Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Adolescence 28 (2005) 75–87
Journal of Adolescence
www.elsevier.com/locate/jado

Perceived academic performance, self-esteem and locus of control as indicators of need for assessment of adolescent suicide risk: implications for teachers

Graham Martin[a,*], Angela S. Richardson[a], Helen A. Bergen[a], Leigh Roeger[b], Stephen Allison[b]

[a] *The University of Queensland, Brisbane, Australia*
[b] *Flinders University, Adelaide, Australia*

Abstract

Introduction: There is currently a need for research into indicators that could be used by non-clinical professionals working with young people, to inform the need for referral for further clinical assessment of those at risk of suicide.

Method: Participants of this repeated measures longitudinal study, were 2603, 2485, and 2246 school students aged 13, 14, and 15, respectively, from 27 South Australian Schools.

Results: Perceived academic performance, self-esteem and locus of control are significantly associated with suicidality. Further, logistic regression of longitudinal results suggests that perceived academic performance, over and above self-esteem and locus of control, in some instances, is a good long-term predictor of suicidality.

Introduction

Over the last 15 years, suicide rates of young people have been cause for considerable concern among health professionals and the community in general. The World Health Organisation (WHO, 2002; p. 1) notes that "… rates among young people have been increasing to such an extent that they are now the group at highest risk in a third of countries, in both developed and

*Corresponding author. Child and Adolescent Psychiatry, Mental Health Centre, K floor, Royal Brisbane Hospital, The University of Queensland, Herston, Qld 4029, Australia. Tel.: 61-7-3365-5098; fax: 61-7-3365-5488.
E-mail address: graham.martin@uq.edu.au (G. Martin).

0140-1971/$30.00
doi:10.1016/j.adolescence.2004.04.005

developing countries''. Youth suicide (15–24 years) is the second leading cause of death in young Australians (Australian Bureau of Statistics, 2001), the third leading cause of death for North Americans (National Center for Injury Prevention and Control, 2003) and accounts for over a fifth of all deaths of young people in the United Kingdom (Samaritans, 1999).

Preventative approaches to suicide have focused mainly on risk assessment (Rudd & Joiner, 1998; Beautrais, 2000). Beautrais. (2000) notes that risk factors reported in international literature can be categorized into several domains including: social and educational disadvantage, childhood and family adversity, psychopathology, individual and personal vulnerabilities, exposure to stressful life events and circumstances, and social, cultural and contextual factors. Despite this knowledge, our ability to accurately identify the suicidal individual remains poor (Rich, Fowler, & Fogarty, 1990).

One of the key problems associated with adolescent suicide risk assessment is that those who have the most daily contact with young people are often not trained to assess risk, and have difficulty in selecting adolescents to refer for clinical assessment. In a study conducted by the British Columbia Suicide Prevention Program (White, Rouse, & Jodion, 1997), 1446 school 'gatekeepers' including teachers, counsellors, administrators, and other professional groups were surveyed on levels of confidence in their interaction with suicidal youth. On average, teachers reported feeling the least confident of all gatekeeper groups. In a similar United States study (King, Price, Telljohann, & Wahl, 1999), high school health teachers completed a 45-item survey to examine perceived self-efficacy regarding adolescent suicide. Of the 228 mostly female, white respondents, only 9% believed they could recognize a student at risk of suicide.

Several studies have investigated effectiveness of suicide risk screens (Thompson & Eggert, 1999; Horowitz et al., 2001). These may have little applicability to teachers, however, as the time needed to collect information may not be available and interpretation of results requires levels of expertise beyond the capabilities of most. If teachers are to increase confidence in their ability to assess for possible suicide risk indicating that onward referral for mental health assessment is required, they need an appropriate, simple screening tool.

The effects of cognitive factors on suicide have been investigated in several studies (Lennings, 1994; Reinecke & DuBois, 2001). Specifically, low self-esteem in children and adolescents (Kazdin, French, & Unis, 1983; Pinto & Whisman, 1996; Tomori & Zalar, 2000) and external locus of control in young adults and adolescents (Goldney, 1982; Goldney, Smith, Winefield, Tiggeman, & Winefield, 1991; Pearce & Martin, 1993) have been found to be associated with suicidality. A few studies have investigated self-esteem and locus of control (LOC) together, some longitudinally.

Beautrais, Joyce, and Mulder (1999) compared 129 individuals under 25 years of age who made non-fatal, medically serious suicide attempts, with randomly selected control cases. Individuals making suicide attempts had elevated odds ratios for hopelessness, neuroticism, introversion, low self-esteem, impulsiveness, and external LOC. When allowances were made for inter-correlations, only LOC, hopelessness, and neuroticism remained significantly associated with suicide attempts.

Schwartz and Kaslow (2000) examined cross-sectional and longitudinal correlates of attributional style in 841 adolescents who completed self-report measures at two times, one year apart. Attributional style was measured using the Children's Attributional Style Questionnaire (CASQ). For all analyses, more maladaptive attributional styles were associated with higher levels of depressive symptoms, greater suicidal ideation, lower self-esteem, greater

levels of pessimism, fewer coping skills, lower levels of social competence, more conflict with parents, and lower levels of family and peer support.

Like self-esteem and LOC, perceived academic performance in adolescence has also been studied. Pinzon Perez, and Perez (2001) surveyed 10th graders from 32 Colombian public schools to examine gender, perceived academic performance, type of school, and their relationships to depression and suicide. Significant differences in perceived academic performance scores were found between those reporting suicidal thoughts and attempts and those who did not. Few other studies into the relationship between perceived academic performance and suicide risk exist, and only two studies to date have investigated perceived academic performance, self-esteem and LOC together (though not in association with suicide). In one such study, DeMello and Imms (1999) surveyed 146 high school students; those with high self-esteem and internal LOC scores showed positive perceptions of their academic performance.

In our previous cross-sectional study of 13 year olds, logistic regression was used to examine a model of perceived academic performance, self-esteem and LOC onto suicidality (Richardson, Bergen, Martin, Roeger, & Allison, 2004). The model successfully classified between 69% and 85% ($p<0.001$) of students admitting suicidal thoughts, plans, threats, deliberate self-injury or attempts. As a result we suggested teachers and educators might use perceived academic performance as a prompt to the need for clinical assessment of reasons for living and suicidal thinking and behaviour. To date there have been no longitudinal studies investigating perceived academic performance, self-esteem and LOC with suicidality.

The current study

The aim of the current study is to both validate and extend our previous work (Richardson et al., 2004) by investigating the longitudinal relationships of perceived academic performance, self-esteem and LOC with later suicidal behaviour. In particular, we examine the utility of perceived academic performance, over and above probable influences from low self-esteem and external locus of control, as a simple indicator of increased risk of suicidal behaviour.

Method

The Early Detection of Emotional Disorder (EDED) program aimed to examine risk factors for suicide behaviour in young people in a longitudinal study from age 13—before the time when suicide thinking and behaviour begin to escalate from about age 15. The study involved surveying high school students annually for three successive years. The present analysis uses data collected in all three waves of the EDED program.

Participants

Two thousand six hundred and three, 2485, and 2246 school students completed the questionnaire at mean age 13 years (Time 1; T1), 14 years (Time 2; T2) and 15 years (Time 3; T3), respectively. Participating schools, both government owned (17 schools) and private (10 schools)

were randomly chosen from both rural and suburban areas, in lower to upper middle socio-economic areas of South Australia (total population approximately 1.5 million).

Approval for the project was obtained from Flinders Medical Centre Ethics Committee, the South Australian Education Department, the Independent Schools Board, Catholic Education Office, and principals and school councils of all schools contacted. All parents received detailed written explanation of the study and were able to view the questionnaire prior to the study at their school. We have previously reported on the composite questionnaire, the Youth Assessment Checklist (Pearce & Martin, 1993, 1994; Martin et al., 1996), and the details of data collection.

Questionnaire administration

Class teachers supervised administration of questionnaires, informed students that participation was voluntary and non-participation would have no adverse consequences. Alternative arrangements were made willingly for the small number who withdrew. A counsellor was made available to talk with any student showing distress, and a group debriefing session followed the completion of the questionnaire. Students personally placed responses in a sealed container to maintain confidentiality. Matching of students from T1 through T3 of the study was completed according to first, middle and last initials of each young person plus their date of birth.

Instruments

Perceived academic performance (PAP): A single-item measure asked students how they would rate their overall academic performance; 'failing', 'below average', 'average', or 'above average'. Scores were recoded into a 2-category variable of failing/below average ('failing') or average/above average ('ok').

Self-esteem (SE): Rosenberg's self-esteem Scale (Rosenberg, 1979), a 10-item, self-report scale measured students' current level of self-esteem and global self-worth on a 5-point Likert scale, ranging from 'almost always true' to 'never true'. Total scores range from 10 (low) to 50 (high self-esteem). RSE has adequate internal consistency, test-retest reliability, face validity and convergent validity (Fleming & Courtney, 1984; Robinson & Shaver, 1973) and can be used with subjects from age ten (Olweus, 1986). The total RSE score was recoded to a 2-category variable ('low self-esteem' and 'high self-esteem') using a cut-off of 41, the median for this sample.

Locus of control (LOC): The Nowicki–Strickland Locus of Control Scale for Children (CNSIE) (Nowicki & Strickland, 1973) was used to measure internal and external attributional style. The CNSIE is appropriate for children aged 9–18 years. Studies have reported adequate internal consistency, test–retest reliability, and convergent validity (Nowicki & Strickland, 1973; Nowicki & Duke, 1983; Nunn, 1989). Total CNSIE scores ranging from 0 to 40 were recoded to a 2-category variable ('internal' and 'external' attributional style) using a cut-off of 13, the median for this sample.

Suicidality: Measurement of suicide thoughts and behaviours was based on the work of Pearce and Martin (1994). Items included in this study were: "Have you ever … thought about killing yourself?"; "… made plans to kill yourself without carrying them out?"; "…made threats to others that you will kill yourself?"; "…deliberately tried to hurt yourself?"; and "…tried to kill yourself?". We assumed that respondents distinguished deliberately hurting themselves

(i.e., deliberate self-injury [DSI]) from trying to kill themselves (suicide attempt). Response choices were 'never', and 'yes' (with six options related to timing). For the present study, responses were collapsed to provide yes/no categorical data.

Data analysis

Univariate relationships between perceived academic performance, self-esteem, LOC and suicidal thoughts and behaviours were investigated using chi-square and Pearson's correlation coefficient. Multivariate relationships were investigated with logistic regression, a useful method for health outcomes research which produces easily interpretable findings in terms of odds ratios (Farrington & Loeber, 2000). Initially, cross-sectional logistic regression analyses using the direct entry method were performed, with PAP, SE and LOC as independent variable predictors onto each of the five suicide variables as dichotomous dependent outcomes, for each time T1, T2 and T3 (thus fifteen analyses in all). Then longitudinal logistic regression analyses were conducted: (i) with PAP, SE and LOC (predictors) at T1 onto each of the five suicide variables (outcomes) at T2 and at T3; and (ii) with the same predictors at T2 and suicide variable outcomes at T3. Thus fifteen longitudinal analyses were conducted in all.

Attritional analysis

Participants responding at T1 ($n = 2603$) were grouped according to presence at T2 ($n = 1713$) or absence at T2 ($n = 890$), and presence at T3 ($n = 1579$) or absence at T3 ($n = 1024$). A series of Pearson chi-square analyses were performed to determine any significant differences between the longitudinal sample and the dropout groups. Adolescents who dropped out at T2 were more likely to indicate 'failing' perceived academic performance (10.8% vs. 6.8%, $\chi^2(1) = 11.85$, $p < 0.001$), low self-esteem (50% vs. 46.1%, $\chi^2(1) = 3.12$, $p < 0.05$), external locus of control (60.3% vs. 53.8%, $\chi^2(1) = 7.72$, $p < 0.01$), suicide thoughts (26% vs. 20.5%, $\chi^2(1) = 9.96$, $p < 0.01$), suicide plans (14.6% vs. 9.6%, $\chi^2(1) = 14.20$, $p < 0.001$), suicide threats (11.9% vs. 8.3%, $\chi^2(1) = 8.11$, $p < 0.01$), DSI (20.5% vs. 14.7%, $\chi^2(1) = 13.75$, $p < 0.001$), and suicide attempts (6.7% vs. 4.4%, $\chi^2(1) = 5.94$, $p < 0.05$). Adolescents who dropped out at T3 were more likely to indicate 'failing' perceived academic performance (11% vs. 6.4%, $\chi^2(1) = 17.78$, $p < 0.001$), external locus of control (58.7% vs. 54.1%, $\chi^2(1) = 4.17$, $p < 0.05$), suicide thoughts (27% vs. 19.5%, $\chi^2(1) = 19.91$, $p < 0.001$), suicide plans (14.1% vs. 9.5%, $\chi^2(1) = 12.81$, $p < 0.001$), suicide threats (12% vs. 67.9%, $\chi^2(1) = 11.51$, $p < 0.001$), DSI (20.2% vs. 14.4%, $\chi^2(1) = 14.57$, $p < 0.001$), and suicide attempts (7.4% vs. 3.8%, $\chi^2(1) = 15.26$, $p < 0.001$). Adolescents who dropped out at T3 were no more likely to have low self-esteem than those included in the longitudinal sample.

Results

The highest rate of 'failing' perceived academic performance was at T2 (10.9%) and the lowest rate at T1 (8.2%)(see Table 1). For boys, self-esteem improved slightly from T1 to T2 and from T2 to T3. For girls, self-esteem improved from T1 to T2 but fell marginally in T3. Distribution of self-esteem scores was negatively skewed (T1 = −0.85, T2 = −0.81, T3 = −0.49). Locus of control

Table 1
Descriptive statistics of self-esteem, locus of control, perceived academic performance and suicide variables at T1 (mean age 13 years), T2 (mean age 14 years) and T3 (mean age 15 years)

Variable		T1 M (SD)	T2 M (SD)	T3 M (SD)
Self-esteem	Boys	40.54 (6.86)	41.18 (6.63)	41.64 (6.98)
	Girls	38.97 (7.44)	39.44 (6.91)	39.33 (6.98)
Locus of control	Boys	13.83 (5.21)	12.63 (5.32)	11.92 (5.41)
	Girls	13.92 (5.31)	13.10 (5.14)	12.95 (5.21)
		n (%)	*n* (%)	*n* (%)
Perceived acad. perf.	Boys	144 (10.1)	89 (10.6)	99 (11.1)
	Girls	66 (5.8)	57 (7.3)	42 (6.2)
Suicide thoughts	Boys	260 (18.4)	179 (19.6)	177 (20)
	Girls	312 (27.4)	243 (31.7)	250 (37.7)
Suicide plans	Boys	118 (8.6)	93 (10.3)	85 (9.7)
	Girls	165 (14.7)	109 (14.3)	113 (16.9)
Suicide threats	Boys	110 (8)	73 (8.1)	62 (7.1)
	Girls	129 (11.4)	93 (12.1)	83 (12.5)
DSI	Boys	213 (15.5)	148 (16.4)	134 (15.4)
	Girls	202 (18)	135 (17.6)	140 (21.1)
Suicide attempts	Boys	54 (3.9)	33 (3.7)	33 (3.8)
	Girls	74 (6.6)	48 (6.3)	47 (7.1)

Note. Perceived academic performance as 'failing'; DSI = deliberate self-injury.

became more internalized with age, mean scores falling slightly from T1 to T2 and from T2 to T3. This change was consistent for both sexes. Locus of control was positively skewed (T1 = 0.45, T2 = 0.53, T3 = 0.48). Highest rates of reported plans (13.7%), threats (10.5%), and attempts (5.8%) were at T2. Highest rates of reported thoughts (28.3% and DSI (18.7%) were at T3 (see Table 1).

Univariate—cross-sectional analysis

Chi-square analyses of perceived academic performance by each of the five suicide variables for each of the three years (15 analyses) indicated that students perceiving academic performance as 'failing' were significantly ($p < 0.001$) more likely to report suicide thoughts, plans, threats, DSI or attempts. Chi-square values range from 19.09 for perceived academic performance and suicide threats in T1 to 85.65 for perceived academic performance and suicide threats in T2.

Significantly lower self-esteem was reported by students who believe they are 'failing'. As expected, those admitting to suicide thoughts, plans, threats, DSI and attempts had lowered self-esteem, compared to those who did not report suicidal behaviours. These results are significant at the $p < 0.001$ level and consistent for T1, T2 and T3, with chi-squares ranging from 56.13 for self-esteem with attempts in T1 to 206.53 for self-esteem with thoughts in T1.

An external attributional style (higher scores on LOC) was reported by students who believe their academic performance as 'failing' compared to those who felt their performance was 'ok'. Similarly, those admitting to suicide thoughts, plans, threats, DSI and attempts had higher LOC

scores than those not reporting suicidal behaviour. All results are significant at the $p<0.001$ level and are consistent for T1, T2 and T3 with chi-squares ranging from 36.39 for LOC and threats in T1 to 129.83 for LOC and thoughts in T3.

Finally, self-esteem and LOC were significantly negatively correlated at T1 ($r=-0.51$), T2 ($r=-0.52$) and T3 ($r=-0.54$)(all $p<0.001$).

Logistic regression—cross-sectional analysis

At T1, T2 and T3, the model using all three predictor variables, perceived academic performance, self-esteem, and LOC onto each of the five suicide-related outcome variables vs. a model with the intercept only is statistically significant ($p<0.001$) for each of the three years. In all cases, the Hosmer–Lemeshow goodness-of-fit test is greater than 0.05 implying the model's estimates fit the data at an acceptable level.

Odds ratios for each predictor variable are reasonably consistent over the three time periods (see Table 2). Holding LOC and self-esteem constant, a student who perceives their academic performance as 'failing' (compared to 'ok') is between 1.5 and 2 times more likely to report suicide thoughts, plans, threats or deliberate self-injury, and is between 2.5 and 3 times more likely to report suicide attempts. Similarly, when holding other variables constant, a student with low self-esteem (compared to high self-esteem) is between 2.5 and 3.5 times more likely to have had suicidal thoughts, plans, and threats, between 2 and 2.5 times more likely to have self-injured, and

Table 2
Odds ratios and 95% confidence intervals from cross-sectional logistic regression models at times T1, T2 and T3

		Odds Ratios (95% Confidence interval)		
Outcome	Predictor	T1	T2	T3
Suicide thoughts	PAP[a]	NS	1.58** (1.14–2.17)	1.91 (1.35–2.68)
	SE[a]	3.48 (2.73–4.46)	2.97 (2.36–3.73)	2.39 (1.90–3.02)
	LOC	2.39 (1.85–3.09)	1.86 (1.48–2.34)	2.24 (1.77–2.83)
Suicide plans	PAP[a]	1.97** (1.28–3.03)	2.15 (1.50–3.07)	1.91** (1.30–2.82)
	SE[a]	3.55 (2.49–5.08)	2.76 (2.02–3.76)	2.93 (2.12–4.08)
	LOC	2.74 (1.88–4.02)	1.91 (1.41–2.59)	2.35 (1.70–3.20)
Suicide threats	PAP[a]	NS	1.86** (1.26–2.75)	1.65* (1.06–2.54)
	SE[a]	3.43 (2.36–5.00)	3.72 (2.57–5.38)	2.51 (1.75–3.61)
	LOC	1.76** (1.21–2.56)	1.72** (1.23–2.42)	1.95 (1.36–2.79)
DSI	PAP[a]	1.53* (1.02–2.30)	2.15 (1.54–3.01)	1.69** (1.17–2.44)
	SE[a]	2.58 (1.96–3.41)	2.17 (1.67–2.84)	1.99 (1.51–2.62)
	LOC	2.33 (1.74–3.24)	2.06 (1.58–2.70)	2.34 (1.77–3.10)
Suicide attempts	PAP[a]	2.87 (1.64–5.03)	3.29 (2.09–5.18)	2.56 (1.55–4.26)
	SE[a]	4.30 (2.26–7.25)	4.13 (2.39–7.14)	2.26** (1.36–3.73)
	LOC	1.79* (1.02–3.13)	1.84* (1.13–3.00)	2.90 (1.70–4.93)

Note. Logistic regression, direct entry, odds ratios given for each dichotomous predictor with other predictors controlled. DSI = deliberate self-injury; PAP = perceived academic performance; SE = self-esteem; LOC = locus of control; NS = not significant.

[a] Odds ratios and confidence intervals inverted. All odds ratios significant at $p<0.001$ except * $p<0.05$; ** $p<0.01$.

between 2 and 4 times more likely to report suicide attempts. Finally, when holding other variables constant, a student with external attributional style (compared to internal style) is between 1.5 and 3 times more likely to report suicide thoughts or behaviours.

Univariate—longitudinal analysis

Chi-square analysis reveals weak associations between perceived academic performance at T1 and suicidality at T2 and T3; only suicide attempts at T3 reaches a level of significance better than $p<0.01$. Stronger associations between perceived academic performance at T2 and suicidality at T3, however, are evident.

Self-esteem at T1 has stronger and more consistent associations with suicidality over the shorter time intervals T1 to T2, and T2 to T3; than over the longer interval T1 to T3.

Locus of control follows a somewhat inconsistent pattern of associations with suicidality. (See Table 3).

Logistic regression—longitudinal analysis

First, the associations of predictors at T1 with outcomes at T2 and T3 were explored. Logistic regression analyses with direct entry of perceived academic performance, self-esteem and LOC at T1 onto suicide variables at T2 and at T3 were conducted. As expected from the preceding chi-square analyses, perceived academic performance at T1 is not a significant predictor to any suicide

Table 3
Pearson's Chi-Square of perceived academic performance (PAP), self-esteem and locus of control (LOC) at T1 and T2 with suicide variables at T2 and T3

Independent variable	Dependent variable	T1 with T2 $n=1713$	T2 with T3 $n=1669$	T1 with T3 $n=1579$
PAP	Suicide thoughts	3.59*	17.88	5.08*
	Suicide plans	3.85*	24.67	NS
	Suicide threats	6.89*	13.16**	NS
	DSI	4.77*	17.15	3.99*
	Suicide attempts	NS	35.62	11.66**
Self-esteem	Suicide thoughts	47.35	79.55	20.66
	Suicide plans	19.61	39.83	24.42
	Suicide threats	25.70	21.94	5.16
	DSI	16.66	31.86	10.07**
	Suicide attempts	14.79	28.04	12.71
LOC	Suicide thoughts	35.68	31.46	9.81**
	Suicide plans	15.87	23.84	10.58**
	Suicide threats	6.99**	NS	6.81**
	DSI	35.01	10.77**	7.80**
	Suicide attempts	7.93**	13.00	10.69**

Note. DSI = deliberate self-injury. NS = not significant. All chi-square statistics significant at $p<0.001$ except * $p<0.05$; ** $p<0.01$.

variables at T2 or T3, with the exception of a weak association with suicide threats at T2 (Odds Ratio = 1.87, 95% Confidence Interval = 1.03–3.40, $p < 0.05$). Contributions from LOC and self-esteem at T1 are significant for some, though not all, suicide variables at T2 and T3. Model chi-square and Nagelkerke R^2 values indicate that only a small amount of the variance in data is explained by these models: 6% or less for the T1 to T2 model; and 4% or less for the T1 to T3 model. Results are summarized in Table 4.

Second, the utility of the model for prediction over the later time interval, T2 to T3, was explored. Logistic regression models for predictors at T2 and outcomes at T3 show significant independent contributions from perceived academic performance at T2 to all suicide variables at T3, in addition to contributions from self-esteem and LOC. Model chi-square and Nagelkerke R^2 values indicate that this T2 to T3 model has improved explanation of data variance relative to the previous models (See Table 5).

Thus a student who indicates their academic performance as 'failing' at T2 is more than twice as likely to make suicide plans and threats, and to self-injure, and more than 4 times more likely to report suicide attempts, than a student who feels their academic performance is 'ok'. This increased risk is after the effects of self-esteem and locus of control have been controlled for.

Table 4
Longitudinal logistic regression models with predictors perceived academic performance (PAP), self-esteem and locus of control (LOC) at T1 onto suicide variables at T2 and T3

		Odds Ratios (95% Confidence interval)	
Outcome at T2 or T3	Predictor at T1	T1 to T2	T1 to T3
Suicide thoughts	PAP[a]	NS	NS
	Self-esteem[a]	1.77 (1.36–2.32)	1.57** (1.19–2.07)
	LOC	1.83 (1.39–2.42)	NS
Model $\chi^2(3)$; Nagelkerke R^2		55.5; 0.060	20.59; 0.024
Suicide plans	PAP[a]	NS	NS
	Self-esteem[a]	1.58* (1.10–2.27)	1.75** (1.21–2.53)
	LOC	1.76** (1.20–2.56)	NS
Model $\chi^2(3)$; Nagelkerke R^2		26.34; 0.038	20.05; 0.030
Suicide threats	PAP[a]	1.87* (1.03–3.40)	NS
	Self-esteem[a]	2.05 (1.38–3.04)	NS
	LOC	NS	1.54* (1.004–2.37)
Model $\chi^2(3)$; Nagelkerke R^2		25.58; 0.040	NS
DSI	PAP[a]	NS	NS
	Self-esteem[a]	NS	NS
	LOC	2.36 (1.69–3.29)	NS
Model $\chi^2(3)$; Nagelkerke R^2		39.66; 0.049	9.56*; 0.013
Suicide attempts	PAP[a]	NS	NS
	Self-esteem[a]	1.93* (1.09–3.43)	2.02* (1.07–3.82)
	LOC	NS	NS
Model $\chi^2(3)$; Nagelkerke R^2		16.24; 0.039	15.77**; 0.042

Note. Logistic regression, direct entry, odds ratios for each dichotomous predictor with other predictors controlled. CI = confidence interval. DSI = deliberate self-injury. NS = not significant.

[a] Odds ratios (95% CI) inverted. All odds ratios and χ^2 significant at $p < 0.001$ except * $p < 0.05$; ** $p < 0.01$.

Table 5
Longitudinal logistic regression with predictors perceived academic performance (PAP), self-esteem and locus of control (LOC) at T2 onto suicide variables at T3

Outcome at T3	Predictor at T2	Odds Ratios (95% CI)	Model $\chi^2(3)$	Nagelkerke R^2
Suicide thoughts	PAP[a]	1.67* (1.08–2.58)	85.55	0.087
	Self-esteem[a]	2.44 (1.87–3.19)		
	LOC	1.36* (1.039–1.768)		
Suicide plans	PAP[a]	2.49 (1.52–4.08)	60.06	0.083
	Self-esteem[a]	2.32 (1.57–3.41)		
	LOC	1.53* (1.051–2.227)		
Suicide threats	PAP[a]	2.18** (1.23–3.85)	29.02	0.047
	Self-esteem[a]	2.51 (1.62–3.89)		
	LOC	NS		
DSI	PAP[a]	2.17** (1.36–3.47)	38.30	0.047
	Self-esteem[a]	1.85 (1.33–2.56)		
	LOC	NS		
Suicide attempts	PAP[a]	4.31 (2.29–8.13)	48.01	0.115
	Self-esteem[a]	3.22** (1.63–6.37)		
	LOC	NS		

Note. Logistic regression, direct entry method, odds ratios given for each dichotomous predictor with other predictors controlled. CI = confidence interval. DSI = deliberate self-injury. NS = not significant.

[a] Odds ratios and confidence intervals inverted. All odds ratios and χ^2 significant at $p<0.001$ except * $p<0.05$; ** $p<0.01$.

Self-esteem at T2 makes a significant independent contribution to all suicidal behaviours at T3. A student indicating low self-esteem at T2 is more than twice as likely to report suicide thoughts, plans, threats and self-injury, and 3 times more likely to report a suicide attempt, than a student with high self-esteem.

Locus of control at T2 makes independent contributions to suicide thoughts and plans at T3, but the relationship with suicide threats, DSI and attempts is fully mediated by addition of self-esteem and perceived academic performance.

Discussion

Two issues are addressed in this study. First, we investigated cross-sectional associations of a model of perceived academic performance, self-esteem and locus of control with suicidality in a large community sample of adolescents. Second, we examined longitudinal predictiveness of the model within the same sample across three waves over two years. Results suggest a possible screening question for teachers and other professionals to prompt referral for in-depth clinical assessment of suicide risk.

Perceived academic performance, self-esteem and LOC are each independently and significantly associated with suicidality at ages 13, 14 and 15 years. These results are consistent with previous research (Goldney et al., 1991; Pearce & Martin, 1994). A model including perceived academic

performance, self-esteem and LOC together, can significantly indicate suicidality within each of the three cross-sectional waves. This validates our previous work (Richardson et al., 2004).

The longitudinal analyses from T1 to T2, and from T1 to T3, reveal some significant though somewhat inconsistent relationships between self-esteem and suicidality, in partial support of Schwartz and Kaslow (2000); and between LOC and suicidality, in partial support of Beautrais et al. (1999). After controlling for the contributions from self-esteem and locus of control, perceived academic performance at time 1 (age 13 years) makes no independent contribution to suicidality at either time 2 (age 14 years) or time 3 (age 15 years).

In contrast, the longitudinal analysis from time 2 to 3 (Table 4) shows a strong and consistent contribution from perceived academic performance at time 2 to all suicidal behaviours at time 3, over and above the contributions from low self-esteem and external locus of control.

These findings may indicate the relative weakness of the perceived academic performance question at time 1 (first year of high school), when, at 13 years of age on average, self-evaluations of academic performance may not yet be an issue. The results of time 2 with time 3 suggest that the importance and relevance of perceived academic performance increases with age.

Our use of dichotomous, rather than categorical or continuous, independent variables in our model was an attempt to find the simplest possible combination of assessments or judgments that a teacher might make, without anxiety, in the classroom situation. Support for our findings from detailed analyses of our first wave data with a four-category variable assessing perceived academic performance and continuous variables assessing self-esteem, locus of control and depressive symptoms (Richardson et al., 2004), indicates the associations revealed here are not spurious.

This analysis was limited to the sub-group of students who could be accurately traced from time 1 to 2. Thirteen percent of the initial sample at time 1 was lost to the study by time 3; and some remaining students completing the survey at each wave were not able to be identified as the same person, as use of initials and birth-dates for identification was thwarted by responses of improbable dates or initials such as YYY. This may have occurred because although students were assured their responses were confidential, for ethical reasons it was necessary to identify students at increased risk of suicide. Thus between time 1 and time 2, 'identified students' were referred onward for in-depth mental health assessment; some of these students were uncooperative and may have wished to hide their identity in the second and third waves. Attrition analysis confirms that those who dropped out are at greater risk of suicidal behaviours than those who continued at time 2 and 3. Therefore the generalisability of our findings is limited. This problem highlights the difficulties of balancing longitudinal coding with subject confidentiality.

Conclusion

Results of this study confirm perceived academic performance as a useful construct. A perception of 'failing' has strong associations with suicidality within any academic year. It appears that academic performance may gain importance with each successive school year. Students in the second wave of our study were more likely to report a perception of 'failing', and this was able to predict suicidal thoughts and behaviour over the subsequent year. Results suggest that teachers and others may be able to use the simple question, "How do you think you are doing

academically?'' to inform decisions about the need for in-depth clinical assessment of risk for suicide in adolescents. Future research needs to investigate associations in later school years, and the long-term ability of perceived academic performance at age 14 to predict suicidal behaviours and suicide risk at later ages.

Acknowledgements

The South Australian Health Commission funded the original EDED research project.

References

Australian Bureau of Statistics. (2001). *Information paper: Suicides* 2001. Canberra: Australian Bureau of Statistics.

Beautrais, A. L. (2000). Risk factors for suicide and attempted suicide among young people. *Australian and New Zealand Journal of Psychiatry*, *34*, 236–420.

Beautrais, A. L., Joyce, P. R., & Mulder, R. T. (1999). Personality traits and cognitive styles as risk factors for serious suicide attempts among young people. *Suicide Life Threatening Behavior*, *29*(1), 37–47.

DeMello, L. R., & Imms, T. (1999). Self-esteem, locus of control and coping styles and their relationship to school attitudes of adolescents. *Psychological Studies*, *44*(1 & 2), 24–34.

Farrington, D. P., & Loeber, R. (2000). Some benefits of dichotomization in psychiatric and criminological research. *Criminal Behaviour and Mental Health*, *10*, 100–122.

Fleming, J. S., & Courtney, B. E. (1984). The dimensionality of self-esteem: Some results for a college sample. *Journal of Personality and Social Psychology*, *46*, 404–421.

Goldney, R. D. (1982). Locus of control in young women who have attempted suicide. *Journal of Nervous and Mental Diseases*, *170*, 198–201.

Goldney, R. D., Smith, S., Winefield, A. H., Tiggeman, M., & Winefield, H. R. (1991). Suicide ideation: It's enduring nature and associated morbidity. *Acta Psychiatrica Scandinavica*, *83*, 115–120.

Horowitz, L. M., Wang, P. S., Koocher, G. P., Burr, B. H., Smith, M. F., Klavon, S., & Cleary, P. D. (2001). Detecting suicide risk in a paediatric emergency department: Development of a brief screening tool. *Paediatrics*, *107*(5), 1133–1137.

Kazdin, A. E., French, N. H., & Unis, A. S. (1983). Helplessness, depression, and suicide intent among psychiatrically disturbed inpatient children. *Journal of Consulting and Clinical Psychology*, *51*, 504–510.

King, K. A., Price, J. H., Telljohann, S. K., & Wahl, J. (1999). High school teachers' perceived self-efficacy in identifying students at risk for suicide. *The Journal of School Health*, *69*(5), 202–207.

Lennings, C. J. (1994). A cognitive understanding of adolescent suicide. *Genetic Social and General Psychology Monographs*, *120*(3), 287–307.

Martin, G., Allison, S., Pearce, C., Cornelissen, S., Rafferty, S., Mead, P., & Williams, K. (1996). Early detection of emotional disorder with particular reference to suicidal behaviours: A preliminary report. In B. Singh, & F. Judd (Eds.), *17th Geigy Psychiatric Symposium: Suicide* (pp. 27–45). Melbourne, Australia: CIBA-Geigy.

National Center for Injury Prevention and Control. (2003). *Suicides in the United States*. Centers for Disease Control and Prevention. Retrieved, March 10, 2003, from http://www.cdc.gov/incipc/factsheets/suifacts.htm

Nowicki Jr., S., & Duke, M. P. (1983). The Nowicki-Strickland life-span locus of control scales: Construct validation. In H. M. Lefcourt (Ed.), *Research with the Locus of Control Construct*, Vol. 2 (pp. 9–51). Waterloo: Academic Press Inc.

Nowicki Jr., S., & Strickland, B. R. (1973). A locus of control scale for children. *Journal of Consulting and Clinical Psychology*, *40*, 148–154.

Nunn, G. D. (1989). Concurrent validity between the personal attribute inventory for children and the Nowicki-Strickland locus of control scale. *Journal of Human Behavior and Learning*, *6*(2), 46–48.

Olweus, D. (1986). Assessment of global negative self-evaluations and perceived stability of self in Norwegian preadolescents and adolescents. *Journal of Early Adolescence*, *6*(3), 269–278.

Pearce, C. M., & Martin, G. (1993). Locus of control as an indicator of risk for suicidal behaviour among adolescents. *Acta Psychiatrica Scandinavica*, *88*, 409–414.

Pearce, C. M., & Martin, G. (1994). Predicting suicide attempts among adolescents. *Acta Psychiatrica Scandinavica*, *90*, 324–328.

Pinto, A., & Whisman, M. A. (1996). Negative affect and cognitive biases in suicidal and non-suicidal hospitalized adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35*(2), 158–164.

Pinzon Perez, H., & Perez, M. A. (2001). A study of suicide-related behaviors among Colombian youth: Reflections on prevention and implications for health education. *American Journal of Health Education*, *32*(5), 288–292.

Reinecke, M. A., & DuBois, D. L. (2001). Socio-environmental and cognitive risk and resources: Relations to mood and suicidality among inpatient adolescents. *Journal of Cognitive Psychotherapy*, *15*(3), 195–222.

Rich, C. L., Fowler, R. C., & Fogarty, R. C. (1990). San Diego suicide study: The adolescents. *Adolescence*, *25*, 845–865.

Richardson, A.S., Bergen, H.A., Martin, G., Roeger, L., & Allison, S., (2004). Perceived academic performance as an indicator of risk of attempted suicide in young adolescents. Submitted for publication.

Robinson, J. P., & Shaver, P. R. (1973). *Measures of social psychological attitudes*. Ann Arbor: Institute for Social Research.

Rosenberg, M. (1979). *Conceiving the self*. Malabar, FI: Krieger Publishing Company.

Rudd, M. D., & Joiner Jr., T. E. (1998). An integrative conceptual framework for assessing and treating suicidal behaviour in adolescents. *Journal of Adolescence*, *21*, 489–498.

Samaritans. (1999). *Young People and Suicide*.Retrieved11April, 2003, from http://www.samaritans.org.uk/know/statistics.shtm#

Schwartz, J. A. J., & Kaslow, N. J. (2000). Psychological, cognitive, and interpersonal correlates of attributional change in adolescents. *Journal of Clinical Child Psychology*, *29*(2), 188–198.

Thompson, E. A., & Eggert, L. L. (1999). Using the suicide risk screen to identify suicidal adolescents among potential high school dropouts. *Journal of the American Academy of Child and Adolescent Psychiatry*, *38*(12), 1506–1514.

Tomori, M., & Zalar, B. (2000). Characteristics of suicide attempters in a Slovenian high school population. *Suicide and life-threatening behavior*, *30*(3), 222–238.

White, J., Rouse, D., & Jodion, N., 1997. *Suicide prevention training needs among school gatekeepers in British Columbia*: *A provincial summary report*. BC Suicide Prevention Program, CUPPL, UBC.

WHO. 2002. *Prevention of Suicidal Behaviours*: *A Task for All*. World Health Organisation. Retrieved 11 April, 2003, from http://www5.who.int/mental_health/main.cfm?p=0000000140