

Strong and Weak Principles for Progressing From Precontemplation to Action on the Basis of Twelve Problem Behaviors

James O. Prochaska

Two principles for progressing from the precontemplation stage of change to the action stage were discovered. The *strong* principle states that progression from precontemplation to action is a function of approximately a 1 standard deviation increase in the pros of a health behavior change. The *weak* principle states that progression from precontemplation to action is a function of approximately a ½ standard deviation decrease in the cons of a health behavior change. In Study 1, these principles were derived from cross-sectional data on 12 problem behaviors relating the pros and cons of changing to the stages of change. In Study 2, these principles were validated on cross-sectional data from an independent sample of 1,466 smokers. Discussion focuses on the implications of these principles for individual psychology and public health policy.

Key words: Stages of change, strong principle, weak principle, progress through stages, twelve problems

The transtheoretical model postulates that both the cessation of high-risk behaviors and the acquisition of healthier alternatives involve progression through five stages of change: precontemplation, contemplation, preparation, action, and maintenance (DiClemente et al., 1991; Prochaska & DiClemente, 1983, 1984, 1992). At any point in time, only a minority of populations at risk are prepared to take action on their problem behaviors. Typically, about 50% of populations at risk are in the precontemplation stage and do not intend to take action in the foreseeable future. With the most preventable cause of premature death, for example, only 10% to 20% of current smokers are in the preparation stage, whereas 40% to 60% are in the precontemplation stage (Abrams, Follick, & Biener, 1988; Gottlieb, Galavotti, McCuan, & McAlister, 1990; Pallonen, Fava, Salonen, & Prochaska, in press; Pierce, 1992; Prochaska et al., 1992). Similarly, in a random-digit-dial survey of 1,067 Rhode Islanders with 15 different health behavior risk factors, only 10% to 20% of people at risk were prepared to take action. Forty percent to 80% were in the precontemplation stage (Rossi et al., 1992). To help entire populations of people at risk, we must discover much more about how people progress from precontemplation to action.

In a previous study, we examined the relationships among the stages of change and the pros and cons of 12 behaviors: smoking, quitting cocaine, weight control, reducing high-fat diets, stopping delinquent behavior, safer sex, condom use, using sunscreens, testing for radon, acquisition of exercise, mammography screening, and physicians' preventive practice with smokers (Prochaska et al., 1994). We discovered that for

all 12 behaviors, people in the precontemplation stage evaluated the cons of making a healthy behavior change as higher than the pros. The opposite was true for groups that were in the action stage. For the majority of problems, the balance between the pros and cons could be clearly interpreted as having reversed before action occurred.

For all 12 problem behaviors, the pros of changing the problem behavior were higher for subjects in the contemplation stage than for those in the precontemplation stage. There was no consistent pattern of differences between these stages on the cons of changing. There was, however, a fairly consistent pattern of differences in the cons of changing between subjects in the contemplation stage and those in the action stage. For 9 of the 12 behaviors, the cons were lower for subjects in action than in contemplation. On the other 3 behaviors, the cons were about the same. There was no consistent pattern of differences between subjects in contemplation and those in action on the pros of changing.

In a series of four studies that included 11 subtypes of smokers within the first three stages of change, I discovered that the cons of smoking were much more important than the pros, in differentiating the use of change processes in 10 of the subtypes (Velicer, Hughes, Fava, Prochaska, & DiClemente, 1992). The subtypes included early, classic, progressive, and disengaged groups in the precontemplation, contemplation, and preparation stages. This led to the hypothesis that progress from precontemplation to action would involve a relatively greater increase in the pros of a healthy behavior change than a decrease in the cons. Healthy behavior change includes the cessation of unhealthy behaviors like smoking and cocaine use and the acquisition of healthy behaviors like exercise and mammography screening. These hypotheses were tested in Study 1 on the data from the 12 problems study (Prochaska et al., 1992). The principles that emerged from Study 1 were then tested in Study 2 on data from a 13th study on 1,466 smokers representing the precontemplation, contemplation, and preparation stages (DiClemente et al., 1991).

This research was supported by Grants CA 27821 and CA 50087 from the National Cancer Institute and by Contract Grant 0-4115-002 for HIV and AIDS Prevention Division of the Centers for Disease Control. Appreciation is expressed to Joseph Rossi for his helpful comments on this article.

Correspondence concerning this article should be addressed to James O. Prochaska, Cancer Prevention Research Consortium, University of Rhode Island, Kingston, Rhode Island 02881-0808.

Table 1
Total Sample Size and Subsamples for Each Stage for Each of the 12 Problem Behaviors

Study	Sample	n	Precon- templation	Contem- plation	Prepara- tion	Action	Maintenance
1	Smoking	764	108	187	X	134	247
2	Cocaine	156	8	15		71	62
3	Weight control	123	18	65		22	18
4	High-fat diet	180	41	32		5	102
5	Delinquency	159	29	46		43	41
6	Safe sex	213	94	17		102	
7	Condom use	345	131	58		20	114
8	Sunscreen use	227	119	18		10	80
9	Radon gas exposure	698	520	121		57	
19	Exercise	717	53	242	182	101	139
11	Mammography	141	31	24		26	60
12	Physicians	135	43	20	3	2	67

Study 1

Method

Subjects

The samples used in the 12 studies on the stages and pros and cons of changing 12 problem behaviors are described in detail in Prochaska et al. (1994). Table 1 summarizes the total sample size and the sample size for each stage for each of the 12 studies. Table 1 indicates that only 2 of the studies (exercise and physician) had subgroups representing the preparation stage. Most of the studies were completed before preparation was identified as a separate stage within the transtheoretical model (DiClemente et al., 1991). Two of the studies (safer sex and radon gas exposure) combined subjects in the action and maintenance stages.

Measures

Stages of change. Except for exercise acquisition, all of the studies used a 4- or 5-item algorithm for staging subjects. The first item asked if subjects currently had the problem or had engaged in the desired positive behavior. If they reported the undesired status and did intend to change in the next 6 months, they were in the precontemplation stage. If they intended to change in the next 6 months, they were in the contemplation stage. For studies that included the preparation stage, subjects had to indicate that they were planning to change in the next month or had made some changes but were not at a particular criterion, such as exercising at least 20 min three times a week. Subjects in the action stage had reached a particular criterion, such as quitting smoking or cocaine, within the past 6 months. Subjects in the maintenance stage had reached criterion more than 6 months before the study. The time criteria were the same for all problem behaviors except mammography screening, where a 12-month criterion is appropriate for assessing action and intentions to take action. For exercise acquisition, a 10-step stage ladder was used for assessing subjects' current stage.

Decisional balance. Most of the studies included items to represent the eight categories of decision making in the Janis and Mann (1977) model: gains or losses for self, gains or losses for significant others, self-approval or disapproval, and approval or disapproval of others. The physician study and the mammography study did not include items for all eight categories but included only items to represent the more global pros and cons of a particular behavior. In all cases, the item content of the decisional balance questionnaire was specific to the problem being studied. Except for mammography, all items were

answered in terms of importance for making a decision to change a specified problem behavior. A 5-point Likert scale was used, which ranged from *not important* (1) to *extremely important* (5). The mammography instrument used an agree-disagree scale, which ranged from *strongly disagree* (1) to *strongly agree* (5).

Procedure

Twelve figures were also provided in the 12 problem paper and revealed the relative balance of the pros and cons of each problem behavior across the stages of change, as represented cross-sectionally by groups in each stage (Prochaska et al., 1994). In the present report, only data that were not analyzed in the 12 problems paper are examined. Specifically examined were the maximum amount of increases in the pros and decreases in the cons of health behavior changes from precontemplation to action. The maximum increase or decrease was used across stages rather than the difference score from precontemplation to action, because the pros and cons often decrease in the action stage. That is, the pros of a health behavior change may peak in the contemplation or preparation stage and then begin to decline once action is taken. The difference on the pros measure between precontemplation and action would not be as clear an indicator of how much the pros increased during the progression from precontemplation to action. The maximum increase or decrease is reported in standardized *T* scores ($M = 50$, $SD = 10$), because that permits comparisons of measures across very different problem behaviors.

Results

Table 2 contains the maximum increase in the pros and the maximum decrease in the cons that occurred between the precontemplation and action stages of change for each of the 12 problem behaviors. As hypothesized, in 10 out of the 12 problem behaviors, the pros of the healthy behavior change increased more than the relative decrease in the cons. The exception was the use of sunscreens and mammography screening, where the changes in the pros and cons were about equal.

Table 2 also shows that averaging across the 12 problem behaviors, the mean maximum increase in the pros of the new behavior was 10.6 *T* points ($SD = 2.6$, range = 7.1–15.9). The 95% confidence interval around the mean was 8.9–12.3. This confidence interval was relatively narrow despite the small number of problem behaviors ($N = 12$).

Table 1
Total Sample Size and Subsamples for Each Stage for Each of the 12 Problem Behaviors

Study	Sample	<i>n</i>	Precon- templation	Contem- plation	Prepara- tion	Action	Maintenance
1	Smoking	764	108	187	X	134	247
2	Cocaine	156	8	15	X	71	62
3	Weight control	123	18	65		22	18
4	High-fat diet	180	41	32		5	102
5	Delinquency	159	29	46		43	41
6	Safe sex	213	94	17		102	
7	Condom use	345	131	58		20	114
8	Sunscreen use	227	119	18		10	80
9	Radon gas exposure	698	520	121		57	
19	Exercise	717	53	242	182	101	139
11	Mammography	141	31	24		26	60
12	Physicians	135	43	20	3	2	67

Study 1

Method

Subjects

The samples used in the 12 studies on the stages and pros and cons of changing 12 problem behaviors are described in detail in Prochaska et al. (1994). Table 1 summarizes the total sample size and the sample size for each stage for each of the 12 studies. Table 1 indicates that only 2 of the studies (exercise and physician) had subgroups representing the preparation stage. Most of the studies were completed before preparation was identified as a separate stage within the transtheoretical model (DiClemente et al., 1991). Two of the studies (safer sex and radon gas exposure) combined subjects in the action and maintenance stages.

Measures

Stages of change. Except for exercise acquisition, all of the studies used a 4- or 5-item algorithm for staging subjects. The first item asked if subjects currently had the problem or had engaged in the desired positive behavior. If they reported the undesired status and did intend to change in the next 6 months, they were in the precontemplation stage. If they intended to change in the next 6 months, they were in the contemplation stage. For studies that included the preparation stage, subjects had to indicate that they were planning to change in the next month or had made some changes but were not at a particular criterion, such as exercising at least 20 min three times a week. Subjects in the action stage had reached a particular criterion, such as quitting smoking or cocaine, within the past 6 months. Subjects in the maintenance stage had reached criterion more than 6 months before the study. The time criteria were the same for all problem behaviors except mammography screening, where a 12-month criterion is appropriate for assessing action and intentions to take action. For exercise acquisition, a 10-step stage ladder was used for assessing subjects' current stage.

Decisional balance. Most of the studies included items to represent the eight categories of decision making in the Janis and Mann (1977) model: gains or losses for self, gains or losses for significant others, self-approval or disapproval, and approval or disapproval of others. The physician study and the mammography study did not include items for all eight categories but included only items to represent the more global pros and cons of a particular behavior. In all cases, the item content of the decisional balance questionnaire was specific to the problem being studied. Except for mammography, all items were

answered in terms of importance for making a decision to change a specified problem behavior. A 5-point Likert scale was used, which ranged from *not important* (1) to *extremely important* (5). The mammography instrument used an agree-disagree scale, which ranged from *strongly disagree* (1) to *strongly agree* (5).

Procedure

Twelve figures were also provided in the 12 problem paper and revealed the relative balance of the pros and cons of each problem behavior across the stages of change, as represented cross-sectionally by groups in each stage (Prochaska et al., 1994). In the present report, only data that were not analyzed in the 12 problems paper are examined. Specifically examined were the maximum amount of increases in the pros and decreases in the cons of health behavior changes from precontemplation to action. The maximum increase or decrease was used across stages rather than the difference score from precontemplation to action, because the pros and cons often decrease in the action stage. That is, the pros of a health behavior change may peak in the contemplation or preparation stage and then begin to decline once action is taken. The difference on the pros measure between precontemplation and action would not be as clear an indicator of how much the pros increased during the progression from precontemplation to action. The maximum increase or decrease is reported in standardized *T* scores ($M = 50$, $SD = 10$), because that permits comparisons of measures across very different problem behaviors.

Results

Table 2 contains the maximum increase in the pros and the maximum decrease in the cons that occurred between the precontemplation and action stages of change for each of the 12 problem behaviors. As hypothesized, in 10 out of the 12 problem behaviors, the pros of the healthy behavior change increased more than the relative decrease in the cons. The exception was the use of sunscreens and mammography screening, where the changes in the pros and cons were about equal.

Table 2 also shows that averaging across the 12 problem behaviors, the mean maximum increase in the pros of the new behavior was 10.6 *T* points ($SD = 2.6$, range = 7.1–15.9). The 95% confidence interval around the mean was 8.9–12.3. This confidence interval was relatively narrow despite the small number of problem behaviors ($N = 12$).

Table 2 further shows that averaging across the 12 problem behaviors, the mean maximum decrease in the cons of the new behavior was 4.5 *T* points (*SD* = 2.2, range = 1.2–8.3). The 95% confidence interval was 3.0–6.0. This confidence interval was also relatively narrow despite the small number of problem behaviors (*N* = 12).

Discussion

These results clearly support the hypothesis that in relation to the cons of a healthy behavior change, the pros increased considerably more in groups representing progress from precontemplation to action. This hypothesis was supported in 10 out of 12 studies, with the exceptions being sunscreen use and mammography screening. With 10 of the behaviors, the increase in the pros was at least twice as great as the decrease in the cons of a healthy behavior change.

These results also reveal the approximate amount of increase that occurred in the pros of a healthy behavior change when progress was reflected cross-sectionally from precontemplation to action. The average amount of increase in the pros was approximately 1 standard deviation, because 10 *T* points equals a 1-standard-deviation change. An increase of 1 standard deviation is considered to be a large effect, or strong effect (Cohen, 1977; Rossi, 1990). To produce such a strong effect, an intervention would have to affect about 20% of the variance in the pros of changing.

The consistency of results across 12 problem behaviors led to the formulation of the following strong principle of progress: Progression from precontemplation to action is a function of approximately a 1-standard-deviation increase in the pros of a healthy behavior change. The formula for this principle is the following:

$$PC \rightarrow A \cong 1 SD \uparrow PROS_H \quad (1)$$

The corollary to this principle is the following: Progression from precontemplation to action is a function of approximately a 1-standard-deviation increase in the cons of not making a healthy behavior change. Not making a healthy change includes failure to cease an unhealthy behavior and failure to acquire a healthy behavior. This corollary is a mirror image of the original principle. The formula for this corollary is the following:

$$PC \rightarrow A \cong 1 SD \uparrow CONS_{UNI} \quad (2)$$

The results of the present study also revealed the maximum decreases that occurred between precontemplation and action in the cons of a health behavior change. The average amount of decrease in the cons was approximately 0.5 standard deviation. A change of 0.5 standard deviation is considered to be a medium-sized effect (Cohen, 1977; Rossi, 1990). Producing such an effect on intervention would have to affect about 5% of the variance in the cons of changing.

Decreases in the cons of a healthy behavior change were not as consistent as increases in the pros. On three of the behaviors—safer sex, condom use, and radon testing—there was little change on the cons. For all three behaviors, de-

Table 2
Maximum Increases (in *T* Scores) in the Pros of Healthy Behavior Changes and Maximum Decreases in the Cons of Not Changing for 12 Target Behaviors

Behavior	Maximum increases	Maximum decreases	Ratio	<i>n</i> in study
1. Smoking cessation ^a	8.5	4.3	2.0 to 1	764
2. Quitting cocaine	13.0	1.9	6.8 to 1	156
3. Weight control	11.9	6.0	2.0 to 1	123
4. Reducing fat intake	7.1	3.0	2.4 to 1	180
5. Stopping delinquency	11.9	3.7	3.2 to 1	159
6. Safer sex	11.5	1.2 ^b	9.6 to 1	213
7. Condom use	11.6	2.4	4.8 to 1	345
8. Using sunscreens	7.9	7.9	1.0 to 1	227
9. Testing for radon	8.1	4.7	1.7 to 1	698
10. Exercise adoption	15.9	5.1	3.1 to 1	717
11. Mammography	8.6	8.3	1.0 to 1	141
12. Following-up smokers	10.7	5.6	1.9 to 1	135
<i>M</i> for 12 problems	10.6	4.5	2.4 to 1	3,858
<i>SD</i>	2.6	2.2		
95% confidence interval	8.9–12.3	3.0–6.0		

^aCons of smoking were used in this study rather than pros of cessation.
^b*P* > .05, indicating no significant decrease.

creases accounted for less than 1.5% of the variance in the cons. Cons for safer sex was the only change among the 24 that was not statistically significant at the .05 level. The average effect size for changes in the cons was also much weaker than for the pros. Given these considerations, the following weak principle of progress was formulated: Progression from precontemplation to action is a function of approximately a one-half of a standard deviation decrease in the cons of a healthy behavior change. The formula for this principle is the following:

$$PC \rightarrow A \cong 0.5 SD \downarrow CONS_H \quad (3)$$

The corollary to this principle is as follows: Progression from precontemplation to action is a function of approximately a one-half of a standard deviation decrease in the pros of not making a healthy behavior change. The corollary is a mirror image of the weak principle. The formula for it is the following:

$$PC \rightarrow A \cong 0.5 SD \downarrow PROS_{UNI} \quad (4)$$

Study 2

Method

The strong and weak principles were tested in Study 2 on previously published data on cross-sectional comparisons in the pros and cons of smoking in 1,466 smokers, representing the precontemplation, contemplation, and preparation stages of change (DiClemente et al., 1991).

Subjects

The sample is described in detail in DiClemente et al. (1991). The total sample included 775 smokers from Rhode Island and 775 from Texas, who volunteered to participate in self-help programs matched to the participant's stage of change. There were 166 smokers in the precontemplation stage who did not intend to quit smoking in the next 6 months. These subjects averaged 29 cigarettes per day, had begun

691
775
69

smoking at age 17, and had smoked for an average of 24 years. About two thirds of this group were female. There were 794 smokers in the contemplation stage who also averaged 29 cigarettes per day, had begun smoking at age 17, and had smoked for 23 years. About two thirds of this group were female. There were 506 smokers in the preparation stage who were planning to quit in the next 30 days and had tried to quit in the past year. They averaged 29 cigarettes per day, had begun smoking at age 17, and had smoked for an average of 23 years. Of this group, 58% were female.

Measures

Stage of change. The same type of algorithm was used in this study for assessing stages as was used in the 12 problems article. Unlike most of the 12 problems, this study included an algorithm for the preparation stage.

Decisional balance. This study used a 20-item version of the Decisional Balance scale, with 10 items for the pros and 10 items for the cons of smoking.

Procedure

Because the DiClemente et al. (1991) study used the pros and cons of the unhealthy behaviors, the corollaries of the strong and weak principles were tested. On the basis of these corollaries, the following was predicted: (a) The cons of smoking would be 10 *T* points, or 1 standard deviation, higher for smokers in the preparation stage as compared with those in the precontemplation stage, and (b) the pros of smoking would be 5 *T* points, or 0.5 standard deviation, lower for smokers in the preparation stage as compared with those in the precontemplation stage.

There was one difference in the samples used to establish and test strong and weak principles. The principles were developed to model differences in subjects in the precontemplation and action stages, but the test sample did not have the action stage represented. This difference did not raise any procedural problems for testing the strong principle, because the cons of smoking decrease in the action stage. The maximum increase would occur in a stage before action, such as in the preparation stage in DiClemente et al. (1991). Therefore, I still predicted that the cons of smoking would be 10 *T* points higher in the preparation stage than in the precontemplation stage.

Testing the weak principle was more problematic with this procedure, because the pros of smoking would be even lower in the action stage than in the preparation stage. Therefore, I predicted that the pros of smoking would be less than 5 *T* points lower for smokers in the preparation stage as compared with those in the precontemplation stage.

Results

The cons of smoking for subjects in the preparation stage were 52.0 *T* points, compared with 42.4 *T* points for smokers in the precontemplation stage. The magnitude of the difference, 9.6 *T* points or 0.96 *SD*, was remarkably consistent with the prediction that was based on the corollary of the strong principle of progress. The difference of 9.6 *T* points falls within the 95% confidence interval for the strong principle of progress.

The pros of smoking for subjects in the preparation stage were 48.0 *T* points as compared with 53.6 *T* points for smokers in the precontemplation stage. The magnitude of the difference, -5.6 *T* points or 0.56 *SD*, was greater than 5 *T* points, whereas my revised prediction was that the difference would be less than 5 *T* points.

Discussion

Study 2 provided remarkable support for the strong principle of progress developed in Study 1. On the basis of the strong principle, it was predicted that the magnitude of the difference on the cons of smoking would be 1 standard deviation. The prediction was off by only 0.04 standard deviation.

If the strong principle of progress developed from cross-sectional studies continues to hold across health behavior changes and in longitudinal studies, then it may be a radical breakthrough in the ability to predict behavior change. This principle provides the ability to predict progress from precontemplation to action as a function of a large difference in the pros of behavior change. More important, these principles can predict the relative magnitude of the difference. This is important because models in the soft sides of behavior science, such as clinical and health psychology, cannot predict the magnitude of differences, even though such predictions are routine in the physical sciences (Meehl, 1978; Rossi, 1985).

The weak principle of progress is indeed weaker in terms of the magnitude of the difference between stages (0.5 *SD* vs. 1.0 *SD*) and the ability to predict the magnitude in new studies. Why the cons have a weaker effect than the pros is an important issue for future investigations.

To help the sizable percentage of the population of people at risk who are in the precontemplation stage, one would probably need to develop interventions that were powerful enough to increase by about 1 standard deviation the pros of a healthy behavior change or the cons of not changing. Interventions would have to be able to affect about 20% of the variance on these decision variables. To obtain such large effects, we will probably need to apply both individual change processes and public health policies. Individual change processes, like consciousness raising and self-reevaluation (Prochaska, Velicer, DiClemente, & Fava, 1988), can be used to increase the perceived pros of healthy behavior changes without altering the actual pros. Helping individuals to become more aware of the multitude of benefits of smoking cessation, for example, can increase the perceived pros for those individuals. Similarly, helping individuals to become aware of the multitude of negative consequences of not quitting smoking can increase the perceived cons of not changing for these individuals. The 1990 Surgeon General's Report was dedicated entirely to raising the consciousness of professionals and the public about the health benefits (pros) of smoking cessation (Centers for Disease Control, 1990).

Public health policies can be dedicated to increasing the actual pros of healthy behavior changes and the cons of not changing. Taxes on tobacco, for example, can immediately increase the cons of not quitting smoking. Reductions in health insurance and life insurance premiums for quitting smoking can immediately raise the pros of quitting.

The pros and cons of behavior change are likely to be crucial for progress across the first four stages of change, in part because they represent an interaction of individual psychology and public health policy. The pros and cons for the 12 problem behaviors are assumed to assess the individual's internal representations of the actual consequences of changing high-

risk behaviors. Those representations are clearly related to the individual's stage of change. The internal representations are probably also related to the society's readiness to change public policies, to increase the pros of healthy behavior changes and the cons of not changing.

At this point, it is not known whether it is better to raise the pros (perceived and actual) of healthy behavior changes, to raise the cons of not changing, or to raise both. The results from this study do suggest, however, that whatever intervention strategies we apply, we will need to produce an increase of T points (approximately 1 SD), if we are to help a sizable proportion of the population at risk progress from precontemplation to action.

References

- 111
2=10 10
- Abrams, D. B., Follick, M. J., & Biener, L. (1988, November). Individual versus group self-help smoking cessation at the workplace: Initial impact and twelve month outcomes. In T. Glynn (Chair), *Four National Cancer Institute-funded self-help smoking cessation trials: Interim results and emerging patterns*. Symposium presented at the annual meeting of the Association for the Advancement of Behavior Therapy, New York.
- Centers for Disease Control (1990). *The health benefits of smoking cessation* (DHHS Publication No. CDC 90-8416). Washington, DC: U.S. Government Printing Office.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (Rev. ed.). San Diego, CA: Academic Press.
- DiClemente, C. C., Prochaska, J. O., Fairhurst, S. K., Velicer, W. F., Velasquez, M. M., & Rossi, J. S. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation and preparation stages of change. *Journal of Consulting and Clinical Psychology, 59*, 295-304.
- Gottlieb, N. H., Galavotti, C., McCuan, R. S., & McAlister, A. L. (1990). Specification of a social cognitive model predicting smoking cessation in a Mexican-American population: A prospective study. *Cognitive Therapy and Research, 14*, 529-542.
- Janis, I. L., & Mann, L. (1977). *Decision making: A psychological analysis of conflict, choice, and commitment*. New York: Collier Macmillan.
- Mechl, P. E. (1978). Theoretical risks and tabular asterisks: Sir Karl, Sir Ronald, and the slow progress of soft psychology. *Journal of Consulting and Clinical Psychology, 46*, 806-834.
- Pallonen, U. E., Fava, J. L., Salonen, J. T., & Prochaska, J. O. (in press). Readiness for smoking change among middle-aged Finnish men: The KUOPIO CVD risk factor trial. *Addictive Behaviors*.
- Pierce, J. (1992). [Random digit dialing sample of 6000 smokers in California]. Unpublished raw data.
- Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change in smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*, 390-395.
- Prochaska, J. O., & DiClemente, C. C. (1984). *The transtheoretical approach: Crossing traditional boundaries of change*. Homewood, IL: Dow Jones/Irwin.
- Prochaska, J. O., & DiClemente, C. C. (1992). Stages of change in the modification of problem behaviors. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification* (pp. 184-218). Sycamore, IL: Sycamore Press.
- Prochaska, J., Velicer, W., DiClemente, C., & Fava, J. (1988). Measuring processes of change: Applications to the cessation of smoking. *Journal of Consulting and Clinical Psychology, 56*, 520-528.
- Prochaska, J. O., Velicer, W. F., Fava, J. L., Goldstein, M. G., Niaura, R., Abrams, D. B., Rossi, J. S., & Rakowski, W. (1992). [Random digit dialing sample of 4200 smokers in Rhode Island]. Unpublished raw data.
- Prochaska, J. O., Velicer, W. F., Rossi, J. S., Goldstein, M. G., Marcus, B. H., Rakowski, W., Fiore, C., Harlow, L. L., Redding, L. A., Rosenbloom, D., & Rossi, S. R. (1994). Stages of change and decisional balance for twelve problem behaviors. *Health Psychology, 13*.
- Rossi, J. S. (1985, March). *Comparison of physical and behavioral science: The roles of theory, measurement and effect size*. Paper presented at the 56th annual meeting of the Eastern Psychological Association, Boston.
- Rossi, J. S. (1990). Statistical power of psychological research: What have we gained in 20 years? *Journal of Consulting and Clinical Psychology, 58*, 646-656.
- Rossi, J. S., Laforge, R., Ruggiero, L., Prochaska, J. O., Velicer, W. F., & Fava, J. C. (1992). [Random digit dialing survey of 1067 Rhode Islanders for 15 risk factors]. Unpublished raw data.
- Velicer, W. F., Hughes, S. L., Fava, J. L., Prochaska, J. O., & DiClemente, C. C. (1992). *An empirical typology of subjects within the Stages of Change*. Manuscript submitted for publication.
- 22nd
K