross, J.C., 1992. In search of how people change: applications to addictive behaviors. *Am. Psychol.* 47, 1102–1114.
- Pronk, N.P., Anderson, L.H., Crain, A.L., et al., 2004. Meeting recommendations for multiple healthy lifestyle factors: prevalence, clustering, and predictors among adolescent, adult, and senior health plan members. *Am. J. Prev. Med.* 27, 25–33.
- Raitakari, O.T., Leino, M., Raikkonen, K., et al., 1995. Clustering of risk habits in young adults: the cardiovascular risk in young Finns study. *Am. J. Epidemiol.* 142, 36–43.
- Rothman, A.J., 2000. Toward a theory-based analysis of behavioral maintenance. *Health Psychol.* 19, 64–69.
- Rothman, A.J., Salovey, P., 1997. Shaping perceptions to motivate healthy behavior: the role of message framing. *Psychol. Bull.* 121, 3–19.
- Rothman, A.J., Salovey, P., Antone, C., Keough, K., Martin, C.D., 1993. The influence of message framing on intentions to perform health behaviors. *J. Exp. Soc. Psychol.* 29, 408–433.
- Salovey, P., Rothman, A.J., Detweiler, J.B., Steward, W.T., 2000. Emotional states and physical health. *Am. Psychol.* 55, 110–121.
- Sheeran, P., Abraham, C., 1996. The health belief model. In: Conner, M., Norman, P. (Eds.), *Predicting Health Behavior*. Open University Press, Philadelphia, PA, pp. 23–61.
- Simpson, C.A., Vuchinich, R.E., 2000. Temporal changes in the value of objects of choice: discounting, behavior patterns, and health behavior. In: Bickel, W.R., Vuchinich, R.E. (Eds.), *Reframing Health Behavior Change with Behavioral Economics*. Lawrence Erlbaum Associates, Mahwah, NJ, pp. 193–218.
- Sorensen, G., Stoddard, A.M., LaMontagne, A.D., et al., 2002. A comprehensive worksite cancer prevention intervention: behavior change results from a randomized controlled trial. *Cancer Cause Control* 13, 493–502.
- Suggs, L.S., 2006. A 10-year retrospective in research in new technologies for health communication. *J. Health Commun.* 11, 61–74.
- Swinburn, B., Egger, G., Raza, F., 1999. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Prev. Med.* 29, 563–570.
- Wilson, G.T., 1980. Cognitive factors in lifestyle changes: a social learning perspective. In: Davidson, P.O., Davidson, S.M. (Eds.), *Behavioral Medicine: Changing Health Lifestyles*. Brunner/Mazel, New York, pp. 3–37.