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Relations between social and emotional competence and mental health: a construct validation study

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Abstract

Researchers working fairly independently of each other have created numerous measures of social and emotional competence (SEC). These measures tend to correlate (sometimes highly) with each other and with measures of stressful events, suggesting potential redundancy. We evaluated which, if any, SEC variables predicted unique variance in social and mental health after controlling for other SEC variables in the study and the impact of stressful events. Three-hundred and thirty-one university students participated in an anonymous, cross-sectional study. We measured stressful events, and a wide variety of SECs, including: social problem solving skill (effective problem orientation, automatic processing, and problem solving), alexithymia (difficulty identifying and describing emotions; minimising emotions), effective emotional control (low rumination, high impulse control, high aggression control, low defensive inhibiting of emotions), and level of emotional awareness. We also assessed a variety of aspects of social and mental health (e.g. depression, anxiety, hopelessness, suicidal ideation, life satisfaction, social support). Covariance analyses revealed that all SEC measures except minimising emotions had significant incremental value over the other measures and over stressful events in predicting social and mental health. The optimal set of predictors differed depending upon the type of health predicted. These findings have important implications for the design of social and emotional intervention programs.

1. Introduction

There has been an explosion of interest in the development of Social and Emotional Learning (SEL) programs that seek to improve social health (e.g. high quality social support) and mental health (e.g. low suicidality, high life satisfaction, low depression; Elias, Hunter, & Kress, 2001).

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There has also been a parallel interest in measuring individual differences in social and emotional competence (SEC; e.g. Ciarrochi, Chan, Caputi, & Roberts, 2001). Such measurement is important in that it can help SEL researchers (1) to screen individuals and identify their strengths and weaknesses, (2) to evaluate how individuals improve as a result of the SEL intervention, and (3) to evaluate theory (e.g. that a particular emotional competence reduces suicidality).

Entire areas of research have sprouted up around particular measures of SEC, and these areas have functioned fairly independently of each other (Ciarrochi, Chan, Caputi, & Roberts, 2001). Such areas include alexithymia (difficulty identifying and describing emotions), emotional awareness, effective emotional control (or management), and social problem solving skill. There is too little research on how these measures interrelate, and whether such measures show incremental validity in predicting psychological health. It is possible that some or many of the variables correlate highly and/or are largely redundant in what they predict. Indeed, previous research suggests that such measures often do correlate, sometimes substantially (Ciarrochi, Chan, & Bajgar, 2001; Ciarrochi, Chan, Caputi, & Roberts, 2001; Davies, Stankov, & Roberts, 1998; Mayer, 2001).

This study evaluated the extent that each SEC variable has incremental value over other SEC variables in this study in predicting social and mental health (from now on referred to simply as psychological health). In addition, we sought to evaluate whether the SEC measures add incremental value over the impact of stressful events (e.g. exam failure). It is possible that stressful events cause both emotional processing and management problems (i.e. low SEC) and low mental health. There is strong evidence that stressful events relate to lower psychological health (Ciarrochi, Deane, & Anderson, 2002; Kanner, Coyne, Schaefer, & Lazurus, 1981) and some evidence that stressful events relate to lower emotional competence (Ciarrochi et al., 2002; Nolen-Hoeksema, Larson, & Grayson, 1999; Nolen-Hoeksema, McBride, & Larson, 1997). It is possible that any relationship observed between SEC and psychological health may be explicable in terms of stressful events.

1.1. Social and emotional competence

SEC measures may be distinguishable from each other by methods such as factor analyses and yet be redundant in terms of what they predict. This possibility may be especially likely with self-report measures of SEC. These measures tend to correlate positively (Ciarrochi, Chan, & Bajgar, 2001; Ciarrocchi, Chan, Caputi, & Roberts, 2001) and therefore may reflect a single factor, which might be labelled "general competence." It may be that this general competence factor is what relates to psychological health, rather than some specific aspect of the different SEC measures.

There are a substantial number of possible SEC measures that could have been included in the study. The decision to include a particular SEC variable was based on both theoretical and pragmatic considerations. Theoretically, we sought measures that sampled a reasonably full range of social and emotional competencies, as defined by current theory (D'Zurilla & Nezu, 1990; Mayer, 2001). We also sought measures that, at least in principle, could be described in terms of more or less effective functioning (e.g. someone high in alexithymia is presumed to function less effectively). Pragmatically, we sought to use measures that have been well-researched by multiple, independent laboratories, and have been shown to relate to important criteria (e.g. behaviour, physical health).

Mayer and his colleagues theorize that there are several dimensions of effective emotional functioning, including accurate perception and expression of emotion, and effective management of emotion (Mayer, Caruso, & Salovey, 1999; Mayer, Salovey, & Caruso, 2000). Others argue

that emotional awareness is an essential aspect of effective emotional functioning (Lane, 2000; Saami, 1999). We measured these dimensions in the present study. We also sought to measure the major dimensions of social problem solving as defined by a number of different researchers (D'Zurilla & Nezu, 1990; Frauenknecht & Black, 1995). These dimensions most notably include effective problem orientation and effective problem solving. We turn now to a review of each of these areas, with special reference to their potential relation to psychological health.

1.2. Difficulty identifying and describing emotions

Alexithymia refers to people who have trouble identifying and describing emotions and who tend to minimize emotional experience and focus attention externally (Taylor, 2001). The Toronto Alexithymia Scale (TAS-20) is one of the most commonly used measures of this construct and has been shown to be related to a number of important life outcomes. For example, people high in alexithymia are more prone to drug addiction, eating disorders, and experiencing physical symptoms (Taylor, 2001). The scale predicts the ability to process and manage emotional states and the ability to recognise faces (Taylor & Taylor, 1997).

1.3. Emotional awareness

Lane and his colleagues have theorized that emotional experience becomes more differentiated and integrated with development, such that the representations of emotional states move from implicit to explicit forms (Lane, Quinlan, Schwarz, Walker, & Zeitlin, 1990). Lane et al. (1990) posited five levels of emotional awareness, each level representing a hierarchical increase in differentiation and integration from the previous level. People low in emotional awareness tend not to use specific emotion terms (sadness, anger) to describe their emotional experience. Instead, they focus on cognitions (''I'd feel confused''), bodily sensations (I'd feel tired) and undifferentiated emotional states (''I'd feel bad'').

Lane et al. (1990) developed the Level of Emotional Awareness Scale (LEAS) in order to operationalize his theory. The LEAS has been shown to relate to self-reported ability to identify and describe emotions (Lane, Sechrest, Riedel, Shapiro, & Kaszniak, 2000; Lane, Sechrest, Reidel, Weldon, Kaszniak, & Schwarz, 1996) and to individual differences in cerebral blood flow in the anterior cingulate cortex during the processing of emotional stimuli (Lane, Reiman, Axelrod, Lang-Sheng, Holmes, & Schwarz, 1998). It has also been shown to predict actual emotion recognition, regardless of whether the recognition task is verbal or nonverbal (Lane et al., 1996). Finally, two experimental studies have demonstrated that people high in emotional awareness are less likely than others to show mood congruent biases in their judgments (e.g. when bad moods lead to negative judgments and good moods to good judgments; Ciarrochi, Caputi, & Mayer, in press).

1.4. Effective emotional control

There is a substantial literature on individual differences in how effective people are at managing their emotions (Ciarrochi, Chan, Caputi, & Roberts, 2001; Nolen-Hoeksema et al., 1997). Roger and Najarian (1989) have developed an instrument that assesses a number of the most important individual differences. Their emotional control questionnaire (ECQ) measures people's

ability to control emotion in trying circumstances, and consists of subscales for measuring Aggression Control, Rehearsal (or rumination), Benign Control (or low impulsivity), and Emotional Inhibition.

The *Rehearsal scale* measures the degree of rumination over emotionally upsetting events. People who score high on this scale have trouble getting upsetting thoughts out of their minds (Roger & Najarian, 1989). Ruminators tend to think repetitively and passively about their negative emotions (''I feel lousy''), and do not take action to change their situation (Nolen-Hoeksema & Davis, 1999). Longitudinal studies have established that people who engage in more rumination have higher levels of depressive symptoms over time and perceive themselves to be receiving less social support, even when controlling for their baseline levels of depressive symptoms (Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema et al., 1999; Nolen-Hoeksema, Parker, & Larson, 1994). High rehearsal has also been associated with delayed recovery from stress, as indicated by delayed heart-rate (Roger & Jamieson, 1988) and physiological (cortisol) recovery (Roger & Najarian, 1998).

The *Emotional inhibition* scale measures the tendency to inhibit or ''bottle up'' experienced emotions. Research by Pennebaker and his colleagues has shown that expressing, rather than inhibiting, emotions can improve physical health and reduce visits to the hospital (e.g. Pennebaker, 1993; Petrie, Booth, & Pennebaker, 1998). Emotional inhibition has been associated with delayed physiological recovery from stress (Roger & Najarian, 1998). Evidence for the incremental validity of the Roger and Najarian rehearsal and emotional inhibition scales suggests that both of these scales predict physiological recovery from stress even after controlling for neuroticism and extraversion (Roger & Najarian, 1998).

Benign control assesses the degree of impulsivity and has been associated with lower heart rate reactivity to a stressful task (Roger & Najarian, 1989). This variable has been modestly associated with Eysenck's psychoticism scale (Roger & Jamieson, 1988). *Aggression control* measures the inhibition of hostility independently of the more general emotional restraint measured by emotional inhibition. This scale has been associated with verbal hostility and assaultiveness (Roger & Najarian, 1989).

1.5. Social problem solving skill

Saarni (1999) has argued that social and emotional development are inseparable, with emotional competence being defined as skills needed to be self-efficacious in emotion eliciting social contexts. Social problem solving abilities have generally been categorized into two broad components that operate in the problem solving process (Shewchuck, Johnson, & Elliott, 2000): problem orientation and problem solving proper (or skill). Problem orientation is a ''motivational process involving the operation of a set of relatively stable cognitive-emotional schemas that describe how a person generally thinks and feels about problems in living, as well as his or her own problem-solving ability'' (Chang & D'Zurilla, 1996, p. 185). Effective problem orientation involves (a) appraising a problem as a challenge rather than a threat, (b) belief in one's own problem-solving capability, (c) expectation of positive problem-solving outcomes, and (d) commitment of time and effort to solving problems rather than avoiding them (Chang & D'Zurilla, 1996).

Problem-solving proper refers to the rational search for a solution through the application of problem-solving strategies and techniques that are designed to maximize the probability of find-

ing the ''best'' or most adaptive solution for a particular problem (e.g. problem definition, alternative generation, consequence prediction, implementation of solution, evaluation of solution, and redevelopment of a new solution if the old solution fails).

There is considerable evidence supporting the link between problem orientation and mental health. Effective problem orientation has been associated with low depression, hopelessness, suicidal ideation, health complaints, and neuroticism (Elliot & Marmarosh, 1994; Elliot, Herrick, MacNair, & Harkins, 1994; D'Zurilla et al., 1998). In evidence of the distinctiveness of the orientation construct, effective orientation has been shown to be associated with low psychological distress and positive coping strategies, even when controlling for optimism, pessimism, positive affectivity, and negative affectivity (Chang & D'Zurilla, 1996). Effective problem orientation has also been related to objective indices of performance, including grade point average (Elliot, Godshall, Shrout, & Witty, 1990; Frauenknecht & Black, 1995) and performance on a concept formation and hypothesis testing task (Shewchuk et al., 2000). There is also some evidence for the validity regarding the construct of problem solving skill, including evidence that it is related to hopelessness, depression, and suicidal ideation (D'Zurrila et al., 1998; Kant, D'Zurilla, & Maydeau-Olivares, 1997).

1.6. Study

Our primary goal in this study was to examine the incremental validity of SEC measures. A SEC measure will be considered to show incremental validity in the present study if (1) it predicts unique variance in psychological health even when controlling for other significant SEC variables and (2) it predicts psychological health even after controlling for the impact of stressful events.

We attempted to sample a wide spectrum of psychological health and included measures of social support, depression, anxiety, stress, suicidal ideation, hopelessness, and life satisfaction. For the sake of convenience we refer to all of these measures as indices of psychological health or psychological well-being (Diener, Suh, Lucas, & Smith, 1999). However, we recognize that negative and positive states differ in important ways (Snyder & Lopez, 2002).

In addition to investigating whether there were main effects of each competence on psychological health, we sought to examine whether these competencies moderated the impact of life stress. We expected that the psychological health of people high in SEC would be less severely affected by stressful life events (Ciarrochi et al., 2002).

2. Method

2.1. Participants and procedure

University students completed two, one-hour measurement sessions for course credit. In session A, participants completed all the measures of social and emotional health and the assessment of social problem solving skill. In session B, participants completed the measures of emotional competence and stressful events. The testing sessions were approximately 1 week apart, and the order of testing was randomised. The entire survey was anonymous. The different sessions were associated by means of a random code.

Three-hundred and sixty-one participants completed either part A or part B, but only 331 participants completed both parts of the study and hence were included in the main data analyses. There were 255 females and 76 males (mean age = 21.9, S.D. = 6.36). Due to two participants completing both part A and B but not completing every section within those parts, the effective sample size for some of the analyses was 329 or 330 (see sample sizes later). Preliminary multivariate analyses revealed that there was no relationship between those who did and did not complete both parts of the questionnaire and the measures of psychological health, Wilk's Lamba = 0.965, $P > 0.1$.

3. Materials

3.1. Social problem solving inventory for adolescents (SPSI-a) (Frauenknecht & Black, 1995)

Much information concerning the definition and validity of the SEC scales has been presented in the introduction, and will not be repeated here. Whilst appropriate for adolescents, the content of the SPSI-a is also appropriate for adults (see examples later). The SPSI-a requires participants to evaluate self-relevant statements on a 5-point scale that ranges from (0) (Not at all true of me) to 4 (Extremely true of me). The problem orientation subscale (9 items; $\alpha = 0.84$; all alphas are based on present sample) consists of statements such as "I often doubt that there is a good way to solve problems that I have." The problem-solving skills subscale (18 items; $\alpha = 0.90$) assesses the extent that people are effective at identifying the problem, generating alternatives, predicting consequences of alternatives, implementing alternatives, evaluating alternatives, and flexibly reengaging the problem solving process if the original solution does not work. The effective automatic processes subscale (3 items; $\alpha = 0.78$) consists of items such as "To solve a problem, I do what has worked for me in the past."

3.2. Emotional control questionnaire (ECQ; Roger & Najarian, 1989)

The ECQ measures people's ability to control emotion in trying circumstances, and consists of scales for measuring "Aggression Control", "Rehearsal", "Benign Control", and "Emotional Inhibition". Participants rate statements true or false of themselves on each of the 14-item scales. Example items and alphas from each scale are as follows: Rehearsal ($\alpha = 0.80$; "I find it hard to get thoughts about things that upset me out of my mind."); Emotional inhibition ($\alpha = 0.77$; "When something upsets me, I prefer to talk to someone about it rather than bottle it up"), Benign control ($\alpha = 0.63$; "I often say things without thinking whether I might upset others"), and Aggression control ($\alpha = 0.72$; "If someone pushed me, I would push back.").

3.3. Levels of Emotional Awareness (LEAS; Lane et al., 1990)

The LEAS is a performance measure of emotional awareness and requires participants to describe their anticipated feelings and those of another person in each of 20 vignettes. Only 16 vignettes were used in the present study due to time constraints ($\alpha = 0.83$). Highly reliable scoring criteria are used to evaluate the degree of differentiation and integration of words denoting

emotion attributed to self and others. Higher scores reflect greater differentiation in emotion, greater awareness of emotional complexity in self and others, and relative absence of alexithymia (Lane et al., 1996).

3.4. Toronto Alexithymia Scale (TAS-20; Bagby, Taylor, & Parker, 1994)

The TAS-20 is a 20-item, self-report measure. Ratings are made on a 5-point scale [strongly disagree (1) to strongly agree (5)]. The TAS-20 is broken down into three subscales: difficulty identifying feelings (''I am often confused about what emotion I am feeling'', ($\alpha = 0.85$), difficulty describing feelings (''It is difficult for me to find the right words for my feelings'', ($\alpha = 0.84$), and externally-oriented thinking (''Being in touch with emotions is essential (reversed)'', ($\alpha = 0.63$). In order to improve clarity in the present paper, this last scale was relabelled ''minimizing emotions/external thinking.''

The TAS-difficulty describing feeling scale and the emotional inhibition questionnaire have item and conceptual overlap. Both scales deal with difficulty expressing emotions. Example items from the TAS include ''It is difficult for me to reveal my innermost feelings, even to close friends''. Similar items from the emotional inhibition scale are ''Expressing my feelings makes me feel very vulnerable and anxious,'' and ''People tell me to describe my feelings more.'' The two scales also correlate quite highly ($r = 0.62$), and consequently were combined to form a single scale, which we labeled difficulty expressing emotions. It should be noted that the purpose of the present study is to evaluate potential redundancy of measures that is not due to mere item overlap, as is the case for the emotional inhibition and difficulty describing emotions subscales. We did evaluate these measures separately and found that they did not predict unique variance. That is, both measures were never significant when they were both entered in covariance analyses. This further justifies combining these scales.

3.5. Stressful events

The Hassles Scale (Kanner et al., 1981) is a 117-item inventory that assesses the frustrations and irritation of everyday encounters that can range from minor annoyance to major pressure, problems or difficulty. Respondents were required to circle the hassles that had happened to them in the past month on a 3-point Likert scale ranging from ''somewhat severe'' (1) to ''extremely severe'' (3). The three point severity scales were summed to generate a total severity score (Kanner et al., 1981).

3.6. Measures of social and mental health

The *Depression Anxiety Stress Scale* (DASS; Lovibond & Lovibond, 1995) consists of three 14-item scales and is designed to measure depression (''I couldn't seem to get any enjoyment out of the things I did,'' ($\alpha = 0.94$), anxiety (''I felt terrified,'' ($\alpha = 0.91$), and stress (''I found it hard to wind down,'' ($\alpha = 0.93$). Participants were asked to indicate the extent that each statement applied to them over the past month. The *Life Satisfaction Scale* (Diener, Emmons, Larsen, & Griffin, 1985) asks participants the extent that they agree (1) or disagree (7) with each of five statements related to life satisfaction (''In most ways my life is close to my ideal;'' ($\alpha = 0.89$).

The *Beck Hopelessness Scale* (BHS; Beck, Weissman, Lester, & Trexler, 1974) comprises 20 true-false items that reflect hopelessness or pessimism (e.g. "My future seems dark to me"). *The Suicide Ideation Questionnaire* (SIQ; Reynolds, 1987) consists of 30 Likert items (e.g. "I thought it would be better if I were not alive") concerning thoughts relating to suicide that occurred in the previous month. The 7-point scale ranges from 0 (I never had this thought) to 6 (Almost every day).

A reduced *Social Support Questionnaire* contained a four-item version of the Social Support Questionnaire (SSQ; Ciarrochi, Chan, & Bajgar, 2001; Sarason, Levine, Basham, & Sarason, 1983). This consisted of items such as "Whom could you count on to help you out in a crisis situation, even though they would have to go out of their way to do so?" For each item participants were asked to list the initials of the people they can rely on, their relationship to them, and their overall satisfaction with the support available to them. This reduced version of the SSQ was highly reliable for amount of support ($\alpha = 0.89$) and satisfaction with support ($\alpha = 0.88$).

4. Results

4.1. Preliminary analyses

4.1.1. Descriptives

The descriptives for the independent variables are as follows: TAS-identifying ($M = 16.81$, S.D. = 6.21), TAS-describing ($M = 13.32$, S.D. = 5.1), TAS-external thinking ($M = 17.63$, S.D. = 4.66), LEAS ($M = 3.55$, S.D. = 0.45), rehearsal ($M = 1.48$, S.D. = 0.24), aggression control ($M = 1.65$, S.D. = 0.22), benign control ($M = 1.49$, S.D. = 0.20), emotional inhibition ($M = 1.42$, S.D. = 0.23), effective problem orientation ($M = 2.56$, S.D. = 0.78), effective automatic process ($M = 2.6$, S.D. = 0.68), effective problem solving ($M = 2.26$, S.D. = 0.65) and stressful events ($M = 51.24$, S.D. = 33.79). The descriptives for the dependent variables are: depression ($M = 0.60$, S.D. = 0.61), anxiety ($M = 0.56$, S.D. = 0.57), stress ($M = 1.04$, S.D. = 0.67), hopelessness ($M = 1.16$, S.D. = 0.16), suicidal ideation ($M = 6.38$, S.D. = 0.68), life satisfaction ($M = 4.61$, S.D. = 1.36), social support satisfaction ($M = 5.19$, S.D. = 0.88), social support amount ($M = 23.29$, S.D. = 8.66).

4.1.2. Sex

ANOVAs were used to evaluate whether sex was related to any of the independent or dependent variables, with alpha set at 0.01 to reduce the problem of type 1 error. There were no significant differences between men and women on any of the psychological health variables, $Ps > 0.01$. In contrast, there were some differences on the competence measures. Men ruminate less than women ($M_{men} = 1.40$, $M_{wom} = 1.50$, $F(1,329) = 9.85$, MSW = 0.058, $P = 0.002$) and have a more effective problem orientation ($M_{men} = 2.84$. $M_{wom} = 2.50$, $F(1.328) = 11.73$, MSW = 0.58 $P = 0.001$), but women are more emotionally aware than men, ($M_{men} = 3.38$, $M_{wom} = 3.60$, $F(1,330) = 13.70$, MSW = 0.20, $P < 0.001$).

4.1.3. Intercorrelations between the independent variables

Table 1 presents the intercorrelations between the measures of stressful events and emotional competence. As expected, stressful events were related to lower scores on a number of the SEC

Table 1
Interrelations between measures of stress and social and emotional competencies

	2	3	4	5	6	7	8	9	10	11
1. Stressful Events	0.04	−0.42**	0.03	0.19**	0.29**	0.38**	−0.26**	−0.06	−0.02	0.04
2. Effective Automatic Processing		0.02	0.38**	−0.12	−0.12	0.01	0.09	−0.11	−0.17*	0.01
3. Effective Problem Orientation			0.25**	−0.32**	−0.49**	−0.39**	0.27**	−0.09	−0.09	−0.11
4. Effective Problem-Solving				−0.24**	−0.26**	−0.06	0.21**	−0.14	–0.27**	−0.06
5. Difficulty Expressing Emotion					0.51**	0.19**	−0.16*	0.17*	0.37*	−0.04
6. Difficulty Identifying Emotions						0.41**	−0.29**	0.02	0.17	0.04
7. Rehearsal							−0.24**	−0.15*	−0.06	0.03
8. Benign Control								−0.24**	−0.14*	−0.01
9. Aggression Control									0.06	0.07
10. Minimizing Emotions /External Thinking										−0.02
11. Level of Emotional Awareness										–

* $P<0.01$.
** $P<0.001$.

measures. The strongest relationships involve effective problem orientation and rumination. The correlations are modest to small, indicating that the competence measures are in principle distinguishable from the impact of stressful events.

The competence measures tend to intercorrelate (except the LEAS), indicating that higher competence on one measure relates to higher competence on another measure. Difficulty identifying emotions showed the strongest correlations with other SEC variables, correlating moderately with effective problem orientation, difficulty expressing emotions, and rehearsal.

4.1.4. Correlations between health and competence variables

We next examined the correlations between our independent variables, and measures of state mental health (depression, anxiety, stress, and suicidal thinking), stable mental health (hopelessness, life satisfaction), and social health (satisfaction with social support and amount of social support). To reduce Type I error, alpha was set at $P<0.005$. Stressful events was associated with all measures of health, with correlations ranging from 0.55 (stress) to −0.25 (satisfaction with social support). Most of the correlations between competence and health were significant and all significant correlations were in the expected direction, with higher competence being associated with better psychological health. Effective problem orientation, difficulty identifying emotions, difficulty expressing emotions, and rumination were significantly related to all forms of health (ts = 0.59–0.19). Benign control was related to all forms of mental health ($r = 0.29$–0.19), but not social health. Effective automatic processes was related with satisfaction with life and satisfaction with social support (rs = 0.17), and effective problem solving was related to depression ($r = -0.19$), stable mental health ($t = -0.29$ for hopelessness and 0.21 for life satisfaction), and satisfaction with social support ($r = 0.21$). Aggression control, emotional awareness, and minimizing emotions showed little relationship with the psychological health variables, with the only significant correlation being between minimizing emotions and hopelessness ($r = 0.21$).

4.2. Main analyses plan

4.2.1. Stepwise regression analyses

We sought to assess whether each competence variable predicts variance in psychological health over and above the variance predicted by other variables. Given the number of intercorrelated variables we have in the present analyses (including main effects and interactions), we did not want to force a large number of nonsignificant covariates into the equation. Such an analysis would tend to mask true effects, due to collinearity issues between the independent variables (Aiken & West, 1991). We thus conducted stepwise regression analyses. The independent variables were stressful events, each of the competencies, and the interactions between stressful events and competencies. The dependent variables were the measures of psychological health. The first step of the analyses involved entering stressful events into the model. The next step involved using a stepwise procedure (see later) to evaluate whether any of the interaction terms should enter the model. The final step involved using a stepwise procedure to evaluate if any of the main effects should enter the model. If an interaction term entered the model in step 2, then the competence that formed a part of that interaction was forced into the model in step 3 (as is necessary for a well-structured model). All variables were standardized in order to reduce collinearity problems between the interaction terms and main effects (Aiken & West, 1991).

4.2.2. Reducing type 1 error

Given the exploratory nature of the stepwise regression analyses, four steps were taken to reduce the problem of Type 1 error. First, we conducted pre-screening multivariate analyses to eliminate any interaction terms that did not predict the psychological health measures as a group. Second, we tested the variables in chunks by first evaluating the interaction terms and eliminating any interaction terms that were not significant and then analysing the main effects. Third, we used directional tests and a conservative criterion for a variable to enter the model ($P < 0.005$) and to be removed from the model ($P < 0.0051$). Finally, we required that all variables identified as significant in the regression analyses were also significant ($P < 0.005$) in nonparametric bootstrap analyses (Mooney & Duval, 1993). This approach is conservative in that it gives us two chances of rejecting an effect (if not significant in either analyses) but only one chance of not rejecting it (if significant in both).

4.2.3. Main analyses

Table 2 presents the models that resulted from the regression and bootstrapping analyses. There was only one variable that was not significant in any of the models, namely, minimizing emotion/external thinking. Stressful events was an important predictor in all analyses except those involving satisfaction with social support and hopelessness. All of the SEC variables (except minimizing emotions) predicted variance over and above stressful events in at least one of the analyses.

The SEC variables also consistently predicted variance over and above the other SEC variables. A number of variables predicted only one psychological health variable, but they related to that variable better than a number of other SEC variables. For example, effective automatic processing and aggression control did not show incremental utility in any analyses except those involving life satisfaction. However, they predicted life satisfaction better than a host of other

Table 2
Set of competence variables that predict unique variance (beta) in each psychological health variable as determined by stepwise regression analyses

	Best model	R^2
State psychological health		
Depression	Stressful events (0.17)[c], Effective Problem Orientation (−0.39)[c], Difficulty Expressing Emotions (0.13)[a], Difficulty Expressing Emotions×Stressful events (0.10)[a], Rumination (0.16)[b]	0.45[c]
Stress	Stressful events (0.28)[c], Effective Problem Orientation (−0.28)[c], Rumination (0.27)[c], Difficulty Identifying Emotions (0.12)[a]	0.52[c]
Anxiety	Stressful events (0.24)[c], Effective Problem Orientation (−0.27)[c], Difficulty Identifying Emotions (0.19)[c], Rumination (0.17)[c], Rumination×Stressful events (0.15)[c]	0.49[c]
Suicidal Thoughts	Stressful events (−0.18)[c], Effective Problem Orientation (0.31)[c], Benign Control (0.13), Benign Control×Stressful events (0.18)	0.31[c]
Stable psychological health		
Hopelessness	Stressful events (0.10), Effective Problem Orientation (−0.36)[c], Effective Problem Solving (−0.16)[b], Difficulty Expressing Emotions (0.18)[c]	0.32[c]
Life Satisfaction	Stressful events (−0.19[c]), Effective Problem Orientation (0.30)[c], Difficulty Expressing Emotions (−0.16)[b], Effective Automatic Processing (0.16)[a], Aggression Control (0.13)[a]	0.28[c]
Satisfaction with Social Support	Stressful events (−0.14), Difficulty Expressing Emotions (−0.25)[c], Rumination (−0.18)[b], Effective Problem Solving (0.14)[a]	0.21[c]
Amount of Social Support	Stressful events (−0.23)[c], Difficulty Expressing Emotions (−0.23)[c], Level of Emotional Awareness (0.15)[a]	0.14[c]

All variables in models were also significant in nonparametric analyses, $Ps \leqslant 0.005$ (see results section). The instructions for the state variables required participants to rate how they felt during the past month.

[a] $P \leqslant 0.005$.

[b] $P \leqslant 0.001$.

[c] $P \leqslant 0.0005$ (one-tailed).

variables, including emotional identification, rumination, and effective problem solving. Similarly, along with effective problem orientation, benign control was the only SEC variable to predict suicidal thoughts. Level of emotional awareness related only to amount of social support, but it was a better predictor of this variable than all SEC variables except difficulty expressing emotions.

All other SEC variables correlated with more than one psychological health variable. The most pervasive two correlates of psychological health were effective problem orientation (predicting six of eight variables) and difficulty expressing emotions (predicting five of eight variables). The next most pervasive correlate was rumination (relating to four health variables), followed by effective problem solving (two variables) and difficulty identifying emotions (two variables).

There were also a number of interaction effects in predicting depression, anxiety, and suicidal thoughts (see Table 2). The coefficients for these interaction terms indicate that, as expected,

stressful events had a less adverse impact amongst those high in the competence compared to those low in the competence. In particular, stressful events had a more adverse impact on depression amongst those who had difficulty expressing emotions. It had a more adverse impact on suicidal thinking amongst those low in benign control, and it had a more adverse impact on anxiety amongst those high in rehearsal.

5. Discussion

As expected, the SEC measures tended to correlate with each other and with the impact of stressful events. However, despite these correlations, all of the measures (except minimizing emotion) showed incremental validity in that they predicted variance in psychological health after controlling for stressful events and after controlling for other significant SEC variables. The most pervasive effects across the measures of psychological health were effective problem orientation, difficulty describing emotion, and rumination.

5.1. Clarifying the relationship between SEC and psychological health

Much previous research has established the link between SEC and hopelessness, suicidal thinking, depression, anxiety, and social support. The present research adds to this past research by demonstrating that the SEC variables show incremental value in prediction. Combined, these measures predict substantial variance in psychological health.

One potential limitation of past research is that the impact of stressful events might have confounded the relationship between SEC and psychological health. For example, people who are faced with difficult life problems (or stresses) are likely to report having more trouble with emotion management and report experiencing more depression. Our research did provide evidence that stressful events were correlated with both SEC and psychological health. However, SEC related to psychological health even after controlling for the impact of stressful events, suggesting that such events do not confound the findings.

Another potential limitation of past research is that common method variance (CMV) might have inflated observed relationships between SEC and psychological health (Lindell & Whitney, 2001). Both SEC and psychological health assessments tend to be based on self-report measures (with the exception of the Level of Emotional Awareness Scale). Perhaps there is a general tendency for people to say positive things about their social and emotional functioning, even if those things are not true. Such a general tendency would effect both self-report SEC measures and self-report psychological health measures and could thus lead to an inflation of observed correlations (Lindell & Whitney, 2001).

Two aspects of our study and analyses are inconsistent with a self-report CMV explanation. First, we measured psychological health and emotional competence on different days, which can reduce the effect of common stimulus cues and the effect of respondent's strain toward consistency (Podsakoff & Organ, 1986). Second, we administered a number of self-report measures that are presumably affected by CMV and used these variables together as covariates in a regression. This procedure reduces or eliminates the impact of CMV on the estimates (Lindell & Whitney, 2001).

5.2. Towards improved theorizing

The optimal set of SEC predictors differed depending upon the type of psychological health predicted. This finding may be valuable in helping to direct and constrain future research and theorizing. We now discuss the findings related to each SEC variable, and speculate about their implications. Future research will be needed to evaluate these speculations.

Effective Problem orientation had the most pervasive effect, relating to all of the mental health measures. In addition, it had the largest betas in all the analyses in which it was significant. However, it was not a significant predictor of social health. Given the importance of this variable to mental health, it seems reasonable that it should be given prominence in any social and emotional learning (SEL) program (though we discuss issues of causality later).

Difficulty expressing emotions related to high depression, hopelessness and to low life satisfaction. It also had a stronger relationship to social health than did effective problem orientation. One possible explanation for this social effect is that people who have difficulty expressing emotions may not make their needs known to others. Thus they get less frequent and satisfactory support. Research has suggested a number of other mechanisms for explaining the link between difficulty expressing emotions and poor mental health. Specifically, the work of inhibiting, rather than expressing, emotions (1) is cognitively demanding, (2) serves as a stressor, and (3) impedes the individual's ability to work through difficult life problems (Pennebaker, 1993; Richards & Gross, 1999).

Effective problem solving was related to low hopelessness and high satisfaction with social support. This latter finding suggests that people who are themselves good problem solvers get the most benefit from social support. This could be because they are better able to use that support, or because they happen to be surrounded by people who help them to be effective problem solvers. Either possibility is intriguing, and deserving of future research.

Difficulty identifying emotions was related to stress and anxiety. There are a number of possible explanations for this effect. Perhaps when people are faced with a life problem, not knowing what they are feeling is itself a source of anxiety (like being blindfolded on the edge of a cliff). Or, the inability to identify emotions may prevent people from effectively resolving problems that cause anxiety.

Rumination related to three of the four state mental health measures, namely, depression, stress, and anxiety. It also related to lower satisfaction with social support. This pattern of findings replicates that of Nolen-Hoeksema and her colleagues (e.g. Nolen-Heoksema, 2000; Nolen-Hoeksema & Davis, 1999) and extends it in demonstrating that relations with rumination hold even after controlling for other SEC measures.

Level of emotional awareness related only to the amount of social support. Emotional awareness may help people to be supportive of others and being supportive of others may make those others more likely to provide support. Alternatively, aware people may be better able to identify that they need support and take time to develop those support networks. Finally, it may be that people with strong social support networks talk more about their emotions, thus increasing their awareness.

Benign control was the only variable other than problem orientation that predicted suicidal thoughts. Under high stress, impulsive (low benign control) people were more likely to think about suicide. This finding suggests that suicidal thinking, at least in our young sample, was an

impulsive coping strategy to stress. Perhaps SEL programs could identify impulsive individuals, and teach them alternative ways of coping.

Low aggression control predicted low life satisfaction. This finding is inconsistent with the view that venting anger can act as an effective catharsis, but parallels the findings that poor aggression control is associated with poor physical health (Salovey, 2001). Effective automatic processing was also related to life satisfaction. Thus, people who were able to rely on past successful solutions to problems had higher life satisfaction. This effect might have occurred because such people have more effective solutions to their problems or because they have better access to those solutions. Future research will be needed to distinguish between these possibilities.

5.3. Practical implications

Many social and emotional intervention programs target a particular type of psychological health (e.g. anxiety). The present study suggests what aspects of SEC are most relevant to each type. Thus, it provides hints as to what aspects of SEC a SEL program should measure (or prescreen) and seek to improve. For example, if a program seeks to reduce anxiety, it should probably target difficulty identifying emotions, since this variable was uniquely related to anxiety. In contrast, if a program seeks to reduce depression, then it should focus more on difficulty describing emotions rather than difficulty identifying emotions, since the former but not the latter was a unique predictor of depression. Of course, if an intervention program seeks to promote all aspects of psychological health, then it might be best to target all the SEC variables identified as significant and unique in this study.

5.4. Limitations

Our work could not establish the direction of causality between different SEC variables. Nor could it establish the direction of the causal relationship between SEC and psychological health. Future research should train people in particular aspects of SEC (Elias et al., 2001) and observe the impact of that training on other SEC variables and on psychological health. Alternatively, if researchers wanted to study the SEC variables simultaneously as in the present study, they could employ a longitudinal design which would allow them to determine if SEC was a precursor, rather than a concomitant, of psychological health. Our work points the way in that it suggests that almost all of the SEC measures included in our study are not redundant with each other or with stressful events. Thus, any of the significant SEC variables appear to be good candidates for future causal analyses.

Our approach has included a wide variety of indices of psychological health and well-being. However, we have emphasized negative indices of well-being (e.g., depression), rather than positive indices. Increasingly, research suggests that positive and negative states may have different causes (Snyder & Lopez, 2002). Thus, future research is needed to establish the relationship between SEC variables and positive states. Our research does suggest that SECs are associated with several positive outcomes such as life satisfaction and quality of social support. Future research is needed to examine the relationship between SEC and positive states such as joy, self-assurance, and contentment.

Women were found to ruminate more and have less effective problem orientations than men. We found no sex differences in psychological health, which suggests that sex can not explain the relationship between the SEC variables and health. However, given the sex differences, future research might examine whether men and women differ in terms of the subsets of SEC variables that best predict psychological health. The present study, with its relatively small sample of men, could not address this issue.

We have sought to include a wide sample of SEC variables, but undoubtedly left some important ones out. For example, we have not included an ability measure of emotional intelligence (EI; Mayer et al., 1999). However, past research has established that this type of measure has only weak to nonsignificant correlations with a wide range of self-report SEC variables (Ciarrochi, Chan, & Caputi, 2000). Thus, it is likely that this measure will show predictive utility over and above the variables used in this study.

In conclusion, researchers working fairly independently of each other have created a substantial number of SEC variables. Surprisingly, there has been relatively little duplication in their efforts. Almost all of the variables predict unique aspects of psychological health. Future causal (intervention) research in this area is certainly warranted.

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