

Modeling the Distinct Pathways of Influence of Coping Strategies on Youth Suicidal Ideation: A  
National Longitudinal Study

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### Abstract

**Objective:** National surveys indicate high rates of suicidal ideation in youth, especially among females. Coping skill training programs hold promise as a potential intervention that can help young people better manage stress and not consider suicide as a solution to life's problems. To assess the promise of this strategy, the present research examined which coping strategies (if any) predicted reduction in youth suicidal ideation over a one year follow-up, and explored the potential pathways through which their influence was channeled. **Method:** Two waves of panel data from a nationally representative sample of youth, assessed one year apart (N=710; Mean age=18 yrs) were analyzed separately by gender using multiple group path analytic procedures. **Results:** Four coping strategies, namely problem solving, emotional regulation, support seeking and acceptance were found to predict reduction in suicidal ideation among both males and females. However, the influence of these strategies (at baseline) was channeled through distinct pathways. The effect of emotional regulation (and acceptance) was channeled through its use at follow-up and was mediated by reductions in perceived stress and depressive symptoms, leading to reduction in suicidal ideation. The influence of support seeking was also channeled through its more recent use at follow-up, but directly predicted reduction in suicidal ideation, with no effect on perceived stress or depressive symptoms. The effect of problem solving on suicidal ideation was mediated by reduction in depressive symptoms, but was not channeled through its use at follow-up, suggesting a longer time course for the protective influence of this strategy. Finally, acceptance had a direct risk-enhancing effect on suicidal ideation. **Conclusions:** Coping strategies commonly used by youth can be effective in reducing suicidal ideation and therefore universal training in the effective use of these strategies should be considered. An understanding of the distinct pathways through which their effect on suicidal ideation is transmitted can better inform the design of youth suicide prevention interventions.

**Key words:** youth suicidal ideation, coping strategies, perceived stress, depressive symptoms, mediational pathways.

Modeling the Distinct Pathways of Influence of Coping Strategies on Youth Suicidal Ideation: A National Longitudinal Study

Reducing suicide rates among adolescents and young adults is identified in Healthy People 2020 as one of the nation's critical health objectives (*Healthy People 2020 Objectives*, 2011). Accounting for 13% of deaths among 15-24 yr olds in 2008, suicide remains the third leading cause of mortality among youth, resulting in the loss of nearly 4,300 lives annually (*Web-based Injury Statistics Query and Reporting System*, 2011). Even more disturbing is that large proportions (14.5%) of high-school students interviewed in national surveys report having seriously considered attempting suicide during the past 12 months (*Youth Risk Behavior Surveillance*, 2010). Suicidal ideation, defined as having thoughts of engaging in behavior intended to end one's life, warrants greater research attention not only because it is a well-established precursor to suicide attempts (Reinherz et al., 1995; Lewinsohn, Rohde, & Seeley, 1994), but also because it overlaps significantly with other preventable youth health risk behaviors such as drunk-driving and violence (Barrios, Everett, Simon, & Brener, 2000). Exposure to suicide attempts and fatalities in peer networks can have a ripple effect on youth, increasing their risk for suicidal behaviors (de Leo & Heller, 2008; Poijula, Wahlberg, & Dyregrov, 2001). As such, the effects of suicidal behavior in youth extend far beyond their immediate families.

Depression, including feelings of hopelessness, is one of the commonly identified risk factors for suicidal ideation (Clum, Esposito, Hirai, & Nelson, 2000; Stewart et al., 2005; Shaffer et al., 1996; Thompson, Mazza, Herting, Randell, & Eggert, 2005). With one in four (26%) high-school students reporting symptoms of depression, such as feelings of hopelessness and sadness (*Youth Risk Behavior Surveillance*, 2010), there is an urgent need for preventive interventions that can help reduce the potential risk for development of suicidal tendencies.

Another pervasive risk factor that is increasingly found to be associated with suicidal ideation is perceived stress (Esposito & Clum, 2003; Grover et al., 2009; Horwitz, Hill, & King, 2011; Johnson et al., 2002; Overholser, 2003; Yang & Clum, 2000). Conceptually, being “stressed” reflects a state of imbalance between environmental demands on a person and the individual’s ability to effectively meet those demands (Lazarus & Folkman, 1984). Assessments of stress typically involve self-reports of recent stressful life events or daily hassles (Compas, Davis, Forsythe, & Wagner, 1987) or more global measures such as the degree to which individuals perceive their lives as stressful (Cohen, Kamarck, & Mermelstein, 1983). Notably, past research suggests that the manner in which young people cope with stressors bears on their ability to reduce their perceptions of stress and avoid the consequent effects on mental health (Clarke, 2006; Overholser, 2003). For instance, adolescents’ inability to effectively handle interpersonal stressors like bullying is found to be associated with increased vulnerability to hopelessness and suicidal tendencies (Brunstein-Klomek et al., 2007; Johnson et al., 2002; Luk, Wang & Simons-Morton, 2010; Skapinakis et al., 2011).

### *Dimensions of Coping*

A recent review identified over 400 different coping strategies across various measures of coping used in past studies (Skinner, Edge, Altman & Sherwood, 2003). In an attempt to classify these strategies, Skinner et al (2003) proposed a hierarchical model wherein different coping strategies can be clustered into higher-order “families of coping” based on their common underlying mechanism of influence. For instance, coping strategies like “making plans” and “thinking of different ways” to resolve the stressor would be classified into the coping family of “problem solving”. In comparison, the family of support seeking would include specific strategies like contact seeking and comfort seeking that focus on making use of social resources

to cope with stressors. Thus, while “coping strategies” within a family can be substituted for each other, “coping families” are considered to be mutually exclusive and have unique operational mechanisms (Zimmer-Gembeck & Skinner, 2011).

Despite the efforts to delineate the multi-dimensional nature of coping behaviors, our understanding of the ways in which coping behaviors influence stress and related mental health outcomes of depression and suicidal ideation remains limited. What is known based on past reviews (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Fields & Prinz, 1997) and meta-analysis (Clarke, 2006) is that “active forms” of coping such as problem solving and support seeking can have beneficial effects in promoting mental health and reducing adjustment problems, but mostly in response to controllable stressors. Other forms of coping, such as emotional regulation and distraction tend to confer mental health benefits when the stressors are relatively unalterable (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). In contrast, reliance on avoidant or disengaging coping styles (e.g., resignation, escape) is generally associated with poor adjustment and behavioral-emotional problems (Seiffge-Krenke, 2000; Connor-Smith, et al., 2000).

Specifically with regards to suicidal ideation, there is some evidence that problem solving and support seeking can have a protective influence, but mostly in clinical samples (Grover et al., 2009; Piquet & Wagner, 2003) and using cross-sectional designs (Chang, 2002; for a review, see Speckens & Hawton, 2005). Further, although some behavioral interventions have shown promising results in reducing depressive symptoms in non-clinical samples (Patton et al., 2011; Brunwasser, Gillham, & Kim, 2009; Sawyer et al., 2010), their efficacy in relation to suicidal ideation has not been evaluated. In a related vein, coping-skill training programs that have shown promising results in reducing depressive symptoms and suicidal ideation have focused on a

limited population of urban adolescents at-risk of dropping out of school (Thompson et al., 2001; Eggert et al., 1995, 2002).

Overall, the efficacy of coping programs in reducing risk of suicidal ideation among a wider range of youth still remains unknown. Suicide prevention strategies currently employed in schools include suicide awareness programs, gatekeeper training programs (sometimes in combination with peer-awareness programs), and screening for suicidal ideation or depressive symptoms (for a review see Gould, Greenberg, Velting & Shaffer, 2003). These programs focus on identifying youth at risk of suicide and linking them to appropriate treatment services. What is lacking in these approaches is the ability to intervene early, prior to the onset of suicidal thoughts.

To assess the viability of coping skill training as a universal prevention strategy that can be implemented before the onset of suicidal tendencies, the present research examines associations between use of different coping strategies and changes in youth suicidal ideation over a one-year time frame. Further, given the prominent role of perceived stress and depressive symptoms as the precursors of youth suicidal ideation, we also examine the impact of coping strategies on these two risk factors.

### *The Present Study*

A cohort of youth, ages 14 to 23 (at baseline), was interviewed regarding suicidal ideation and its important precursors (perceived stress, depressive symptoms of sadness and hopelessness) at baseline and at one-year follow-up. Use of a wide range of coping strategies from different families (including problem solving, support seeking, emotional regulation, acceptance, and distraction) was also assessed at both time points. As seen in Figure 1, the effect of each coping strategy (at baseline) on the three mental health outcomes was examined both directly (represented by bold arrows) and indirectly, as mediated by its more recent follow-up

assessment (represented by dashed arrows). The indirect effect of a coping strategy (at baseline), channeled through its more recent follow-up assessment, indicates a shorter time course for the manifestation of its effects, whereas the direct effect of a coping strategy (at baseline) that is not channeled through its follow-up assessment suggests a longer time course. The net effect of each coping strategy (at baseline) on *change* in suicidal ideation was also evaluated. This net effect on ideation could not only be mediated by the corresponding follow-up assessment of the coping strategy, but also through potential changes in perceived stress and/or depressive symptoms. The association between perceived stress and suicidal ideation was hypothesized to be mediated by depressive symptoms, based on past research (Ang & Huan, 2006; Thompson et al., 2005).

#### *Gender Differences in Coping with Stress*

An additional interest in our study concerned the well-known finding from national surveys that young females report higher levels of stress, depressive symptoms, and suicidal ideation than males (National Center for Health Statistics, 2009; Youth Risk Behavior Survey, 2010). An important consideration in understanding these gender differences is the differential use of various coping strategies by male and female youth. Generally, female youth report greater use of support seeking than males, who tend to rely more heavily on problem solving (Zimmer-Gembeck & Skinner, 2008; Seiffge-Krenke, 1995; Ebata & Moos, 1994; Connor-Smith et al., 2000; Hampel & Petermann, 2006; Taylor, 2006). An obvious question that arises in light of these gender differences is whether the differential use of various coping strategies by male and female youth is linked to their differential success in coping with stressors, thereby resulting in the observed gender gaps in mental health. To answer this question, we tested separate models for males and females, and compared the resultant paths from various coping strategies to different mental health outcomes.

In sum, the three main research questions addressed in this study were:

- (1) Which coping strategies (if any) predict reductions in youth suicidal ideation over a one year follow-up period? Further, are these effects direct (i.e. related to baseline assessments) or are they mediated by the more proximal follow-up assessments of these strategies?
- (2) Do different coping strategies influence suicidal ideation directly, or is their effect mediated by changes in perceived stress and/or depressive symptoms?
- (3) Finally, does the effect of coping strategies or their pathways of influence vary by gender?

## **Methods**

### *Participants*

The present study made use of panel data from the National Annenberg Survey of Youth (NASY), which is an annual survey of 14 - 22 year old youth conducted by the Annenberg Public Policy Center and approved by the Institutional Review Board of the University of Pennsylvania. Random digit telephone procedures were used to obtain a nationally representative sample of adolescents and young adults (N = 1239) who were interviewed in 2008 and followed up one year later in 2009. Initial recruitment and interviews in 2008 were done over the phone. The response rate for the initial survey was close to 50%, which is comparable to national telephone surveys of adult health risks conducted by the Centers for Disease Control and Prevention (*Behavioral Risk Surveillance System*, 2011). For the follow-up interview, respondents had the option to be interviewed over the phone or to complete an online version of the survey. Nearly half of the follow-up sample responded using the online survey. No differences were found in the response patterns based on the mode of re-interview. All respondents were compensated \$10 for their participation in the baseline interview and an additional \$25 upon completion of the follow-up interview.



Approximately 40% of the original sample was lost to follow-up, resulting in a panel sample of 710 participants. Bivariate correlations revealed that the probability of missingness (0/1) on each of the key follow-up variables was only related to the age of participants, suggesting that our data satisfied the missing at random assumption (Little & Rubin, 1987). Therefore, two approaches were used to analyze the data and the results were compared. First, we used listwise deletion and included only those participants who were interviewed at baseline as well as at follow-up (N = 710) and controlled for the effects of age in the analysis. Our second analytic strategy made use of the full sample at baseline (N = 1239) and employed multiple imputation to generate five sets of panel data with 1239 cases each, imputing the 40% missing data at follow-up for all key variables (Enders, 2010; Schafer & Olsen, 1998). Multiple imputation is a commonly used technique for handling missing data in longitudinal studies that satisfy the missing at random assumption (Little & Rubin, 1987; Newman, 2003). The output from both the analytic techniques was compared. Since the pattern of findings obtained was the same, for ease of presentation we only report results from the complete-case panel data analysis (N = 710).

### *Measures*

*Suicide Ideation and Symptoms of Depression* (hopelessness and sadness) in the past 12 months were assessed at baseline (T1) and at follow-up (T2) using items taken from the Youth Risk Behavior Survey (YRBS): “How often, if ever, have you seriously considered attempting suicide?” and “How often, if ever, have you felt so sad or hopeless for two weeks in a row that you stopped doing your usual activities”, respectively. Response categories ranged from 1 “Never”, 2 “Once”, 3 “Twice” to 4 “Three or more times”. Due to the low response rates in the

higher categories resulting in highly skewed distributions, the responses were recoded into a binary (1= ever; 0=never) format.

*Coping responses to stress* were measured using six items adapted from the Response to Stress Questionnaire (RSQ; Social stress version; Connor-Smith et al., 2000), a psychometrically sound, multi-dimensional questionnaire designed to assess coping responses to stress among adolescents. Since interpersonal stress is the most common type of stress encountered by young people, the stress inventory began with a description of interpersonal stressors (e.g., when you have trouble getting along with other people or when other people make you upset...), and elicited responses on a scale of 1 to 3 regarding the frequency with which the respondent employed each of the six coping strategies when faced with interpersonal stressors. Four distinct families of coping were identified based on the hierarchical coping structure recommended by Skinner et al. (2003). These included *problem-solving* (“think about different ways to solve or fix the problem”), *support-seeking* (“try to get support from friends or family members”, “ask other people for ideas or suggestions to make problem better”), *emotional control/self-regulation* (“keep my feelings under control as much as possible”) and *accommodation*, which included coping strategies of acceptance (“just take things as they are and go with the flow”) and distraction (“think about happy things to take my mind off the problem”). Both baseline and follow-up assessments of each of the coping strategies were included in the model as predictors of change in perceived stress, depressive symptoms and suicidal ideation.

*Perceived Stress* was measured at baseline and at follow-up using a three item scale adapted from the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983), assessing how often in the last few months the respondent felt (1) “nervous and stressed”, (2) “unable to control important things in life”, and (3) “that difficulties were piling up so high that s/he could not

overcome them”. These three items had high composite reliability scores (rho’s) (Raykov, 1997) at baseline (0.85) and at follow-up (0.84) and were therefore averaged to obtain a continuous measure of perceived stress at each time point.

### *Statistical Analysis*

Descriptive analyses were conducted using sampling weights in STATA 11.0. The five imputed data sets were also generated in STATA. Multiple group path analysis procedures were conducted using Mplus (version 6) to test the hypothesized model presented in Figure 1, separately for males and females, using the complete case and imputed data sets. Given the binary nature of two of our outcome variables, the models were tested using the robust mean and variance adjusted weighted least squares estimator (WLSMV). Model fit was assessed using multiple global fit indices and examination of residual diagnostics. The criteria for a good fit included a non-significant  $\chi^2$  test statistic, RMSEA (Root Mean Square Error of Approximation) value less than 0.05, and values of comparative fit index (CFI) and Tucker-Lewis Index (TLI) greater than 0.90.

## **Results**

### *Sample Descriptives*

The study sample (N = 710; Mean age =  $18 \pm 2.3$  yrs) was balanced in terms of gender (49% females) and was diverse with regards to racial-ethnic identity (62% Non-Hispanic White, 18% Hispanic, and 14% Non-Hispanic Black). At baseline, 12.3% of the sample (and 13.1% of 15-19 year olds) reported having seriously considered attempting suicide during the past 12 months, which is similar to the recent estimate of 13.8% reported among a nationally representative sample of high-school students aged 15-19 years (*Youth Risk Behavior Surveillance*, 2010). We observed a non-significant drop in the rates of suicide ideation at

follow-up. Gender and age based comparisons of the distributions of the key variables can be found in Table 1. As expected, females were more likely to report suicidal ideation than males, although the difference was more pronounced at follow-up. Females also reported greater use of support seeking, while males reported greater reliance on emotional regulation and acceptance. Only a marginal gender difference was found in the use of problem solving. Age-related differences were found in the use of problem solving, support seeking and emotional regulation, with older adolescents reporting greater use of these strategies. Besides gender, none of the other demographic variables – age, racial-ethnic identity, urbanicity of residence, region of country, neighborhood income – were associated with suicidal ideation at baseline or at follow-up.

#### *Path Analysis Results*

*Multiple Group Analysis.* The hypothesized model presented in Figure 1 was tested separately for males and females, with all path coefficients free to be estimated for each group. The model fit was good,  $\chi^2(62) = 98.89, p = 0.002$ ; CFI = 0.93; RMSEA (90% CI) = 0.04 (.03, .06). In the next step, all path coefficients were constrained to be equal across males and females and the model fit was evaluated. The constrained model was found to fit the data equally well,  $\chi^2(86) = 128.68, p = 0.002$ ; CFI = 0.92; RMSEA (90% CI) = 0.04 (.02, .05). Model fit comparisons of the unconstrained and constrained model conducted using Mplus's DIFFTEST command revealed a non-significant drop in model fit,  $\chi^2(24) = 32.51, p = 0.11$ , suggesting that gender did not moderate the impact of coping strategies on mental health outcomes in our sample. Thus, the final model was analyzed as a single group and the results from this analysis are described below.

*Stability over Time.* Over-time stability was observed in all three mental health outcomes, although the auto-regressive coefficients of depressive symptoms and suicidal ideation were weaker in comparison to that of perceived stress (see standardized coefficients presented in

Figure 2). Over-time stability was also observed for all the coping strategies, with correlations between baseline and follow-up assessments ranging from 0.18 (problem-solving) to 0.38 (support-seeking).

*Stress and Suicidal Ideation.* Perceived stress emerged as a strong risk factor for suicidal ideation. As expected, its effect was *entirely* mediated by depressive symptoms. On adding depressive symptoms as a mediator in the model, the direct effect of stress on suicidal ideation dropped to non-significance. The net mediated effect of stress on suicidal ideation, estimated using the product of coefficients method (MacKinnon, Lockwood, Brown, Wang & Hoffman, 2007) was significant,  $\beta$  (SE) = 1.36 (.23),  $p < .001$ .

*Coping responses and their time course of influence.* With the exception of distraction, all coping strategies (at baseline) significantly predicted *change* in at least one mental health outcome. However, the effects of emotional regulation and support-seeking were more proximal in nature, given that the effect of their baseline use was entirely mediated through their more recent use at follow-up. In comparison, the effects of problem solving and acceptance were more long-term, in that it was their baseline assessments that were related to change in mental health outcomes, not their more recent follow-up assessments.

*Coping responses and their effects on suicidal ideation.* With the exception of distraction, the use of all coping strategies (at baseline) significantly predicted *change* in suicidal ideation over the one-year follow-up. The influence of emotional regulation (at baseline) was channeled through its more recent use at follow-up,  $\beta$  (SE) = .18 (.04);  $p < .001$ , leading to reductions in stress,  $\beta$  (SE) = -.025 (.007);  $p < .001$ , with significant carry-over effects on reductions in depressive symptoms,  $\beta$  (SE) = -.042 (.012);  $p < .001$  as well as suicidal ideation,  $\beta$  (SE) = -.034 (.011);  $p = .001$ . Problem solving (at baseline) on the other hand directly predicted reduction in

depressive symptoms,  $\beta$  (SE) =  $-.33$  (.12);  $p < .01$ , with significant carry-over effects on suicidal ideation,  $\beta$  (SE) =  $-.27$  (.10);  $p < .01$ . The effect of support seeking (at baseline) was channeled through its follow-up assessment, and directly predicted reduction in suicidal ideation,  $\beta$  (SE) =  $-.11$  (.05);  $p < .05$ . The use of support-seeking did not influence levels of perceived stress or depressive symptoms over the one year follow-up. Similarly, the use of problem solving was only marginally associated with change in perceived stress ( $p < .10$ ).

Acceptance was the only strategy that had both protective and risk-enhancing effects. Use of acceptance (at baseline) predicted increased use of emotional regulation over the one-year follow-up,  $\beta$  (SE) =  $.14$  (.03);  $p < .001$ , leading to a net protective effect on suicidal ideation,  $\beta$  (SE) =  $-.03$  (.01);  $p < .01$ . But, the use of acceptance as a coping response was also directly associated with an increase in suicidal ideation,  $\beta$  (SE) =  $.34$  (.16);  $p < .05$ .

The only coping strategy that failed to have any significant influence, i.e. distraction, was significantly correlated with all the other strategies that did have a significant effect, namely problem-solving ( $r = .20$ ), support-seeking ( $r = .27$ ) and emotional regulation ( $r = .10$ ). Overall, the model explained a significant amount of variance in all three dependent variables - perceived stress ( $R^2 = .18$ ), depressive symptoms ( $R^2 = .43$ ), and suicidal ideation ( $R^2 = .59$ ) at follow-up.

The model was also re-analyzed using the imputed data sets. All the findings obtained from the complete-case analyses were replicated, with the exception of the direct risk-enhancing effect of acceptance, which was no longer significant,  $\beta$  (SE) =  $.03$  (.02);  $p = .18$ . The significant paths along with the corresponding standardized coefficients obtained using the two analytic procedures (i.e. complete-case and multiple imputation) are presented in Figure 2.

## Discussion

Although the efficacy of coping strategies has been previously reported using cross-sectional and clinical samples (Chang, 2002; Compas et al., 2001; Grover et al., 2009; Sadowski & Kelly, 1993; Speckens & Hawton, 2005), our longitudinal research with a nationally representative sample provides more robust evidence of the linkages between the use of these coping strategies and changes in mental health outcomes over time. Furthermore, our findings help delineate the distinct pathways through which the influence of coping strategies on suicidal ideation is transmitted.

More specifically, the study finds that three types of coping strategies, problem solving, support seeking, and emotional regulation, naturally adopted by male and female youth were protective in reducing risk of suicidal ideation over a one-year follow-up period. Notably, these coping strategies had unique (direct and mediated) pathways as well as distinct temporal patterns of influence on suicidal ideation. The use of support seeking predicted reduction in suicidal ideation, with the effect being transmitted through its more recent follow-up assessment. In contrast, emotional regulation (through its follow-up assessment) and problem solving (at baseline) predicted reduction in suicidal ideation as a mediated effect that was channeled through perceived stress and depressive symptoms, respectively. The greater time lag in observing the effects of problem solving may be due to the fact that it takes longer to actually implement this strategy, trying alternative ways to address the stressor(s); whereas emotion regulation and support seeking may have more immediate/proximal effects. Our inability to detect an effect of distraction may be attributable to the relatively lower frequency of use of this strategy by our study participants. Despite these differences however, the results indicate that young people's natural use of coping strategies can be effective in reducing important sources of suicidal ideation (stress and hopelessness) as well as directly averting consideration of suicide. The

results also point to the potential for universal interventions to enhance coping strategies among youth to reduce risk for suicide and to promote mental health more generally.

Similar to previous studies (Ebata & Moos, 1994; Hampel & Petermann, 2006; Seiffge-Krenke, 1995), we observed significant gender differences in the frequency of use of different coping strategies, but surprisingly the effects of these coping strategies on mental health outcomes were quite similar for both genders. Thus, even though the mechanisms underlying these coping strategies did not vary across gender, their differential frequency of use among males and females could explain the gender differences in the prevalence of mental health problems in our sample. To elaborate further, females in our sample relied more heavily on support seeking, which did reduce their ideation but left them vulnerable to continued stress and hopelessness. Males, on the other hand, used emotion regulation more frequently which helped them better manage their stress and consequentially reduce their ideation as well. These gender differences suggest that female youth may especially benefit from greater use of emotional regulation and related strategies like relaxation and meditation that can help them cope with emotional distress in a constructive manner (Skinner et al., 2003).

The mixed role of acceptance as both enhancing the risk for suicidal ideation as well reducing it through greater emotional regulation suggests that the effectiveness of this strategy may depend on the characteristics of the stressor, like its severity and controllability. Acceptance can be an adaptive coping strategy for severe and uncontrollable stressors like loss of a parent, but may not be an effective coping strategy for interpersonal conflicts with parents, peers or romantic partners (Jaser et al., 2007; Seiffge-Krenke, 2011). Unfortunately, we did not assess the relative controllability or severity of the stressors being experienced by our sample and as such are limited in our ability to explain the divergent effects of acceptance as a coping strategy.



*Implications for Prevention*

Overall, our findings support the motivating premise of our research that coping-skill training programs can be a promising supplement to current suicide prevention strategies, and thereby help to prevent the onset of suicidal behavior in youth more universally. The programs currently used especially in school settings focus almost entirely on enhancing the likelihood that suicidal youth can be identified and referred to appropriate treatment providers. Although this is an important strategy, it would be useful to have programs that can be delivered at an early stage, before the onset of suicidal thoughts. The present results provide evidence that coping strategies can help young people to better cope with stressors and prevent them from considering suicide as a solution to life's problems.

The role of support-seeking in reducing risk of suicidal ideation is promising, even though it does not necessarily reduce perceptions of stress or address feelings of hopelessness. The reasons why the use of support seeking only directly impacts suicidal ideation remain less clear. One possibility is that the presence of supportive others in the lives of youth provides them a reason for living. Past research using both normal (Connell & Meyer, 1991) and clinical samples (Malone et al., 2000) has shown that "reasons for living" tend to be inversely related to the risk of suicidality. Additionally, it is possible that social support provides suicidal individuals greater awareness that others have also faced similar challenges that they were able to eventually overcome. For example, the "It gets better" national anti-bullying media intervention may be successful in reducing risk for suicide among LGBT (Lesbian Gay Bisexual and Transgender) youth by providing social support and sharing stories of others who have successfully weathered the same stressors. Although this message may not directly address the interpersonal stressors being experienced, it could well be effective in averting consideration of suicide as a solution.

The finding regarding the effect of problem solving being channeled through reductions in depressive symptoms is consistent with the results of cognitive-behavioral interventions that have been found to be successful in reducing levels of depression in youth (Brunwasser, Gillham, & Kim, 2009). Present findings indicate that such interventions may also help lower the risk of youth suicidal ideation. Further, the problem-solving skill building aspects of similar interventions (Shure & Israeloff, 2001) can be provided as more universal training in schools.

The results also suggest that to be most effective in promoting stress management and overall mental health, coping-skill training programs should include components of problem solving (Shure & Israeloff, 2001), support seeking (Eggert et al., 1995, 2002), and emotional regulation (Greenberg, Kusche, Cook, & Quamma, 1995). However, given the separate pathways of influence and the different time course of effects, the impact of coping strategies on youth mental health outcomes should be evaluated separately. Skinner et al. (2003) were the first to call attention to the distinction between different families of coping strategies, based on the unique operational mechanisms by which they help an individual cope with stressors. The present findings provide further evidence for why coping strategies from different families should be assessed independently and delivered in combination in order to fully exploit their impact on youth mental health outcomes. Equally important is for preventive interventions to encourage and train young people in the flexible use of these strategies so as to better match the demands of the stressors (cf. Cheng, 2002).

Coping-skill training programs also have appeal as a suicide prevention strategy because they are non-discriminatory and can be provided universally in school and community settings at a younger age, thereby targeting adolescents when they are still at relatively low risk. Although the efficacy of coping skill training programs in reducing depression and suicidal ideation among

students at-risk of dropping out from school has been evaluated previously (Eggert et al., 1995, 2002), the present findings suggest that randomized trials to evaluate the effects of coping training programs in broader, non-clinical samples would be a useful next step to more clearly demonstrate the effectiveness of coping strategies for reducing suicidal ideation. Similar coping based programs, like the Coping Power Program (Lochman & Wells, 2003) and Life Skills Training program (Botvin & Griffin, 2004) have been effective in reducing other adolescent problem behaviors, such as substance use and aggression, which tend to be associated with suicidal ideation (Bridge, Goldstein, & Brent, 2006). To be useful for prevention of suicidal ideation however these coping programs would need to be expanded to include components that train adolescents to become more adept at dealing with interpersonal stressors more generally, along with enhancement of their social support networks (Eggert et al., 1995, 2002).

Several limitations of our study must be considered when interpreting the findings. First, we do not have information about the degree of controllability of interpersonal stressors being experienced by our study participants, which would have been helpful in better evaluating the efficacy of various coping strategies. Second, we only asked respondents about the frequency with which they used different coping strategies, and as such know little about the efficacy with which they applied these strategies in real life. The third limitation stems from the fact that we had limited knowledge about the presence of personality disorders or temperament-related factors like emotional reactivity that may impinge on an individual's ability to effectively use coping strategies. It could also be that the use of different coping strategies was merely a reflection of other sources of resilience that were actually responsible for the reduction in suicidal ideation. The effects of such "third variables" cannot be ruled out as potential causes of both coping and suicidal ideation. Finally, as is the case with most other studies of adolescent

risk behaviors, the key variables in our study were assessed using self-reports which may bias our findings due to shared method variance.

Despite these limitations, our findings present a compelling case for training of coping skills for better stress management and reduction of suicidal ideation among youth. Given the unique ways in which different coping strategies can influence youth suicidal ideation, interventions that help youth flexibly use different coping strategies to effectively meet the challenges posed by the stressors in their lives are clearly needed.

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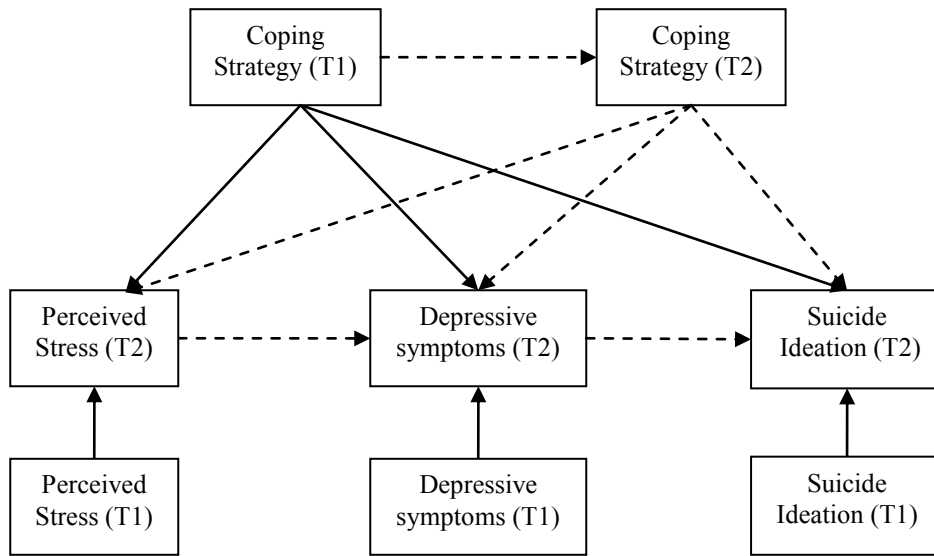
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Table 1. Descriptive statistics by gender and age: Frequencies / Mean (sd)

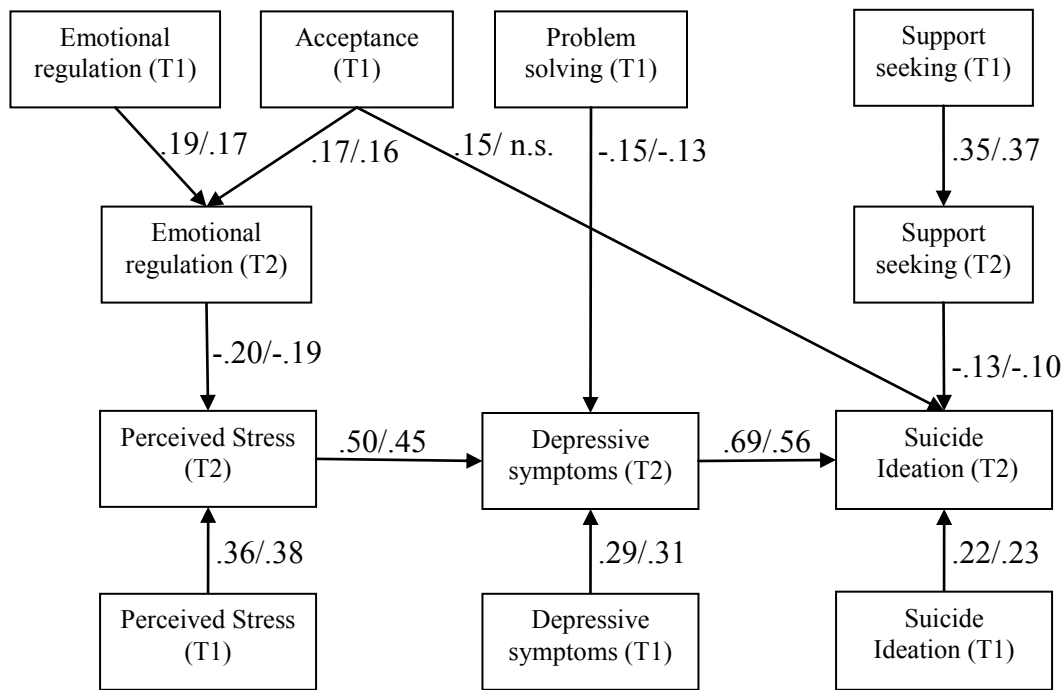
| Variables                                       | Full<br>baseline<br>sample<br>(N=1239) | Panel<br>data<br>(N=710) | Descriptives based on Panel Data (N = 710) |                 |                   |                               |                             |                   |
|-------------------------------------------------|----------------------------------------|--------------------------|--------------------------------------------|-----------------|-------------------|-------------------------------|-----------------------------|-------------------|
|                                                 |                                        |                          | Male<br>(49%)                              | Female<br>(51%) | <i>p</i><br>value | Younger<br>(≤18 yrs)<br>(56%) | Older<br>(≥19 yrs)<br>(44%) | <i>p</i><br>value |
| <i>Mental Health Outcomes</i>                   |                                        |                          |                                            |                 |                   |                               |                             |                   |
| Suicidal ideation (baseline)                    | 10.1%                                  | 12.3%                    | 9.8%                                       | 14.9%           | (n.s.)            | 13%                           | 8.5%                        | =.08              |
| Suicidal ideation (follow-up)                   |                                        | 11.5%                    | 8.1%                                       | 15.1%           | <.05              | 11.2%                         | 9.2%                        | (n.s.)            |
| Depressive symptoms (baseline)                  | 29.8%                                  | 35.1%                    | 27.1%                                      | 43.5%           | <.001             | 29.9%                         | 27.0%                       | (n.s.)            |
| Depressive symptoms (follow-up)                 |                                        | 38.3%                    | 32.5%                                      | 44.4%           | <.05              | 35.8%                         | 34.0%                       | (n.s.)            |
| Perceived stress (baseline; range: 1-3)         | 1.72 (.44)                             | 1.68 (.39)               | 1.61 (.38)                                 | 1.75 (.38)      | <.001             | 1.69 (.38)                    | 1.67 (.40)                  | (n.s.)            |
| Perceived stress (follow-up; range: 1-3)        |                                        | 1.72 (.42)               | 1.63 (.40)                                 | 1.80 (.42)      | <.001             | 1.74 (.42)                    | 1.70 (.41)                  | (n.s.)            |
| <i>Coping Strategies (Family) (Range: 1-3)</i>  |                                        |                          |                                            |                 |                   |                               |                             |                   |
| Problem solving (Baseline; Problem-solving)     | 2.54 (.59)                             | 2.55 (.58)               | 2.53 (.59)                                 | 2.60 (.56)      | (n.s.)            | 2.49 (.59)                    | 2.63 (.56)                  | <.01              |
| Problem solving (Follow-up; Problem-solving)    |                                        | 2.55 (.58)               | 2.50 (.61)                                 | 2.60 (.54)      | =.05              | 2.49 (.60)                    | 2.64 (.53)                  | <.01              |
| Support-seeking (Baseline; Support-seeking)     | 2.25 (.60)                             | 2.26 (.61)               | 2.19 (.61)                                 | 2.44 (.56)      | <.001             | 2.27 (.60)                    | 2.25 (.61)                  | (n.s.)            |
| Support-seeking (Follow-up; Support-seeking)    |                                        | 2.26 (.60)               | 2.20 (.60)                                 | 2.41 (.57)      | <.001             | 2.23 (.63)                    | 2.31 (.55)                  | <.05              |
| Emotional regulation (Baseline; Self-reliance)  | 2.62 (.59)                             | 2.60 (.60)               | 2.63 (.59)                                 | 2.56 (.60)      | (n.s.)            | 2.59 (.60)                    | 2.61 (.60)                  | (n.s.)            |
| Emotional regulation (Follow-up; Self-reliance) |                                        | 2.55 (.59)               | 2.62 (.57)                                 | 2.47 (.60)      | <.01              | 2.51 (.62)                    | 2.60 (.53)                  | <.05              |
| Acceptance (Baseline; Accommodation)            | 2.26 (.69)                             | 2.27 (.67)               | 2.28 (.66)                                 | 2.26 (.69)      | (n.s.)            | 2.28 (.67)                    | 2.27 (.67)                  | (n.s.)            |
| Acceptance (Follow-up; Accommodation)           |                                        | 2.28 (.64)               | 2.31 (.64)                                 | 2.21 (.62)      | <.05              | 2.26 (.65)                    | 2.31 (.62)                  | (n.s.)            |
| Distraction (Baseline; Accommodation)           | 2.15 (.73)                             | 2.16 (.73)               | 2.11 (.73)                                 | 2.27 (.71)      | <.01              | 2.14 (.74)                    | 2.17 (.71)                  | (n.s.)            |
| Distraction (Follow-up; Accommodation)          |                                        | 2.15 (.71)               | 2.06 (.73)                                 | 2.24 (.68)      | <.01              | 2.11 (.73)                    | 2.20 (.68)                  | <.10              |

Figure 1. Conceptual representation of the hypothesized model.



*Note:* T1 refers to baseline assessments and T2 denotes follow-up assessments. Bold lines represent direct effects, while dashed lines represent mediated effects of coping strategies (at baseline). The effects of all five coping strategies (problem solving, support seeking, emotional regulation, acceptance and distraction) were examined at baseline and at follow-up. All exogenous variables in the model were correlated.

Figure 2. Final model showing standardized coefficients corresponding to significant paths from both complete case and multiple imputation analyses.



Note. Coefficient value before the slash represents output from complete case (cc) analyses; value after slash indicates output from multiple imputation (mi) analyses, i.e. cc/mi. Model fit indices:  $\chi^2(31) = 58.8, p = 0.002$ ; CFI = 0.95; TLI = 0.91; RMSEA (90% CI) = 0.03 (0.02, 0.05). Multi-group path analysis examining gender variations revealed a non-significant drop in model fit when path coefficients were constrained to be equal across males and females. Since there were no gender differences, the coefficients from the full sample are provided. The effect of age on all three mental health dependent variables was co-varied out. The effect of acceptance at T1 on suicide ideation at T2 was significant *only* in the complete case analysis. All other effects were significant in both complete case and multiple imputation based analyses. All exogenous variables in the model were correlated.