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Adolescent Risk: The Co-Occurrence of Illness, Suicidality, and Substance Use

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Illness is rarely considered a "risk factor" in adolescence. This study tests illness, suicidality and substance use as outcome measures in a path analysis of 1028 Swiss adolescents in secondary prevention programs. The model showed that negative mood (depression and anxiety) predicted two paths. One path led from negative mood to suicidality and from there to substance use. The other path led directly from negative mood to illness. Traditional protective factors (good relationships, secure identity) protected against the negative mood-suicide-substance path, but not against the negative mood-illness path.

KEY WORDS: adolescent at risk; illness; suicidality; substance use.

ILLNESS, SUICIDALITY, AND SUBSTANCE USE

Research on risk and protection (RAP) in adolescence identifies an array of macro, micro, intra- and interpersonal factors which, in various combinations and interactions contribute to young people either being vulnerable to or resisting all manner of potential risks. In a recent study Narring *et al*. (2003) found that among 9268 Swiss adolescents, those who identified themselves as having chronic conditions (such as diabetes, asthma, or heart disease) were more likely than adolescents without health problems to engage in dangerous behavior including driving without seat belts, drink driving, substance use and suicide attempts. Poor health is associated with poverty, acting out, negative mood, suicidality, and difficult family relationships, all of which are associated with vulnerability. Nevertheless, research on adolescent RAP factors that address health typically defines "health risks" behaviorally, for example, as personal safety, violence, substance use, suicide attempts, premature sexuality and so on. In other words, health status—which is measured in other age groups by physical symptoms of illness, or doctor visits—is rarely seen as either an outcome or an RAP factor in adolescence.

RAP factors have been successfully modeled using path models to predict outcomes based on interactions. The aim of this paper is to propose and test a Structural Interactive Path (SIP) model of adolescent risk and protective factors that includes illness as well as suicidality and use of tobacco, alcohol, and cannabis as interacting outcome measures. One caveat about the choice of outcome measures: Generally, one study's outcome measure is another study's risk factor. For example, substance use, negative mood and suicide have each been seen as a risk for one of the others. In this paper we examine the interaction of the outcome measures as risk factors for each other, as well as outcome measures for other risks.

NEGATIVE MOOD AS A RISK FACTOR

Negative Mood and Illness

Recent studies document the predictive association between negative mood and illness in nonelderly patients

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(Berardi *et al*., 2002; Ormel *et al*., 1999). Berardi *et al*. (2002) found that among 1896 primary care patients in Italy aged 14 and over, 7.8–9% presented as depressed, and depression was related to severity of physical illness as well as to disability. The Berardi findings fail to address the question of the order of onset: Which came first, illness or depression? Ormel *et al*. (1999) specifically address the role of depression as a predictor of illness in a study of 1051 nonelderly people in The Netherlands who consulted a medical doctor. They found that 14% were depressed but disability free at time of first consultation. Patients assessed as depressed but disability free at first visit were 1.5 times more likely to develop a physical illness/disability at 3-month follow-up and 1.8 times more likely to have a physical disability at 12-month follow-up. This suggests that depression and/or negative mood precedes the onset of physical symptoms. However, Hotopf *et al*. (1998) in a longitudinal cohort study in the United Kingdom found that abdominal pain in adolescence was associated with psychiatric disorder in adulthood. Concerning emotionality and physical symptoms, Egger *et al*. (1999) showed a strong relationship between emotional disorder and somatic complaints in younger adolescents (9–16 years). There were gender, illness and complaint specific associations in boys and girls. Williams *et al*. (2002) examined the concurrent and longitudinal relations between self-assessed health, and depressive symptoms among adolescents. Physical symptom reports were related to depressive symptoms both concurrently and longitudinally.

In addition, research indicates that depression onset is occurring earlier in life today than in past decades. A recently published longitudinal prospective study found that early-onset depression often persists, recurs, and continues into adulthood, and indicates that depression in youth may also predict more severe illness in adult life. Depression in young people often co-occurs with other mental disorders, most commonly anxiety, disruptive behavior, or substance abuse disorders, and with physical illnesses, such as diabetes (Boice, 1998).

Thus there are consistent reports of the association between negative mood variables and physical illness, yet the logical and chronological relationships demand further exploration, particularly among adolescents, since both illness and negative mood in adolescence are predictive of problematic life course.

Negative Mood and Suicidality

Both negative mood and substance use have been associated with risk for suicide in adolescence (Giaconia *et al*., 2001). In 1997, suicide was the 3rd leading cause of death among 10–24-year-olds in the United States. NIMH-supported researchers (National Institute of Mental Health, 2003) found that among adolescents who develop major depressive disorder, as many as 7% may commit suicide in the young adult years. Predictably, depression in children and adolescents is associated with an increased risk of suicidal behaviors. This risk may rise, particularly among adolescent boys, if the depression is accompanied by conduct disorder and alcohol or other substance abuse. Finally, in an extensive review of the literature on the relationship between adolescent suicidality and risk factors, Beautrais (2000) found that the risk of suicidal behavior increases among young people who have a mood disorder or are involved in harmful use of drugs including alcohol.

Negative Mood and Substance Use

The National Institute of Mental Health (2002) estimates that at least 2.5% of children under the age of 18 (1.8 million American children) are "severely depressed." The American Academy of Child and Adolescent Psychiatry (Giaconia *et al*., 2001) places the number at 5% (3.4 million). A number of epidemiological studies have reported that up to 2.5% of children and up to 8.3% of adolescents in the United States suffer from depression. Negative mood includes both anxiety and depression. Anxiety has been seen as predisposing teenage boys to drug use, and depression has been examined as both prior to and subsequent to both drug use and suicide attempts (Berardi *et al*., 2002; Christie *et al*., 1988). A number of studies on general populations have shown comorbidity between depressive mood and substance use (Brown *et al*., 1996; Fergusson *et al*., 1996; Michel *et al*., 1998; Brook *et al*., 1998). According to Henry *et al*. (1993), depressive mood precedes substance use at the age of 15, but only in boys. A recently presented review showed that psychosocial problems might be more a cause than a consequence of cannabis use, especially with regard to associations between use and mental illness (MacLeod *et al*., 2004). Wilens *et al*. (1997) also confirm that anxiety precedes substance use in adolescents. However, an epidemiological study on a very large number of adolescents has shown that substance use precedes depressive mood (Burke *et al*., 1994). Contrary to these findings, Deykin *et al*. (1987) found that both drug use and alcohol use were followed by anxious disturbances. Christie *et al*. (1988) reported that being anxious doubled the risk of using drugs. Trait anxiety and anxiety sensitivity were found to be important personality risk factors for substance use (tobacco, alcohol and cannabis; Comeau

et al., 2001). Norton (2001) reports the same results. In short, depressive mood, anxiety and conduct disorders are the most often mentioned intra-personal predictors of substance use. However, these mental disorders have also been observed as consequences of substance use.

SECURE SELF AS A PROTECTIVE FACTOR

A secure self, based on self-esteem and self-worth, is an emotional component of self-evaluation of personal qualities and competencies. The term self-esteem and self-worth are most commonly used to describe a global view of self, without reference to specific competencies (Harter and Marold, 1994; Rosenberg *et al*., 1995). Studies of self-esteem in adolescence have consistently found more positive self-esteem in males than in females (Statham and Roades, 2001). Some studies have also reported age trends, with levels of self-esteem increasing across adolescence (Block and Robins, 1993). Rosenberg reported in 2 papers on a longitudinal study of boys who were in the 10th grade (Rosenberg *et al*., 1989; Rosenberg *et al*., 1995). Data from 1886 boys who participated in the first 2 waves of data collection were included. In the 1st of these studies, Rosenberg *et al*. (1989) assessed reciprocal relations between global self-esteem and depressive affect. They significantly affected each other, but the negative relationship between these 2 measures was due more to the effects of depressive mood on self-esteem than the reverse. In contrast, relations between grades and self-esteem were primarily attributable to effects of school performance on self-esteem, rather than the reverse. "The significant effect of school marks on self-esteem lends support to self-esteem theory. If superior performance within a valued arena of achievement – academic performance – produces favorable reflected appraisals, social comparisons, and self attributions, then we can understand why grades exercise a positive effect on global self-esteem" (Rosenberg *et al*., 1989, p. 1012).

In the 2nd study (Rosenberg *et al*., 1995) these researchers further examined associations between both specific and global self-esteem and affective and behavioral outcome measures. They found substantially higher correlations between measures of positive affect (happiness, life satisfaction) or negative affect (depression, general anxiety, irritability, negative affective states) and global self-esteem than between the same measures and academic self-esteem.

Block *et al*. (1991) examined the consistency of negative affect from childhood through late adolescence. They found that depressive symptoms at age 18 were associated with personality characteristics at earlier ages. Further they found that, by age 7, boys who were later identified as being depressed tended to be described by their teachers as aggressive, undercontrolled, and limit testing. Girls reporting relatively high levels of depression, on the other hand, tended to be seen as academically bright and thoughtful. Depression at age 18 was associated with low self-esteem for girls, but not for boys.

Secure Self and Illness

While there is little literature that directly assesses the relationship between self-esteem and physical health, there are a myriad of reports (MacLeod and Austin, 2003) on the self-esteem or stigma concerns of adolescents with chronic health conditions (e.g. epilepsy). Our concern with illness as an adolescent risk factor alerts us to the co-occurrence of lowered self-esteem and physical illness in adolescent suicidality (Guillon *et al*., 2003). In general, depression and self-esteem are seen as the inverse of one another (Shrier *et al*., 2001), and the relationship between depression and illness (that is, the inverse of secure self) is well documented.

Secure Self and Suicidality

Recent research has noted the correlation between self-esteem and psychological resilience even among at risk youth. Csorba *et al*. (2003) for example, in a study of 490 consecutively referred 8–17-year-old outpatients, found that suicidal youth differed from nonsuicidal depressed youth on only 3 of 130 items: negative self-esteem, hopelessness, and proneness to violence. Put another way, positive self-esteem could be considered a protective factor against suicide attempts and suicidal ideation. Guillon *et al*. (2003) also found that suicidal adolescents had significantly lower self-esteem than adolescents with other clinical diagnoses. Thus we expect a secure sense of self to be protective against suicidality.

Secure Self and Substance Use

One body of literature that looks at resilient coping examines the relationship of school adjustment, behavioral self-regulation, self-confidence, competence, self-efficacy and self-control to protection from the temptations of delinquent peers and substance use (Byrne, 2000; Hawkins *et al*., 1992). These variables can be said to represent a developmental re-organization of a secure sense of self in relation to the environment (Levitt and Selman,

1996). A number of studies pursuing the same line of questioning (e.g. McGee and Williams, 2000) have shown negative relationships among measures of self-concept and substance use.

FAMILY RELATIONS AS A PROTECTIVE FACTOR

Good family relations are consistently associated with protection against early onset and prolonged substance use in adolescence, while negative family relations create vulnerability for both suicidality and substance use.

Family Relations and Illness

A number of previous studies have suggested that children from single-parent families are likely to be in poorer health compared with other children (Wadsworth *et al*., 1983; Mauldon, 1990; Montgomery *et al*., 1996). The risk of accidental injuries and infections, in particular, seems to be elevated among children from single-parent families (Moyes, 1980; Wadsworth *et al*., 1983; Roberts, 1994; Fleming and Charlton, 1998). The risk increase seems to vary from 2- to over 3-fold (Roberts, 1994; Fleming and Charlton, 1998). Low income, poor housing, and lack of supervision together with stress and insecurity of a single-parent in child rearing have been suggested to explain the increased risk of illness and accidental injury among children in single-parent households (Wadsworth *et al*., 1983; Fleming and Charlton, 1998). All of these factors, in turn, (low income, bad neighborhood, parental stress) have been identified as RAP factors. Adolescents from single-parent families also had more somatic complaints (aches and pains, palpitations, nausea, dizziness, difficulties falling asleep, irregular bowel function, and heartburn) than other adolescents (Aro, 1989; Aro and Palosaari, 1992), but according to some studies the difference was apparent only for females (De Goede and Spruijt, 1996). On the other hand, Wingert *et al*. (1968) and Brink and Vanderpool (1982) found no relationship between family background and physical illness or hospitalization. Parallel findings of an increased risk of physical illness among the adult offspring of single-parent families emerged in a recent case-control study by Agid *et al*. (1999). Subjects with early parental loss (due to parental death or permanent separation) reported statistically significantly more cases of physical illness than other subjects (45.8% vs. 15.1%, $p = 0.01$).

Family Relations and Suicidality

Good family relationships are said to protect against adolescent suicide. Zweig *et al*. (2002), in a study of over 12,000 American adolescents, found that good family relations were associated with lower risks for suicidality as well as lower risks for substance use.

Family Relations and Substance Use

Previous research (Wills *et al*., 2001) had shown that parental support is inversely related to substance use. In a sample of 3984 young adolescents in 5 European cities McArdie *et al*. (2002) found that confiding in mother was the most significant protective factor against drug use. In 4 out of 5 cities, living with both parents was a protective barrier against drug use. Parental supervision offered protection, regardless of family constellation. Only in Dublin did peers have a greater influence than parents.

A THEORETICAL MODEL

In this paper we propose and test a SIP model with illness, suicide and substance use. Negative mood has been associated with all three outcomes. What paths lead from negative mood to each of the outcomes? What are the relationships among illness, suicidality and substance use for at risk adolescents? Poor family relations have been associated with all 3 outcomes, and variables associated with a secure sense of self have been seen as protective of both suicide and substance use. We therefore proposed to test the following SIP model (Fig. 1).

To summarize we can formulate the following model:

1. Negative mood (depression, anxiety)
   (a) represents a risk factor for higher suicidal thinking which in turn is a risk for substance use,
   (b) is a leading indicator for other illness related concerns, and (c) is negatively associated with the relationship with parents.
2. Secure self (self-esteem, self-efficacy) is regarded as a direct protective factor against suicidal thinking and indirectly protects against substance use.
3. Secure self is connected to a good relationship with parents and protects against substance use.
4. A good relationship with parents is also a protective factor against suicidal thinking.
5. Protective factors have little or no effects on illness but risk factors do.

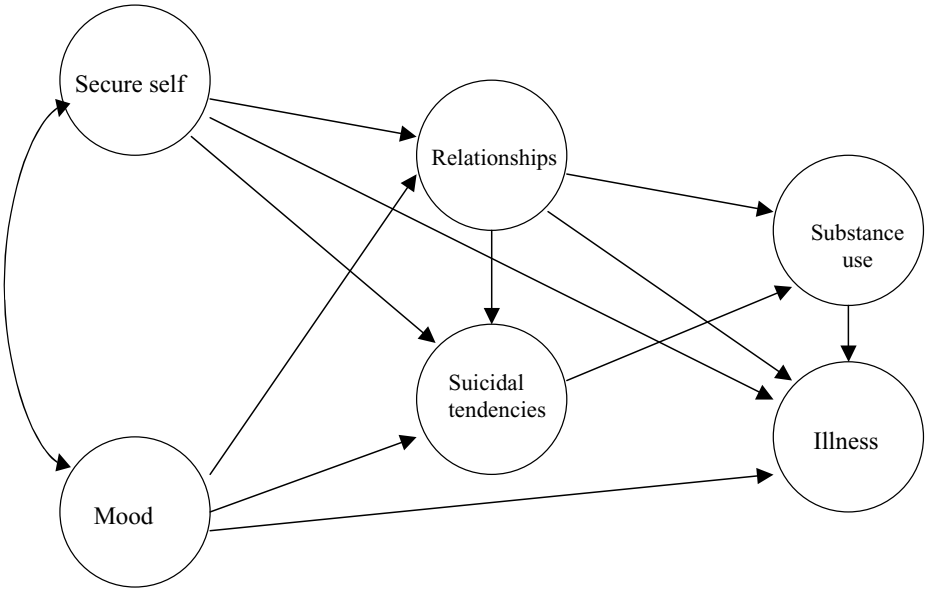

Fig. 1. Theoretical model.

6. In general for all hypotheses effects should vary by age and gender.

To test these hypotheses we use a path model.

METHODS

supra-f (*Sucht-Prävention Forschung*) is a national project begun in 1999 with the aim of answering the following question: What works in secondary prevention for adolescents at risk? The national projects, initiated by the Swiss Federal Office of Public Health, were implemented by 12 intervention centers across Switzerland. These centers vary in their concepts, depending on the local sites' perception of need, the local resources available, and each community's approach to intervention.

The *supra-f* programs target adolescents aged 11–20 who face situations that place them at risk of school dropout, substance use or deviant behavior. The sample consists of 1028 adolescents. There are twice as many boys than girls. The younger boys and girls (11–15) are in school, the older ones (16–20) have a professional background. Criteria for inclusion in the program are one or more of the following: (a) substance use, (b) deviant behavior, (c) school absenteeism or dropping out of vocational training, (d) family problems, and/or (e) psychological problems.

PROCEDURE

Data were collected at entry to the program with a self-report questionnaire and an interview. The questionnaire took about 45 min to administer, the interview about 18 min. The staff could be asked for help in case of need (e.g., not understanding the sense of a question). The survey was administered under conditions of confidentiality. The adolescent's results were coded to protect confidentiality of data.

MEASURES

The questionnaires can be classified as including (1) sociodemographical data, (2) psychological data, (3) drug use, (4) physical complaints, and (5) contacts with the health system. Items on sociodemographic characteristics included age, gender, family and school background. The psychological data included depression, a 15 item questionnaire with a 5-point Likert scale (item example: "I was sad," scale: *rarely or not at all–less than 1 day weekly* to *mostly–5 to 7 days weekly*; Hautzinger and Bailer, 1993), two instruments for anxiety: the German version of the SCL-90-R Anxiety Scale (example: "Within the last week I have been anxious"; Franke, 1995) and the trait version of the STAI by Laux *et al*. (1981), measures of self-image (example: "I am sure that I do the right things"; Harter, 1982), self-efficacy (example: "Whatever happens I will cope with it," Jerusalem and Schwarzer,

Table I. Scales and Reliability of the Instruments Used

	Items		Alpha	Authors
Depression	15	5-Point scale	0.89	Hautzinger and Bailer (1993)
Anxiety (SCL-90-R)	10	4-Point scale	0.89	Franke (1995)
Anxiety (STAI trait)	20	4-Point scale	0.90	Laux *et al*. (1981)
Self-esteem	7	4-Point scale	0.84	Harter (1982)
Self-efficacy	10	4-Point scale	0.83	Jerusalem and Schwarzer (1999)
Relationship with parents: cohesion	3	4-Point scale	0.59	Armsden and Greenberg (1987)
Relationship with parents: emotional	5	4-Point scale	0.85	Armsden and Greenberg (1987)
Suicidal thinking; attempts	3	2-Point scale	0.62	Arènes *et al*. (1998); Ferron *et al*. (1997); Narring *et al*. (1994)
List of physical complaints	14	4-Point scale	0.82	Ferron *et al*. 1997; Narring *et al*. 1994
Alcohol use	5	6-Point scale	0.84	Arènes *et al*. (1998); Narring *et al*. (1994)
Cannabis use	1	5-Point scale	—	Arènes *et al*. (1998); Narring *et al*. (1994)
Smoking	1	6-Point scale	—	Arènes *et al*. (1998); Narring *et al*. (1994)
List of contact to the health system	11	4-Point scale	0.60	Ferron *et al*. (1997); Narring *et al*. (1994)

1992), relationship with parents (example: "My parents accept me as I am"; Armsden and Greenberg, 1987), and suicidal thinking and suicide attempts (example: "Have you thought about committing suicide within the last 12 months?"; Arènes *et al*., 1998; Ferron *et al*., 1997). We measured substance use including cigarette smoking (*never* to *more than 20 daily*), alcohol (*never* to *every day*) and cannabis use (*never* to *every day*) for the last 30 days (Arènes *et al*., 1998; Narring *et al*., 1994). The list of physical complaints and the list of contacts with health systems are reported in Ferron *et al*. (1997) and Narring *et al*. (1994). Validity data are reported in the respective works cited. In Table I we report the reliability for each measure.

MODEL EVALUATION

The study uses a structural equation model (SEM) as the main method of analysis. SEM is a multivariate statistical model that evaluates both the measurement quality of a set of variables used to measure a latent construct (the measurement model) and the relationship among the latent constructs (the structural model). A latent construct is a variable that is not directly measured. For example "mood" is the variable for depression and anxiety. We used Amos 4, a software package, to estimate structural relationships (Arbuckle and Wothke, 1999) for calculating the model.

RESULTS

There are boys (age 11–15, $N = 319$; age 16–20, $N = 388$), and girls (age 11–15, $N = 124$; age 16–20, $N = 197$) living with both parents ($N = 611$), living with 1 parent ($N = 230$), living with nonparents ($N = 52$), and living alone ($N = 27$). There are some missing data for sociodemographic variables ($N = 108$).

Concerning the variables in the model (see Table II) results are as follows:

Mood: The latent variable created by depression and anxiety. Younger adolescents score lower while females of both age groups score higher than boys. All groups differ ($p \leq 0.05$).

Secure self: The latent variable made up of self-efficacy and self-esteem differs between males and females ($p \leq 0.05$).

Relationships: The latent variable made up of emotional relationships and cohesion with parents. On emotional relationship with parents all groups differ ($p \leq 0.05$). On cohesion, females differ from males ($p \leq 0.05$).

Suicidal tendencies: The latent variable made up of two items: thoughts about suicide and suicide attempts. In both variables girls have significantly higher values than boys ($p \leq 0.05$), and older girls score higher on suicidal thinking than younger girls ($p \leq 0.05$).

Substance use: The latent variable created from alcohol, tobacco and cannabis use. The younger adolescents score lower than older ones ($p \leq 0.05$).

Illness: The latent variable created from health complaints and contacts with the health system (physicians, others). There is a difference on health complaints between boys and girls ($p \leq 0.05$) and the older girls score higher than the younger ones ($p \leq 0.05$). On health complaints and contact with the health system the older girls score highest, significantly different from all other groups ($p \leq 0.05$), and the younger boys report less contact with the health systems than the girls of the same age ($p \leq 0.05$).

Table II. Means and Standard Deviations of Observed Variables in the Model by Age Groups and Gender

	Age 11–15 (Mean (SD))		Age 16–20 (Mean (SD))	
	Male ($N = 319$)	Female ($N = 124$)	Male ($N = 388$)	Female ($N = 197$)
Mood				
Depression (0–45)	9.00 (7.54)	14.63 (10.26)	10.36 (8.05)	16.69 (9.74)
Anxiety (10–50)	15.70 (7.00)	19.06 (7.99)	15.62 (6.17)	19.80 (7.96)
Secure				
Self-efficacy (1–4)	3.09 (0.44)	2.96 (0.47)	3.10 (0.45)	2.95 (0.48)
Self-esteem (1–4)	3.26 (0.51)	3.08 (0.65)	3.32 (0.51)	3.00 (0.65)
Relationships				
Emotional (1–4)	3.34 (0.66)	3.00 (0.74)	3.19 (0.67)	2.86 (0.78)
Cohesion (1–4)	3.30 (0.65)	3.13 (0.69)	3.23 (0.65)	3.09 (0.69)
Suicidal tendencies				
Thinking (no/yes)	0.21 (0.41)	0.45 (0.50)	0.27 (0.44)	0.62 (0.49)
Attempts (no/yes)	0.14 (0.45)	0.46 (0.70)	0.16 (0.46)	0.48 (0.68)
Substance use				
Alcohol (1–6)	1.79 (1.01)	1.78 (0.92)	2.19 (1.05)	2.07 (0.94)
Tobacco (1–6)	2.44 (1.74)	2.78 (1.73)	3.35 (1.81)	3.69 (1.79)
Cannabis (1–5)	1.82 (1.37)	1.64 (1.07)	2.50 (1.65)	2.24 (1.53)
Illness				
Complaints (1–4)	1.42 (0.32)	1.77 (0.46)	1.49 (0.39)	1.94 (0.50)
Contact with medical services				
Physicians (0–6)	1.51 (1.20)	1.88 (1.25)	1.60 (1.24)	2.31 (1.40)
Therapists (0–5)	0.50 (0.73)	0.40 (0.67)	0.59 (0.78)	0.85 (0.95)

Note. Alcohol: alcohol consumption the last 30 days, tobacco: do you smoke, cannabis: cannabis consumption the last 30 days.

These intercorrelations are comparable to those found by Metha *et al*. (1998). Table III presents the factor loadings and residuals of each of the indicator variables for their respective latent constructs. Most factors were significant ($p \leq 0.05$) and most factor loadings are >0.50. This indicates that the indicator variables are a good measure of the latent constructs.

The model is presented with different age and gender groups as younger adolescents (11–15) differ in their development from older adolescents (16–20) and boys and girls differ in terms of RAP factors (Fig. 2, Table V).

Risk Factors for Illness Suicidality, and Substance Use

Intercorrelations among the risk factors (Table IV) show that the highest correlations are between negative mood and health (0.47), negative mood and suicidal ideation and behavior (0.40), and between health and suicidality (0.35). As Fig. 2 shows, negative mood directly influenced both suicidal thinking and illness for all 4 age by gender groups. The risk of negative mood for suicide ranged from 0.39 to 0.52, while the risk of negative mood for illness ranged from 0.37 to 0.53. Within the SIP model, suicidal thinking functioned as a mediating factor for substance use (0.27 to 0.63) except among the older girls (0.04 ns). Substance use acted as a low-level mediating factor for illness (0.19 to 0.24), except among older boys (0.24, ns). Secure self and negative mood are negatively related ($-.39$ to $-.58$). For all ages and both genders secure self is related to a good emotional and cohesive relationship with parents (0.39 to 0.60). A good relationship with parents protects against substance use overall, but more for girls than for boys (-0.25 to -0.43; older boys $= -0.11$ ns). Secure self may be marginally risk against suicidal thinking for the younger boys (0.19), while for girls good relationships with their families are marginally protective against suicide (-0.14 to -0.31).

Results for the Different Subgroups

Negative mood was a powerful direct predictor of both illness and suicidality. While age differences were apparent, gender differences were most striking. For boys, it was negative mood which led most frequently to suicidality and thence to substance use (younger boys 0.52 and 0.32; older boys 0.61 and 0.63). For girls, negative mood

Table III. Standardized Factor Loadings by age and gender

	Factor loadings			
	11–15		16–20	
Age	Male	Female	Male	Female
Mood				
Depression	0.84	0.84	0.88	0.79
Anxiety	0.84	0.77	0.76	0.83
Secure self				
Self-efficacy	0.52	0.73	0.68	0.67
Self-esteem	0.82	0.79	0.74	0.85
Relationships				
Emotional	0.84	0.87	0.79	0.94
Cohesion	0.70	0.63	0.67	0.67
Suicidal tendencies				
Suicidal thinking	0.88	0.88	0.98	0.79
Suicidal attempts	0.42	0.57	0.47	0.49
Substance use				
Alcohol	0.65	0.70	0.62	0.39
Tobacco	0.61	0.63	0.49	0.58
Cannabis	0.78	0.63	0.71	0.64
Illness				
Complaints	0.76	0.84	0.86	0.72
Contact with physicians	0.37	0.52	0.51	0.48
Contact with therapists	0.53	0.55	0.45	0.51

Note. FL: factor loading.

was slightly more likely to lead to illness (0.48, younger girls and 0.53 older girls) than to suicidality (0.44 and 0.39) and thence to substance use (0.27 and 0.04 ns). Further, good parental relationships protected girls against suicidality (−0.14 and −0.31) and substance use (−0.25 and −0.40). A good relationship with the parents was a strong protective factor for younger boys against substance use (−0.43), but had no protective effect for older boys. Finally, substance use was slightly related to illness, except among older boys (Fig. 2).

DISCUSSION

This study tested an SIP model of RAP factors with illness, suicidality, and substance use as outcome measures. The SIP model allowed us to trace 2 risk trajectories. The 1st path went directly from negative mood to illness. Illness as a risk factor connected to negative mood demands further investigation. This path was the greatest risk for girls. We too often neglect the physiological symptoms of stress and moral conflict connected to the adolescent transition, despite its central role in adolescent malaise. The 2nd path led from negative mood through suicidality to substance use. The negative mood-suicidality-substance-use path was most common for the older boys. Popular theories of substance use as self-medication might suggest that a young man who is depressed or anxious, considers or attempts suicide, and then turns to substance use to "mellow out." We suggest an alternative hypothesis. Negative mood leads to questioning the meaning of life, whether life in general or one's own life and future in particular. Such thoughts put social rules and expectations in abeyance, thus making room for substance use. Substance use, in turn, is a test of the meaningfulness or meaninglessness of life and of one's mortality. In this way substance use, like unsafe driving and unsafe sex are, to paraphrase Einstein, a way of playing dice with the universe, thumbing one's nose at convention without fear of the consequences.

We predicted that secure self and good parental relations would be protective against suicidal thinking and substance use. While good family relationships provided

Table IV. Correlations Between the Variables in the Model

	Mood	Secure self	Relationships	Suicidal tendencies	Substance use	Illness	Age
Secure self	−0.35						
	0.000						
Relationships	−0.27	0.36					
	0.000	0.000					
Suicidal tendencies	0.40	−0.23	−0.27				
	0.000	0.000	0.000				
Substance use	0.24	−0.14	−0.29	0.24			
	0.000	0.000	0.000	0.000			
Illness	0.47	−0.25	−0.21	0.35	0.27		
	0.000	0.000	0.000	0.000	0.000		
Age	0.07	−0.02	−0.12	0.11	0.32	0.19	
	0.019	0.497	0.000	0.000	0.000	0.000	
Gender	0.30	−0.20	−0.18	0.31	0.01	0.32	0.05
	0.000	0.000	0.000	0.000	0.733	0.000	0.109

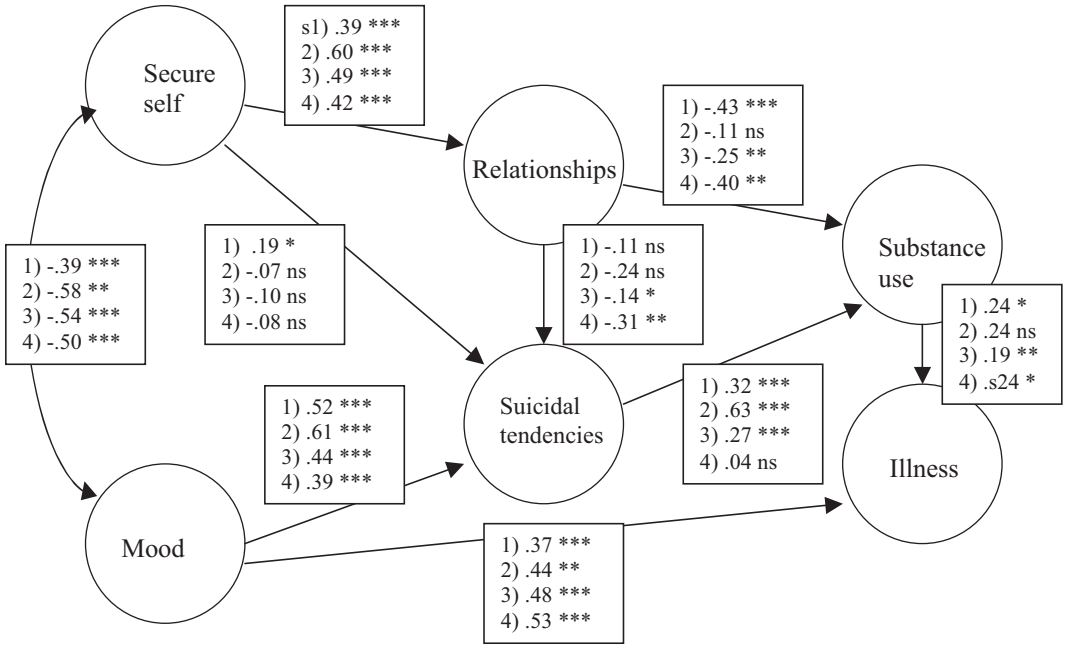

Fig. 2. Model of protective and risk factors on substance use and illness for male and female adolescents. *Note.* (1) male: 11–15 years; (2) male: 16–20 years; (3) female: 11–15 years; (4) female: 16–20 years; $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, ns: nonsignificant.

Table V. Fit Indices

Gender	Age	Chi square	*df*	Chi-sqaure/*df*	NFI	RMSEA
Boys	11–15	103.57	65	1.59	0.99	0.04
	16–20	171.26	65	2.63	0.98	0.06
Girls	11–15	105.18	65	1.61	0.97	0.07
	16–20	128.64	65	1.97	0.97	0.07

Note. All chi-square values are significant ($p < 0.05$); NFI: Normed Fit Index; RMSEA: Root Mean Square of Approximation.

some protection against substance use, they were less protective against suicidality. Further, while a secure sense of self is negatively related to mood and – through its relationship to family cohesion – protective against substance use, a secure sense of self offered almost no protection against suicidality.

Implications for Prevention

These observations are extremely important for prevention programs for two reasons. 1st, many primary and secondary prevention programs make the assumption that helping to develop a positive sense of self esteem, self confidence and competence will be protective (Kahne, 1996; McGee and Williams, 2000). Our results suggest that in the presence of good family relations a secure sense of self is protective against substance use. This means that helping youth to develop a secure sense of self may militate against negative mood, which, in this model, was the core risk. This suggests that prevention efforts might more fruitfully target the negative mood that underlies all 3 risks (illness, suicidality, substance use). 2nd, the relationship between negative mood and illness should not be underestimated or ignored. Illness may be the way that many adolescents experience or metabolize depression and anxiety. What is the long-term outlook for adolescents who are both anxious/depressed and ill? Is the association between illness and mood in this population a reflection of state or trait? While the gender difference in the mood-illness path might be explained by adolescent menstrual malaise, both boys and girls who had negative mood were likely to have frequent symptoms (headache, stomach ache) and injuries.

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