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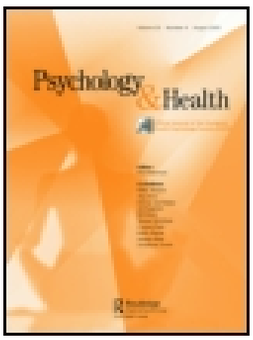

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SELF-EFFICACY AND SOCIAL SUPPORT AS PREDICTORS OF SMOKING AFTER A QUIT ATTEMPT

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The current study examined self-efficacy and social support as predictors of maintenance after an attempt to stop smoking. As in previous studies, self-efficacy at the end of treatment was a significant predictor of reported smoking during the follow-up period. At 3 months after treatment the prediction from self-efficacy was weaker than a prediction from the level of post-treatment smoking. However at 10 months self-efficacy was the strongest predictive variable assessed in the study. In contrast, social support for the quit attempt was not a significant predictor of maintenance at any stage. The results provided qualified support for the contention that self-efficacy can often be a more powerful predictor than previous performance attainments, especially under conditions of greater situational change.

KEY WORDS: Smoking, prediction, self-efficacy, social support

INTRODUCTION

Relapse continues to be a major problem for treatments of cigarette smoking and other substance abuse (Miller, 1980; Shiffman, 1982). This has prompted considerable interest in predicting which clients will resume smoking and in constructing models of relapse (Brownell, Marlatt, Lichtenstein and Wilson, 1986). In this search the concepts of self-efficacy and social influence or support have achieved special prominence.

Self-efficacy about resisting smoking in high-risk situations is a significant predictor of abstinence up to six months later (O'Leary, 1985). Early data on self-efficacy measures even suggested that they were able to identify the type of situation where the person is most at risk (Condiotte and Lichtenstein, 1981; cf. Baer, Holt and Lichtenstein, 1986; Baer and Lichtenstein, 1988). Consistent with self-efficacy theory (Bandura, 1977) the predictive power of self-efficacy is strongest when people are best informed about the challenges they will face and the capabilities they can muster at the time—i.e. when the efficacy appraisals are made after the person has begun an attempt

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to quit and when the forecast is over a shorter period (e.g. McIntyre, Lichtenstein and Mermelstein, 1983). In contrast, when people have not yet elected to change their behavior, high self-efficacy is usually associated with motivation or intention to change (e.g. Kelly, Zyzanski and Alemagno, 1991), but its ability to predict smoking outcomes is more variable (Kelly *et al.*, 1991; cf. Lawrence, 1989).

Bandura (1977) argued that self-efficacy appraisals predict behavior because they have a causal function in its production. In the present context, people who were confident about resisting smoking in a particular situation would put greater effort into resistance when the situation occurs. This view was integrated into a social-cognitive model of relapse by Marlatt and Gordon (1985). From the inception of the self-efficacy concept, this causal role for efficacy judgements has come under critical scrutiny (Borkovec, 1978). One contention is that the predictive power of self-efficacy may derive from performance achievements and that it is these, and not self-efficacy, that are involved in the causal sequence (e.g. via the skills that performances reflect). Since Bandura (1977) agrees that recollections of one's achievements are powerful determinants of self-efficacy, the issue is not resolved by showing that past performance accounts for much of self-efficacy's prediction. Rather, research needs to focus on which variable or set of variables operate as the most powerful predictors. In other task domains, the evidence suggests that self-efficacy is most likely to be a stronger predictor when there is a change in the task demands and the person is aware of the changes when the self-efficacy judgment is made (Bandura, 1982). This research favours Bandura's view that the predictive judgements combine a variety of information and supports his causal hypothesis. In the case of smoking, some of the data suggest that self-efficacy may sometimes be a less powerful predictor of later smoking than is past smoking behavior (e.g. Baer *et al.*, 1986; cf. Garcia, Schmitz and Doerfler, 1990). The current study took another look at this question.

Within a social-cognitive description of successful quitting, social influences are also seen as important. One type of social influence involves social support for the quit attempt, where other people supplement the smoker's skills in attention diversion, problem solving or stimulus control and provide incentives for persistence at the quit attempt. In line with this idea, support and assistance from a spouse or living partner has been associated with success in a quit attempt (Mermelstein, Lichtenstein and McIntyre, 1983). Surprisingly, there appears to be little research on the joint predictive power of self-efficacy and specific social support for later smoking. One exception is the study by Kelly *et al.* (1991), which did not obtain a significant prediction of later smoking from either self-efficacy or social support. However that study was not conducted in the context of a quit attempt, and merely analysed single-question measures of the predictor variables. The present study provided a more rigorous test of the predictive utility of both support and self-efficacy for subjects who had fresh experience of a quit attempt.

The current literature has also neglected to examine whether people take into account social influences when they are making self-efficacy judgements about smoking. Yates and Thain (1985) found that successful quitters had higher self-efficacy if they had fewer friends who smoked, and Baer *et al.* (1986) obtained a significant correlation between self-efficacy and concurrent ratings of global social support.

These findings suggest that perceived social support for the quit attempt could be a determinant of self-efficacy, but the issue needs further examination. A secondary aim of the current study was to examine this issue.

Subjects who participated in a trial of four smoking interventions were studied over a 10-month follow-up period. The study attempted to predict the subjects' smoking status over the follow-up, from measures that included their post-treatment self-efficacy, their specific social support and their smoking levels before and after treatment.

METHOD

Procedure

The subjects for this study were volunteer participants in a trial of smoking treatments that was covered by a prime-time national television program. Participants had been recruited from newspaper advertisements that offered help to quit smoking for a commitment fee of $25. Respondents were excluded if they had a severe cough or were pregnant, or if they lived outside the Sydney metropolitan area. Subjects also had to consent to television coverage of the trial, which included filming of meetings before and after treatment as well as some individual interviews with participants.

Treatments in the study consisted of a *Social-Cognitive* approach with relapse prevention training, *Hypnotherapy*, *Rapid Smoking plus Nicotine Gum*, and *Acapuncture*. They varied from one to eight sessions over five weeks and were offered by proponents of each type of treatment from five treatment locations across Sydney. At pre-treatment subjects were randomly assigned to one of these four treatments. However 24 subjects requested a change of treatment because of difficulty in travelling a large distance from their residence to the location of the treatment. Results from the treatment trial are analysed with and without these reallocated subjects.

Assessment Measures

Smoking behavior. Self-monitored assessments of smoking over five days provided the primary measure of smoking at pretest and post-treatment. Subjects were regarded as not smoking at post-treatment if they reported no cigarettes over the full five days of monitoring. The self-monitoring data were also used to derive measures of smoking levels at pre-treatment and post-treatment. At the follow-up assessments subjects retrospectively reported the duration of abstinence from smoking. Abstinence was defined as at least 7 days off smoking (the closest response category to the criterion used at post-treatment).

Self-reported consumption was checked against measures of carbon monoxide levels (CO; Hughes, Fredericksen and Frazier, 1978) during meetings in the television studio before and after treatment. At post-treatment, CO measures of 7 or less were obtained by 82% of subjects who said they had not smoked that day and by only 6% of those who reported smoking. These data substantially corroborate the self-reported consumption levels.

Table 1 Smoking Self-Efficacy Items

Feeling happy	Feeling depressed
Feeling tense, worried or anxious	Feeling embarrassed
Feeling bored or having nothing to do	Feeling angry, frustrated or impatient
Drinking alcohol	Having a tea/coffee break
Experiencing pressure in my job	After waking up in the morning
Experiencing a personal or family crisis	Thinking about my weight
After a meal	While driving
While watching TV or reading	On the telephone
After an argument	When alone
When with others smoking and/or offering me a cigarette	

Self-Efficacy. In collaboration with Liddle (1986), a 19-item self-efficacy scale was constructed. The scale was based on items from previous self-efficacy scales (Condiotte and Lichstenstein, 1981; Di Climente, 1981; Nicki, Remington and MacDonald, 1984), on high risk situations for relapse (Cummings, Gordon and Marlatt, 1980; Shiffman, 1982), and on high frequency situations for smoking (Buckalew and Gibson, 1984). The items in the scale are reproduced in Table 1. Subjects were asked to rate how confident they were that they could always avoid smoking in each situation, if they were trying to do it without professional help. Confidence for each situation was rated from 0 (can't resist smoking in the situations) to 5 (certain I can do it). A measure of self-efficacy strength was derived by taking the average confidence score across the 19 situations. In Liddle (1986), this scale had internal consistency of .92 by coefficient alpha.

Social support for the quit attempt. Social support for smoking cessation was measured by responses to four items: (a) It is likely that my spouse/partner will complain if I am irritable for too long on this quit attempt (reverse scored), (b) My spouse/partner helps me to keep track of my smoking when I am trying to cut down, (c) My spouse/partner will try to help me by talking me out of having a cigarette, and (d) My spouse/partner has expressed pleasure at my efforts to quit smoking. In each case, the person circled a number from −2 (strongly disagree) to 2 (strongly agree). This score was converted to a scale from 1 (low support) to 5 (high support), and an average score was obtained from the four items. The internal consistency of this scale was .74 by coefficient alpha, which was acceptable for a four-item scale.

Other measures. Data were also collected on sex, age, the age they started smoking, the time since they last quit smoking, their longest quit period and the presence of smokers in their environment.

RESULTS

Subjects. There were no significant pretest differences between groups on sex, age, the age they started smoking, quitting history, or number of cigarettes smoked at pretest. One hundred and two subjects (54 men and 48 women) attended at least one treatment

session and provided pre- and post-treatment data. Their average age was 39.7 years (Range = 18 to 71), and they began smoking at a mean age of 18.4 years (Range = 10 to 47). Before treatment they smoked an average of 27.2 cigarettes per day (Range = 1 to 52). The median interval since they last attempted to quit smoking was 10 months, and the median duration of their longest quit attempt was 2 months.

Follow-up assessments were conducted by telephone at 3 months and 10 months post-treatment and provided samples of 90 and 81 respectively. There were no consistent differences between subjects who returned data on particular follow-up assessments and those who did not. At 3 months, the return rate for the social cognitive and hypnotherapy treatments was higher than in the other treatments ($\chi^2(3) = 7.93$, $p < .05$), but this result was not maintained at the 10-month assessment. Subjects who returned data at 3 months had also been off smoking for a longer period at their last attempt (Unequal variance $t(27.6) = 3.05$, $p < .01$), but here too the effect was not maintained at 10 months. On the other hand, there was no difference at 3 months in levels of smoking before the treatment for subjects who returned follow-up data and those who did not. At 10 months the subjects in the sample had smoked significantly *more* cigarettes at present than those who did not return the data (Unequal variance $t(64.1) = 2.50$, $p < .02$). Of particular interest to this paper is the fact that there were no significant differences in post-treatment measures of smoking, social support or self-efficacy between subjects who were available for assessment at follow-up and those who were not.

Treatment outcome. Quit rates were 63% of the full sample available at post-treatment, 28% of subjects who were tested 3 months after treatment and 22% of the 10-month sample. The impact of the four groups significantly differed at post-treatment, $\chi^2(3) = 14.16$, $p < .005$, and at 3 months, $\chi^2(3) = 9.99$, $p < .02$, but at 10 months the non-smoking rates from the treatments were not significantly different, $\chi^2(3) = 4.78$, n.s.

These results were affected by the reallocation of the 24 subjects who were unable to travel to their randonmly assigned treatment. When reallocated subjects were omitted the relative order of groups was unchanged, but only the post-treatment results reached significance, $\chi^2(3) = 9.93$, $p < .02$ (at 3 months, $\chi^2(3) = 4.53$, n.s., and at 10 months, $\chi^2(3) = 2.61$, n.s.). The quit rates for the interventions are displayed in Table 2.

Table 2 Relative quit rates for the four smoking programs

Assessment Period	*Percentage Not Smoking in Each Treatment Group*[1]			
	Social-Cognitive	*Hypnotherapy*	*Rapid Smoking & Nicotine Gum*	*Acupuncture*
Post-Treatment	84.6% ($n = 13$)	66.7% ($n = 27$)	55.0% ($n = 20$)	33.3% ($n = 21$)
Three Months	38.5% ($n = 13$)	32.0% ($n = 25$)	33.3% ($n = 18$)	6.7% ($n = 15$)
Ten Months	30.8% ($n = 13$)	26.1% ($n = 23$)	25.0% ($n = 16$)	7.1% ($n = 14$)

1. The comparison of alternate treatments only includes subjects who attended their randomly allocated treatment.

Participants in the Social-Cognitive program had the highest initial quit rate, followed by Hypnotherapy, Rapid Smoking, and Acupuncture. At 10 months the Social-Cognitive program still had the highest absolute quit rate and Acupuncture the least.

Determinants of self-efficacy. Consistent with self-efficacy theory, smoking level at post-treatment was significantly associated with the concurrent measure of self-efficacy, $r = -.59$, $p < .001$. This was consistent with results of previous studies (e.g. $r = -.53$ in Baer *et al.*, 1986). However post-treatment self-efficacy was not significantly predicted by socio-demographic variables, smoking history, presence of smokers in the environment or pretreatment smoking level. A multiple linear regression that forced the entry of all these variables produced $R^2 = .31$, $F(11, 31) = 1.04$, n.s., and none of the parameter estimates significantly differed from zero. Nor was self-efficacy significantly related to social support scores at post-treatment, $r = .01$, n.s. These analyses suggest that subjects did not take account of their social context or smoking history when they estimated whether they could resist smoking in future. Instead, they focussed on their current achievement in quitting.

Prediction of smoking status from self-efficacy and social support. The primary theoretical focus of the study was the prediction of smoking status during follow-up from self-efficacy and social support. For these analyses the sample was aggregated across treatment groups, since the predictive analyses incorporated the primary outcome measures from the study. Reallocated subjects were included, as were subjects who were not initially successful at quitting smoking. Degrees of freedom vary across analyses because of missing data on some individual measures.

Means and standard deviations for self-efficacy and social support scores are shown in Table 3. Self-efficacy at post-treatment significantly predicted smoking at 3 months, $F(1, 60) = 4.58$, $p < .04$, and at 10 months, $F(1, 48) = 6.26$, $p < .02$. Social support for the quit attempt was not a significant predictor of follow-up outcomes at 3 months, $F(1, 56) = 2.58$, n.s., or at 10 months, $F(1, 47) = 0.33$, n.s.

To test whether these results could be related to other variables such as gender, age, education, quitting history or the presence of other smokers, we examined whether any

Table 3 Self-efficacy and social support as predictors of smoking status

Predictor	*Follow-up Period*			
	Three months		*Ten months*	
	Not Smoking	*Smoking*	*Not Smoking*	*Smoking*
Self-Efficacy				
Mean (sd)	3.70 (0.97)*	3.06 (1.22)	3.97 (0.74)*	3.16 (1.4)
n[1]	23	39	15	35
Social Support				
Mean (sd)	3.60 (0.69)	3.28 (0.71)	3.40 (0.61)	3.27 (0.76)
n[1]	21	37	15	34

* $p < .05$.

1. The number of subjects for each comparison varies according to the number of subjects who completed the relevant post-treatment measure and who provided information at the follow-up assessment.

Table 4 Univariate predictions of smoking outcome

	t	*df*	χ^2	*p*
Prediction of Quit Status at 3 Months				
Age	0.28	75		ns
Gender		1	8.39	ns
Education level	0.36	75		ns
Partner a smoker (No/Yes/No Partner)		2	0.55	ns
Presence of adult smokers in residence		1	0.37	ns
Number of friends smokers	0.41	76		ns
Time since began smoking	0.66	75		ns
Time off smoking—last time	0.87	75		ns
Time off smoking—longest time	0.98	75		ns
Number of cigarettes at pre-treatment	2.14	60		.04
Prediction of Quit Status at 10 Months				
Age	0.50	66		ns
Gender		1	0.60	ns
Education level	1.73	65		ns
Partner a smoker		2	0.51	ns
Presence of adult smokers in residence		1	2.60	ns
Number of friends smokers	0.80	66		ns
Time since began smoking	0.60	66		ns
Time off smoking—last time	0.66	68		ns
Time off smoking—longest time	0.10	68		ns
Number of cigarettes at pre-treatment	0.98	51		ns

of these variables were associated with smoking outcomes (see Table 4). None of these variables significantly predicted smoking outcomes at either 3 months or 10 months. However the initial smoking level was related to outcomes. At post-treatment, the non-smokers had been smoking 5.1 fewer cigarettes at pretest than did the smokers, $t(71) = 2.42$, $p < .025$. This effect was retained at the 3-month follow-up, $t(60) = 2.14$, $p < .05$, but had disappeared by the 10-month follow-up, $t(51) = 0.98$, n.s.

Self-efficacy versus quit achievements as predictors of smoking status. The analyses up to this point had not tested the relative strength of post-treatment assessments of smoking and self-efficacy as predictors. As already mentioned, self-efficacy was strongly associated with lower smoking at post-treatment. If the shared variance was associated with follow-up measures of smoking, entry of one variable into a discriminant function would substantially deplete the contribution of the other. The important test of self-efficacy was not whether it remained significant after controlling for smoking status, but which variable was the stronger predictor. Therefore a second set of discriminant functions allowed post-treatment measures of self-efficacy, social support and smoking level to compete for entry using a stepwise procedure. Results are displayed in Table 5.

Contrary to our expectations, the 3-month analysis favoured post-treatment smoking over self-efficacy as a predictor. As Table 4 shows, post-treatment smoking level entered at Step 1, and no other variables significantly added to this prediction. Post-treatment smoking correctly predicted 91.3% of the non-smokers at 3 months, and 44.4% of the smokers. That is, very few people who were smoking at post-

Table 5 Discriminant function analyses

	F to enter	*df*	*p*	*D*[1]
Prediction of Quit Status at 3 Months				
Step 1 Number of Cigarettes at Post	7.05	1,55	.012	.5756
Remaining variables				
Self-efficacy at Post	3.05	1,54	ns	
Social Support at Post	2.13	1,54	ns	
No other variables entered the equation				
Correct Classification: 91.3% Quit, 44.4% Not Quit				
Prediction of Quit Status at 10 Months				
Step 1 Self-efficacy at Post	6.18	1.46	.017	.5993
Remaining variables				
Number of Cigarettes at Post	3.16	1,45	ns	
Social Support at Post	0.18	1,45	ns	
No other variables entered the equation				
Correct Classification: 73.3% Quit, 60.6% Not Quit				

treatment gave up in the next 3 months, but (as in other studies), a substantial proportion of the people who initially quit returned to smoking.

In contrast to the 3-month analysis, the results at 10 months favoured self-efficacy over number of cigarettes at post-treatment. Self-efficacy entered the equation first, and no other variable significantly added to the prediction. Post-treatment self-efficacy correctly predicted 73.3% of the non-smokers and 60.6% of the smokers, even though the outcomes were 10 months after the prediction.

Treatment group as an additional predictor. Since there was an initial effect for treatment group, we examined whether the addition of the treatment group added to the predictions at the final step. This was to see whether, for example, an effect for differential skill development was still present across the treatment conditions after the main predictive variables were entered. However there was no significant additional prediction from treatment group at either 3 months or 10 months.

DISCUSSION

This study attested the validity of self-efficacy as a predictor of sustained success from an attempt to stop smoking. The fact that subjects are able to predict their responses to situational challenges over a period as long as 10 months is a particularly impressive demonstration of self-efficacy, and the results in this study join a substantial set of similar observations both within this performance domain (e.g. Condiotte and Lichtenstein, 1981) and others (e.g. Kavanagh and Wilson, 1989; Sitharthan and Kavanagh, 1990). The study also gave qualified support for the hypothesis that the self-efficacy prediction is not simply reflecting higher performance attainments. When predicting outcomes at 10 months, the effect of self-efficacy could not be attributed to the level of post-treatment smoking. In contrast at 3 months self-efficacy was a weaker predictor than post-treatment smoking level. The short-term results were similar to

those of other studies such as Baer *et al.* (1986), where smoking at post-treatment was a stronger predictor than self-efficacy over a 6-month period. Comparable results were also observed by Sitharthan and Kavanagh (1990) in a prediction of controlled drinking over 6 months post-treatment. However in both Baer *et al.* (1986) and Sitharthan and Kavanagh (1990) self-efficacy remained a significant independent predictor, whereas in the present study it did not. Perhaps the additional length of follow-up in the previous studies was enough for an independent self-efficacy effect to emerge, since the 10-month results in this study suggested that the cognitive mediation achieved greater relative prominence in the longer term.

The tendency for self-efficacy theory to be more strongly supported in the longer term is highly consistent with the proposed mechanism for the self-efficacy effects. Over shorter periods, there is likely to be less variation in the situational challenges that people face in their quit attempt. As they progress through the follow-up period, the probability of encountering a wider range of situations increases. While the lengthened prediction period may sometimes make it more difficult for people to predict their capabilities, the decay in the predictive utility of self-efficacy would be expected to be less steep than the loss sustained by past performance attainments. This is because the self-efficacy judgment allows people to adjust their prediction for expected situational features and expected skill levels.

There is a sense in which the control of self-efficacy effects for the predictive effect of past performance may be an overly conservative test of the contribution of the cognitive component. If self-efficacy were a determinant of the performance attainment at post-treatment (Bandura, 1977), the prediction of follow-up smoking from the post-treatment level would confound behavioral skills with cognitive mediators (Bandura, 1991b). To the extent that the self-efficacy judgement is stable over time, a prediction from performance may therefore include some of the true predictive effect from self-efficacy (Wood and Bandura, 1989). As a result the comparison of self-efficacy and performance may be weighted somewhat against self-efficacy. The confounding is likely to be greatest in the shorter term, because of the relative stability of the situational challenge.

The test of self-efficacy theory within our study is subject to the validity of our self-efficacy measure. Scales like ours attempt to assess the subjects' perceived capability to apply whatever skills they have to resist smoking in specific situations. This type of measure was criticised by Devins and Edwards (1988) as confounding efficacy and outcome expectations. The authors instead recommended a self-efficacy measure that asked about perceived ability to apply specific stop-smoking techniques. However the difference between the measures is better seen as a distinction between molar and molecular assessments than as "pure" versus "confounded" measures of self-efficacy. An analogy would be to the self-efficacy question, "How confident are you that you can run 2 km without stopping?" That question does not specify the individual component behaviors that the person will need to employ, but asks whether the person can mobilise these skills to meet the behavioral challenge. Bandura (1991a) argues—correctly in our view—that Devins and Edwards confused a performance attainment with a performance outcome. Outcomes of the changes in smoking behavior would have included physical costs or benefits, social reactions, and self-evaluations

(Bandura, 1984, 1991a). None of these confound the measure used in the current study.

We were surprised by some results on correlates of self-efficacy. We did obtain the expected association with quitting achievements, but subjects did not seem to incorporate information about social context in their self-efficacy assessments (cf. Baer *et al.*, 1986). One possible reason is that the instruction assessed confidence in resisting smoking "without professional help", and this may have induced subjects to concentrate on their capabilities as individuals rather than on the assistance they might derive from others.

The absence of a relationship with perceived social support may have been an advantage for self-efficacy, since support was a poor predictor of outcomes during follow-up. This result was inconsistent with some previous research (e.g. Mermelstein *et al.*, 1983), although the predictive effect of support was often relatively weak in those studies. It is possible that a more detailed social support measure such as the one used in Mermelstein *et al.* (1983) could have derived a better prediction of follow-up outcomes. While a replication using other measures of social support is required, the current data strongly suggest that perceived social influences have less utility than personal skills and self-efficacy in predicting sustained non-smoking outcomes.

If self-efficacy and skills were important for maintenance of treatment gains, an intervention that targetted the relapse prevention skills would be expected to be most effective. The Social-Cognitive intervention did just that, and in the short term it did have a significantly stronger impact. Although its long-term effects held up reasonably well, the relative effect did not reach significance with the sample size that was employed in this study.

Clearly the study has some limitations that affect generalization from the results. Among these is the fact that participating subjects were volunteers who had to agree to television interviews about their experiences, and the absence of full data on some subjects. Despite these features, the study derived results that were highly consistent with the existing literature, and we are confident that they would be replicable in a wider community sample. Its message for clinical practice is that maintenance of gains in the long-term may require more than just attainment of the immediate behavioral goal. The person also needs to develop confidence and skills in meeting the challenges that will be faced after the intervention ends (Kavanagh and Wilson, 1989; Sitharthan and Kavanagh, 1990). Self-efficacy measures offer a means to assess these maintenance objectives.

Author Notes

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