

**Adolescent Engagement with Problem Solving Tasks:
The Role of Coping Style, Self-Efficacy, and Emotions**

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Abstract

Adolescence involves a number of developmental tasks and challenges. To deal with the demands that confront them, adolescents draw on their coping resources. The aim of this study was to investigate how adolescents respond to problems. One hundred and sixty-six secondary school students completed a problem solving task using an interactive computer program. The program (a) measured each student's general coping style by presenting students with a coping inventory, and (b) recorded student choices, self-efficacy and emotions as they engaged with the problem solving task. The findings support a model linking a productive coping style with enhanced self-efficacy and positive emotions during problem solving.

Adolescence marks the transition between childhood and adulthood. By its very nature, it involves many physiological, psychological, social, and cognitive changes. These changes include the formation of a personal identity, the establishment of new peer networks, and the development of abstract thinking skills (Dacey & Kenny, 1997; Geldard & Geldard, 1999; Heaven, 1994). To manage these challenges, adolescents rely on their coping repertoire, which includes their problem solving competencies and skills. If adolescents are not able to deal adaptively with

stress or have poor problem solving abilities, there are a number of mental health problems that might develop, including depression and anxiety (Nezu & Ronan, 1988). Research has shown that adolescent mental health problems are associated with academic underachievement, social skill deficits, and increased levels of suicidal ideation and behaviours (Kovacs, 1989). Clearly, an inability to cope with stress has many negative outcomes.

What is Coping?

Coping is defined as the cognitive and affective responses used by the individual to manage stress (Folkman & Moskowitz, 2004). Most coping research has been influenced by the work of Lazarus (1966) and his colleagues. According to Lazarus and Folkman (1984, p. 141), coping is “the cognitive, behavioural [and emotional] efforts to manage particular external and/or internal demands that are appraised as taxing or exceeding the resources of the person”. Therefore, by this definition, coping is a process that involves cognitive appraisal of resources.

Lazarus’ (1966) theory of stress and coping emphasises two levels of appraisal in the coping process. The first level is primary appraisal. Here, the individual perceives whether whether an event is harmful or threatening. Secondary appraisal involves examination of the available coping resources. As a consequence of appraisals of one’s resources and the situation, the person-environment relationship develops. This relationship, which is explained in Lewin’s (1936) person-environment interaction model, involves the constant state of action and reaction between the individual and the environment. Thus, coping is a dynamic process that is dependent on both the demands of the environment and the characteristics of the individual.

Dimensions of Coping

Coping researchers have tended to group coping responses into coping categories or styles. Lazarus and Folkman (1984) proposed two main types of coping, problem-focused coping and emotion-focused coping. Problem-focused coping involves attempting to control or alter the sources of the stress. Emotion-focused coping involves efforts to manage emotional responses to stress. Lazarus (2000) emphasised that although problem- and emotion-focused coping are conceptually distinguishable, they should not be considered independent and usually occur together.

Other researchers have categorised coping in terms of adaptive outcomes. For example, Frydenberg and Lewis (1993) examined the coping responses of thousands of Australian adolescents and proposed three coping categories: solving the problem, reference to others, and non-productive coping. Solving the problem involves working on a problem and remaining optimistic; reference to others involves turning to others for support; and non-productive coping involves ignoring the problem, worrying, and wishful thinking. Although Frydenberg and Lewis (in press) point out that coping processes are not intrinsically good or bad and should be considered within the context in which they occur, they argue that, in general, coping strategies can be considered productive or non-productive. Attempting to manage the problem, with or without reference to others, represents a functional style of coping while the use of non-productive strategies that have an emotional focus represents a dysfunctional type of coping.

Effective Coping

Research has identified a number of factors that are associated with effective coping in adolescents. These factors include perceived personal control and perceived coping competence (Frydenberg & Lewis, 2002). Perceived competence to handle stressful situations has been labelled perceived self-efficacy by Bandura (1994). Self-efficacy refers to people's beliefs about their capacity to control their own level of functioning and the events that affect their lives. Efficacy beliefs influence how people think, feel, motivate themselves, and behave. According to Bandura, people who believe they can deal with stressors do not experience distressing thoughts, while those who believe they cannot deal with threats experience high levels of anxiety. In other words, belief in one's capacities is associated with particular emotional experiences.

Recently, a number of researchers have investigated the relationship between adolescent coping and positive emotions (Boekaerts, 2002; Pekrun, Goetz, Titz, & Perry, 2002). Interest in the role of positive emotions in the stress process has been prompted by a rise in the number of studies focusing on the positive aspects of human functioning more generally in psychological research (Seligman, in press; Sheldon & King, 2001). Fredrickson (2001) argued that the emerging field of positive psychology has inspired an increase in studies examining the functions of positive emotions in psychological health and well being and has put forward a broaden-and-build theory of positive emotions. Fredrickson's model assumes that certain positive emotions expand people's momentary thought-action repertoires. In particular, positive emotions, such as joy, interest, contentment, pride, and love, expand attention, cognition, and action.

In their research examining students' positive emotions in academic settings, Pekrun et al. (2002) found that positive emotions are experienced no less often than negative emotions and have many beneficial effects. For example, the emotions of enjoyment, hope and pride were positively correlated with students' motivation to learn. In addition, Pekrun and his colleagues proposed that positive emotions are associated with academic self-efficacy and achievement, and that positive emotions facilitate flexible and creative ways of thinking, problem solving, and coping. However, they argued that since there are very few studies linking positive emotions with productive coping, further research in this area is necessary.

The Present Investigation

Previous research supports the view that productive coping is associated with enhanced self-efficacy and positive emotions. The purpose of this study was to examine the relationships between coping style, self-efficacy and emotions during problem solving. An interactive computer program was used to monitor adolescents' responses to a problem solving task. General coping skills were also assessed. Drawing on coping theory, self-efficacy theory and the emerging studies examining positive emotions, the current study proposed that a productive coping style would be positively related to both self-efficacy and positive emotions during problem solving.

Method

Participants

Participants were 166 Year 7 to 10 students (93 females and 73 males) from a coeducational government high school in an outer suburb of Melbourne, Australia. The mean age of students was 14 years and 6 months. All students reported that English was their first language. Twenty nine percent were in Year 7, 27 percent in Year 8, 27 percent in Year 9, and 17 percent in Year 10.

Materials and Measures

Computer program. All of the variables in this study were monitored using the interactive computer program, *Between the Lines* (Ainley, Hidi, & Tran, 1997). This program has previously been used with adolescent populations (Ainley, Hidi, & Berndorff, 2002).

Coping style. The computer program presented students with the General Short Form of the Adolescent Coping Scale (ACS; Frydenberg & Lewis, 1993). The ACS is self-report checklist that contains 18 coping strategies. Strategies are associated with three styles of coping, solving the problem, reference to others, and non-productive coping. Students were required to indicate the degree to which they use each strategy on a five-point scale, where 1 = doesn't apply or don't do it and 5 = used a great deal. The ACS has been used over a number of years with different

groups of young people (Frydenberg & Lewis, 2000), and has established reliability and validity (Frydenberg & Lewis, 1996).

Problem solving task. Students were presented with two problem-solving tasks. The first task invited students to consider whether plastic bags should have taxes or levies on them. The second task invited students to consider whether school canteens should be prevented from selling unhealthy foods. Students were required to choose one task to complete. The problems were selected because they are topical issues and developmentally appropriate for Year 7 to 10 students. To help students develop a problem solving solution, students were able to access several resources within the program. For example, the first resource for the school canteen task was information about the prevalence of obesity among Australian adolescents.

Self-efficacy. After selecting a problem solving task to complete, students answered a number of preliminary questions. One question was “How confident are you that you will be able to come up with a good answer?” Students were required to rate how confident they were on a five point scale, where 1 = not at all confident, and 5 = certain.

Emotions. Emotions were assessed by presenting students with a panel of faces at the beginning of engagement with the problem solving task. The faces depicted eight emotions: happy, hopeless, proud, angry, relieved, anxious, hopeful, and shameful. These emotions were derived from Pekrun et al.’s (2002) studies of positive emotions and young people. Students indicated the degree to which they were feeling each emotion on a five-point scale, where 1 = not at all and 5 = a lot. Earlier

studies have found that adolescents are able to use a panel of faces to indicate how they are feeling (Ainley, Hidi, & Berndorff, 2002; Ainley, Hillman, & Hidi, 2002).

Procedure

Consent was obtained from parents and students before testing. Students accessed the computer program during a regular class in the school's computer laboratories. At the beginning of each session, the researcher introduced the study as an investigation of student reactions to a problem-based scenario. Students were instructed to work individually. The data was collected over several days.

Results

Coping Responses

Prior to statistical analysis of the relationships among the ACS items, the descriptive properties of the ACS items were examined. Table 1 shows the means and standard deviations for the 18 coping strategies contained in the ACS. The coping strategies are organised according to the three coping styles as proposed by Frydenberg and Lewis (1993), solving the problem, reference to others, and non-productive coping. This table shows that the most commonly reported coping strategies fell within the first coping style, solving the problem. Specifically, the most frequently reported coping strategies were solving the problem, physical recreation, seeking relaxing diversions, and working hard to achieve.

Table 1

Means and Standard Deviations for the ACS Items

Coping Style and Related Strategies	<u>M</u>	<u>SD</u>
Solving the Problem		
Solving the Problem	4.06	.80
Physical Recreation	3.97	1.11
Seek Relaxing Diversions	3.93	1.12
Work Hard to Achieve	3.80	.97
Seek to Belong	3.60	.97
Focus on Positive	3.44	1.16
Reference to Others		
Seek Social Support	3.02	1.04
Social Action	2.34	1.09
Seek Spiritual Support	2.25	1.39
Seek Professional Help	2.00	1.26
Non-Productive Coping		
Seek to Belong	3.60	.97
Wishful Thinking	3.48	1.38
Worry	3.29	1.20
Keep to Self	2.97	1.24
Tension Reduction	2.63	1.37
Spend Time With Boy/Girl Friend	2.60	1.44
Self Blame	2.55	1.26
Ignore the Problem	2.37	1.24
Not Coping	2.31	1.08

To investigate whether the three styles best described the coping styles of the current sample, a Principal Components Analysis was performed on the 18 ACS items. The initial solution produced six factors with eigenvalues greater than one. Factors 1 and 2 together had loadings above .40 for most of the 18 items, accounting for 30.4 percent of the variance. The other four factors were difficult to interpret as they contained complex variables. Velicer's Minimum Average Partial Test supported

the extraction of two factors, a finding that was further supported by examination of the scree plot.

The factors were obliquely rotated because it was anticipated that the coping strategies might be correlated. Four items were removed from the final factor analysis because they were either highly positively skewed (seek spiritual support and seek professional help) or they had low factor loadings in the preliminary analyses (spend time with boy/girl friend and social action). An examination of the pattern matrix revealed that when a .40 factor loading cut-off was used seven items loaded on the first factor, and seven items loaded on the second factor.

The first factor was defined as “non-productive coping style”, and the second factor was defined as “productive coping style”. Table 2 presents the items and the associated loadings for these two factors.

Table 2

Factor Analysis of the ACS Items

Item	Factor	
	Non-Productive Coping Style	Productive Coping Style
Self Blame	.70	
Keep to Self	.61	
Ignore the Problem	.59	
Worry	.58	
Wishful Thinking	.55	
Tension Reduction	.55	
Not Coping	.48	
Physical Recreation		.63
Improve Relationships		.62
Focus on Positive		.62
Seek Relaxing Diversions		.60
Work Hard to Achieve		.55
Solving the Problem		.48
Seek Social Support		.47

Self-Efficacy

Student self-efficacy was assessed by examining the mean rating for the question “How confident are you that you will come up with a good answer?” The mean rating was 3.26 (SD = 0.95).

Emotions

To investigate which emotions were experienced during problem solving, the frequencies of each emotion reported were examined. See Figure 1. The emotions hopeful (37 percent) and happy (24 percent) were the most commonly reported emotions during engagement.

For the purposes of further analyses, these scores were used to generate a positive emotion score. The scores took into consideration the selection and intensity of positive emotions.

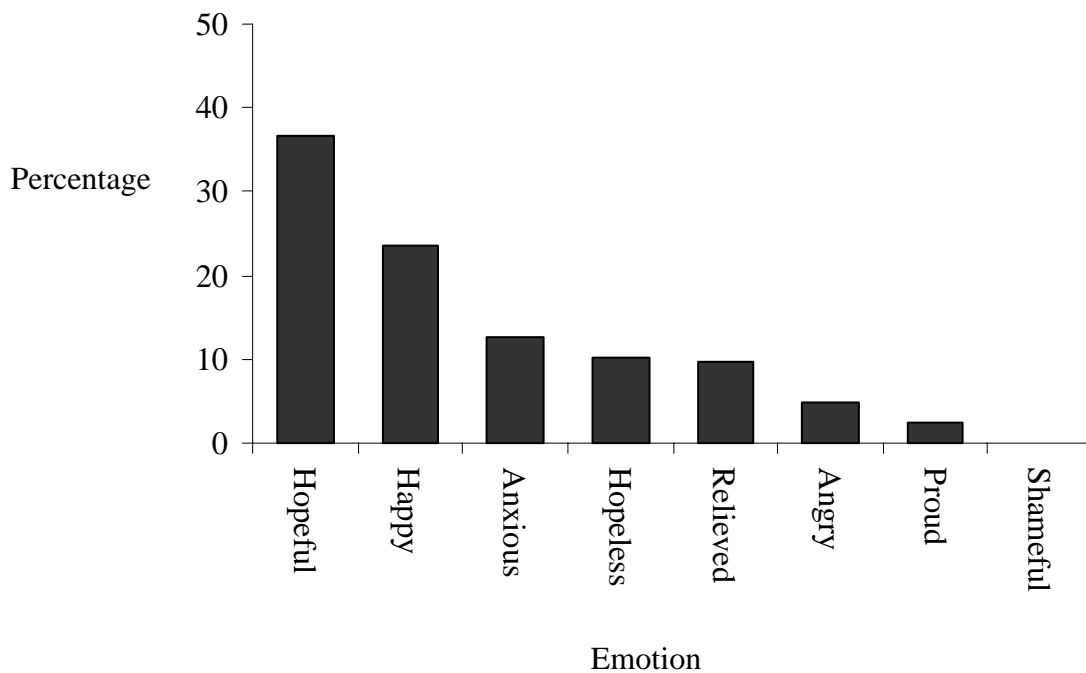


Figure 1. Emotions chosen during the problem solving task.

Relationship Between Productive Coping Style, Self-Efficacy, and Positive Emotions

Correlations were used to explore the relationships between a productive coping style, self-efficacy, and positive emotions. Table 3 shows that a productive coping style is positively correlated with both self-efficacy and positive emotions, and that self-efficacy is positively correlated with positive emotions.

Table 3

Correlations between Productive Coping Style, Self-Efficacy, and Positive Emotions

	Productive Coping Style	Self-Efficacy	Positive Emotions
Productive Coping Style	-		
Self-Efficacy	.17*	-	
Positive Emotions	.28**	.25**	-

* $p < .05$, ** $p < .01$.

To further explore these relationships, a series of standard multiple regressions were performed. First, productive coping style was regressed on to self-efficacy. Next, productive coping style and self-efficacy were regressed on to positive emotions. The standardised regression coefficients (β), the semipartial correlations (sr^2) and adjusted R^2 values are displayed in Table 4. The regression of productive coping style on to self-efficacy was significant, $F(1,161) = 4.95$, $p < .05$, with a productive coping style predicting 17 percent of the variation in self-efficacy. The regression of the two independent variables productive coping style and self-efficacy onto the dependent variable positive emotions also revealed significant relationships,

$F(2,160) = 10.90, p < .01$, with a productive coping style predicting 25 percent of the variation in positive emotions, and self-efficacy predicting 20 percent of the variation.

Table 4

Standard Multiple Regression Analyses Between Productive Coping Style, Self-Efficacy and Positive Emotions

Predictor Variables	Dependent Variables			
	Self-Efficacy		Positive Emotions	
	β	s_r^2	β	s_r^2
Productive Coping Style	.17*	.03	.25**	.06
Self-Efficacy	-	-	.20**	.04
Adjusted R^2	.02		.11	

* $p < .05$, ** $p < .01$.

These findings are summarised in Figure 2, which shows that a productive coping style is predictive of positive emotions during problem solving, and that this relationship is mediated in part through the influence of a productive coping style on self-efficacy.

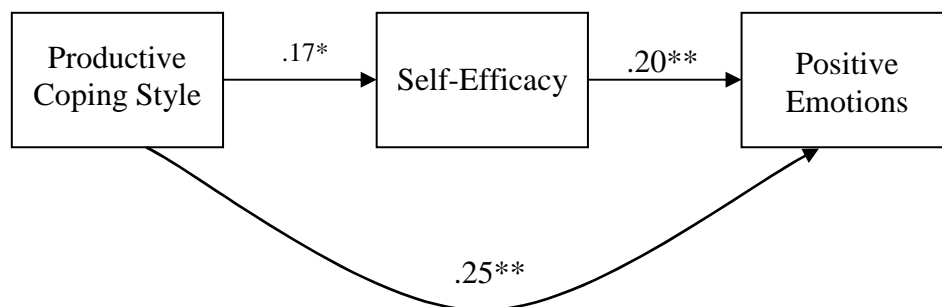


Figure 2. Significant path relationships between productive coping style, self-efficacy and positive emotions (* $p < .05$, ** $p < .01$).

Discussion

The current study sought to investigate how adolescents respond to problems using a sample of Year 7 to 10 students. It examined the coping styles that students bring to problems, their beliefs about their competencies, and their emotions during problem solving.

Coping Responses

Students reported that they more frequently used coping strategies associated with the solving the problem coping style. Specific strategies reported most frequently were solving the problem, physical recreation, seek relaxing diversions, and work hard to achieve. Each of these strategies might be considered functional ways of coping, which suggests that the students tend to use adaptive coping strategies when dealing with a problem solving situation.

A particularly interesting finding was that two coping styles best described the current sample, productive coping style and non-productive coping style. This finding appears to be inconsistent with the three coping categories or factors proposed by Frydenberg and Lewis (1993), solving the problem, reference to others, and non-productive coping. However, it is important to note that two reference to others coping strategies (seek spiritual support and seek professional support) were removed from the final factor analysis because students reported that they were used very infrequently. Thus, the inconsistencies between the two factor solutions might have been due to the particular characteristics or demographics of the current sample. In

other words, the three factor solution might not be generalisable to samples of different demographic make-up.

Self-Efficacy

Self-efficacy theory focuses on the individual's perceptions about his or her capacity to handle challenges (Bandura, 1994). Student assessments of their ability to deal effectively with the problem solving task indicated that they seemed moderately certain that they could provide a quality solution to the problem. This suggests that the students believed they had the skills to cope competently with the challenge.

Emotions

It is noteworthy that two positive emotions (hopeful and happy) accounted for more than half of all emotions reported during engagement with the problem. This indicates that positive emotions play an important role during problem solving. In addition, it provides support for the argument that there should be no less attention paid to positive emotions than to negative emotions when investigating stress and coping (Pekrun et al., 2002).

Relationships Between Productive Coping, Self-Efficacy, and Positive Emotions

Examination of the relationships between productive coping style, self-efficacy and positive emotions supported predictions and provided support for a model linking productive coping style, self-efficacy and positive emotions during

problem solving. A productive coping style was predictive of positive emotions, both directly and indirectly, through self-efficacy. This finding has a number of important implications. It suggests that the broader coping style that the adolescent brings to problem solving tasks influences the character of their coping responses during problem solving.

The results imply that if adolescents are taught productive or adaptive coping skills, their beliefs about their capacity to cope and their positive emotional experiences during problem solving might be enhanced. Furthermore, the results imply that any coping skills program aimed at increasing coping skills might also be aimed at enhancing the self-efficacy of young people by increasing their understanding of their own capabilities. However, it is important to remember that the problems in the study were topical or issues based. More research is needed to investigate whether these relationships hold for problems that are personal in nature.

Conclusions

In conclusion, this study has proposed a model connecting a productive coping style with enhanced self-efficacy and positive emotions. It has been demonstrated that use of adaptive coping strategies is positively associated with an increased sense of one's own capabilities and positive emotional experiences. One consequence of this research is a greater understanding of adolescents who employ more functional coping strategies. It is hoped that this understanding will help parents, educators and other professionals to foster and promote productive coping skills and psychological wellbeing in adolescents.

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