

A FORMAL TEST OF THE INTERPERSONAL PSYCHOLOGICAL THEORY OF
SUICIDE AND A CLOSER LOOK AT THE ROLE OF SOCIAL SUPPORT IN
ADOLESCENT SUICIDAL IDEATION AND BEHAVIOR

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ABSTRACT

A FORMAL TEST OF THE INTERPERSONAL PSYCHOLOGICAL THEORY OF SUICIDE AND A CLOSER LOOK AT THE ROLE OF SOCIAL SUPPORT IN ADOLESCENT SUICIDAL IDEATION AND BEHAVIOR

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The purpose of this dissertation project was to examine the theoretical and empirical importance of perceptions of interpersonal relationships to suicidal ideation (SI) and behavior in an adolescent clinical sample. The first study offered a rigorous test of the interpersonal-psychological theory of suicide as it applies to SI in a sample of adolescents at risk for suicide. Specifically, the association between the two interpersonal states central to this theory, perceived burdensomeness and thwarted belongingness, and severity of SI, was tested across three separate models. The first was a cross-sectional model, the second a short-term prospective model, and the third a competing developmentally sensitive mediational model that used a short-term prospective study design. Participants were 143 adolescents (64% female, 81% white, range = 12-18 years, $M = 15.38$, $SD = 1.43$) consecutively admitted to a psychiatric partial hospitalization program. Data were collected with paper and pencil surveys upon intake into the program

(Time 1 [T1]) and discharge from the program (Time 2 [T2]). Youth SI was assessed with the Suicidal Ideation Questionnaire and depression (diagnosis and symptom severity) with the Youth Inventory-4. Youth also completed the Interpersonal Needs Questionnaire, which assesses for perceptions of burdensomeness and thwarted belongingness. Results of cross-sectional analyses showed an independent association of perceived burdensomeness on T1 SI, after controlling for depression diagnosis and sex. There was no main effect of thwarted belongingness and no significant interaction between the two interpersonal states. In a short-term prospective moderation model, neither interpersonal state predicted T2 SI after controlling for covariates. In a third mediation model, thwarted belongingness, but not perceived burdensomeness, had a significant indirect effect on T2 SI via T2 depressive symptom severity after controlling for T1 SI and sex. Results suggest that: 1) perceptions of burdensomeness may contribute to concurrent risk for SI; and 2) thwarted belongingness affects depression symptom severity over time, which indirectly predicts SI over a short follow-up time frame. These results only partially replicate findings with adults in prior tests of the interpersonal-psychological theory of suicide. Though results are preliminary, these data suggest that perceptions of burdensomeness and thwarted belongingness may function differently in adolescent relative to adult clinical samples.

The second study examined the relative contributions of perceptions of social support from parents, close friends, and school on current SI and suicide attempt (SA) history in a clinical sample of adolescents. It also explored whether interactions between these sources of support help explain additional variance in suicidality. Data were collected

with paper and pencil surveys and a structured clinical interview from the 143 adolescents described in the first study. The well-validated Beck Scale for Suicidal Ideation, Child and Adolescent Survey of Social Support, Youth Inventory-4, and the Self-Injurious Thoughts and Behavior Interview were used to assess study constructs. Hierarchical linear and logistic regression analyses were conducted to examine main and interactive effects of perceptions of social support on SI and SA, respectively. Results from the linear regression analysis revealed that perceptions of low school support independently predicted greater severity of SI after accounting for parent and close friend support. Further, the relationship between low perceived school support and SI was strongest among those who perceived low (versus) high parental support. Results from the logistic regression analysis revealed that perceptions of low parental support independently predicted SA history after accounting for school and close friend support. A significant interaction between close friend and school support was also found. Those who perceived low support from school and close friends reported the greatest odds of a SA history. Results address a significant gap in the social support and suicide literatures by demonstrating that perceptions of parent, school, and close friend support play an important role in understanding adolescent SI and SA. Moreover, the confluence of low support across sources may place adolescents at heightened risk for more severe SI and/or behavior.

Overall, results of both studies suggest that perceptions of interpersonal relationships may play an important role in adolescent mental health, including SI and suicidal behavior. Adolescents who believe that they are a burden on others or lack close connections with

family members, peers, and/or school staff school, may be at heightened risk for SI or behavior either directly or indirectly via co-occurring mental health problems. Clinically, results suggest that efforts to improve relationships and perceptions of support across all three social domains in the context of treatment with adolescents in clinical care may be important in suicide prevention efforts.

A SHORT-TERM, PROSPECTIVE TEST OF THE INTERPERSONAL-PSYCHOLOGICAL THEORY OF SUICIDE IN AN ADOLESCENT CLINICAL SAMPLE

In recent years, there has been a concerted effort among researchers to increase scientific knowledge in the area of adolescent suicide. Given that suicide is currently the third leading cause of death for adolescents, improving our knowledge of factors that contribute to the desire for death is imperative to address this public health crisis. Data from the 2011 Youth Risk Behavior Survey (YRBS; Eaton et al., 2012) suggest that almost 16% of high school students in the United States seriously considered attempting suicide in the past year. Several studies have demonstrated that severity (frequency and specificity) of suicidal ideation (SI) predicts subsequent suicide attempts across community (Reinherz, Tanner, Berger, Beardslee, & Fitzmaurice, 2006) and clinical (Huth-Bocks, Kerr, Ivey, Kramer, & King, 2007; Prinstein et al., 2008) samples. Research aimed at improving our understanding of the development of SI may aid in suicide intervention efforts. The purpose of the current study is to evaluate the interpersonal-psychological theory of suicide (IPTS) (Joiner, 2005) in an adolescent sample.

Theories of suicide

Much of our current knowledge of why individuals take their own lives is attributable to the creation and testing of theory. While theories of suicide abound in

adults, fewer have been put forth and tested in adolescents. The importance of social relationships to individuals who think about suicide or take their own lives is a consistent theme across several theories of suicide. Indeed, Durkheim and Simpson (1951; 1897) classified suicide as stemming from social causes, including isolation, altruism, and anger/frustration. Similarly, Shneidman (1993) states that suicide is driven by a desire to escape psychological pain or “psychache.” At least one cause of this psychache is a lack of nurturing interpersonal relationships. Specific to adolescents, the cognitive-behavioral theory of suicide (Spirito, Esposito-Smythers, Weismore, & Miller, 2012) suggests that “predisposed” adolescents (i.e., those with psychiatric disorders) turn to suicide as a means to cope with severe negative affective arousal, cognitive distortion (e.g., catastrophizing), and maladaptive behavior (e.g., substance use), triggered by a significant stressor. Many times, this significant stressor is interpersonal in nature. Components of this latter theory have received support in the adolescent suicide literature (Miller & Esposito-Smythers, 2013).

Interpersonal-psychological theory of suicide

The IPTS, in particular, places a heavy emphasis on interpersonal relationships as a key component in the development of SI (Joiner et al., 2009; Van Orden et al., 2010). According to the IPTS, the desire for death arises from the confluence of perceived burdensomeness and thwarted belongingness. Thwarted belongingness refers to feelings of alienation from friends, family, or other valued social contacts. Perceived burdensomeness refers to the belief that one is highly ineffective and incompetent, and that this incompetence negatively affects other people. While both of these socially-based

cognitive distortions are posited to lead to SI, Joiner and colleagues state that it is the interaction of these two constructs that lead to the greatest severity of SI. When these two cognitive distortions are paired with the ability to enact lethal self-injury (i.e., acquired capability), an individual is at risk for suicide attempts and completion (Van Orden, Witte, Gordon, Bender, & Joiner, 2008).

Recent literature reviews that examine the IPTS (Ribeiro & Joiner, 2009; Van Orden et al., 2010) suggest that there is strong support for perceived burdensomeness and thwarted belongingness as reliable predictors of SI across various adult samples (e.g., undergraduates, suicide attempters, suicide completers, drug addicted outpatients, and psychotherapy outpatients). Support has also been found in more recent research conducted with undergraduates, older adults, and military personnel (Van Orden, Cukrowicz, Witte, & Joiner Jr., 2012). Specifically, higher levels of perceived burdensomeness and thwarted belongingness are positively associated with severity of SI. Further, individuals with greater (versus lower) perceptions of thwarted belongingness *and* greater (versus lower) perceived burdensomeness report the most severe levels of SI (Van Orden et al., 2012).

Application of IPTS to Adolescents

Despite the rapidly accumulating support for the IPTS in adult samples, this theory has not been formally tested in an adolescent sample. However, many studies have examined the association between perceptions of social support and SI in adolescent samples, a construct closely associated with perceived belongingness. In a relatively recent review of the literature, (King & Merchant, 2008) conclude that there is strong

support for the importance of interpersonal variables, including perceptions of support and connectedness with family and peers, in understanding risk for SI among adolescents. More recent cross-sectional and longitudinal work has also suggested that a lack of social support has a significant, robust relationship with adolescent SI even after controlling for numerous covariates, including age, sex, race/ethnicity (Babiss & Gangwisch, 2009; Bonanno & Hymel, 2010; Hetrick, Parker, Robinson, Hall, & Vance, 2012; Hill & Pettit, 2014) and psychiatric symptoms or diagnoses (Hetrick et al., 2012; Logan, Crosby, & Hamburger, 2011; Pettit, Green, Grover, Schatte, & Morgan, 2011). Though this literature does have some methodological limitations, including infrequent use of validated measures of SI (Bonanno & Hymel, 2010) and longitudinal designs (Babiss & Gangwisch, 2009), it offers important preliminary evidence for the association between adolescent perceptions of social connectedness and SI.

To our knowledge, no research to date has examined the association between burdensomeness, or associated measures, and SI in an adolescent sample. However, it has been theorized that SI may arise when adolescents perceive that they are “expendable” family members (Sabbath, 1969). In other words, the adolescent may believe that s/he is invaluable or a burden on his/her family which may precipitate suicidal thinking. The present study is the first to use a validated measure of the actual constructs of thwarted belongingness and perceived burdensomeness, to formally test the IPTS in an adolescent sample.

Also unexplored to date is the relative contribution of thwarted belongingness and perceived burdensomeness to SI in an adolescent sample, and whether other well

established risk factors for SI may mediate these relationships (e.g., depression severity) in this age group. Adolescence is a developmental period characterized by rapid socio-emotional development. One of the key developmental tasks of adolescence is the establishment of healthy interpersonal relationships and a sense of belonging (Collins & Steinberg, 2006). Recent longitudinal evidence suggests that greater social support serves as a buffer against SI and lower social support as a risk factor for SI (Czyz, Liu, & King, 2012; Dupéré, Leventhal, & Lacourse, 2009; Winfree & Jiang, 2010). Comparatively, perceptions of burdensomeness may be less common among adolescents. Early theories of social cognitive development posit that adolescence is characterized by a focus on oneself as opposed to others (Elkind, 1967). This theory is supported by more recent developmental research which suggests that the ability to consider others' perspectives may not fully develop until young adulthood (Blakemore & Choudhury, 2006; Choudhury, Blakemore, & Charman, 2006). Therefore, the belief that one is a burden, which requires the ability to consider others perspectives, may be more relevant for adults than adolescents. Thus, it is plausible that thwarted belongingness may be somewhat more important than perceived burdensomeness for understanding suicide risk in adolescents.

Recent research has also begun to expand upon the IPTS by integrating other known risk factors for suicide into their examinations (e.g., (Anestis & Joiner, 2011; Hill & Pettit, 2014; Kleiman, Liu, & Riskind, 2013). For example, using a short-term prospective study (6-8 weeks), (Kleiman et al., 2013) found evidence that the IPTS constructs (measured at baseline) partially mediated the association between baseline

depressive symptoms and suicidal ideation at follow up in a sample of 299 undergraduates. In a cross-sectional study of 101 primary care adult outpatients, researchers found that forgiveness was related to suicidal behavior indirectly via the cumulative effect of depression, thwarted belongingness, and perceived burdensomeness (Nsamenang, Webb, Cukrowicz, & Hirsch, 2013). Overall, these studies suggest that perceptions of thwarted belongingness and burdensomeness partially mediate the relationship between depression and suicidal behavior in adult samples. However, it is equally plausible that these two constructs may lead to depression and subsequent SI. Depression is one of the strongest predictors of adolescent SI (O'Connor, Smyth, Ferguson, Ryan, & Mark, 2013) and interpersonal difficulties predict depression over time (Bosacki, Dane, & Marini, 2007). Thus, depression may be an important mediator of the association between these two IPTS constructs and SI.

Hypotheses

As stated above, no study to date has formally tested the IPTS in an adolescent sample. Further, very few studies have examined other factors that may mediate the association between perceptions of thwarted belongingness or burdensomeness and SI over time. The present study will examine these questions using both a cross-sectional and short-term (ca. three to four week follow-up) longitudinal research design. Given that SI has been shown to vary by sex (Nock et al., 2013) and depression symptoms (O'Connor et al., 2013), these factors will be statistically controlled in relevant analyses. Three hypotheses are offered. The first two hypotheses provide a direct test of the IPTS in an adolescent sample. The third hypothesis is based on the developmental literature

described above which suggests that perceptions of thwarted belongingness may be more important than perceive burdensomeness in explaining SI, and that depressive symptom severity may help explain this association.

Perceptions of high thwarted belongingness and burdensomeness would be independently associated with concurrent SI after controlling for major depressive disorder (MDD) diagnosis and biological sex. Further, burdensomeness would moderate the relationship between thwarted belongingness and SI. Specifically, individuals with the highest (versus lowest) levels of these cognitive distortions would report the highest levels of SI.

Perceived burdensomeness, thwarted belongingness, and their interaction will predict SI over a short-term, prospective time frame (Time 2 [T2]) controlling for SI at Time 1 (T1), T2 MDD diagnosis, and sex.

T1 thwarted belongingness would be indirectly associated (via T2 MDD symptom severity) with T2 SI. T1 perceived burdensomeness would have neither a direct effect nor indirect effect (via T2 MDD symptom severity) on T2 SI.

Methods

Participants

Participants were 143 adolescents (range = 12-18 years, $M = 15.38$, $SD = 1.43$) consecutively admitted to a partial hospitalization program (PHP) in an outpatient behavioral health facility in the Mid-Atlantic area. The PHP is a short term, crisis stabilization program for adolescents stepping down (e.g., inpatient hospitalization) or up (e.g., outpatient, intensive outpatient) in level of behavioral health services. The

behavioral health center from where participants were drawn is located in a large suburban area outside of a major city. The center is one of the largest providers of mental health services for children, adolescents, and families in this metropolitan area. The center accepts patients who are uninsured, privately insured, or on Medicaid. Patients generally present to the PHP with a variety of severe symptomatology including SI and suicidal behavior, self-harming behavior, school refusal, severe depression and anxiety, and/or externalizing behavior. Patients in the program are assigned a primary therapist and an attending psychiatrist for medication management. Patients participate in treatment for six hours a day, five days a week, over the course of three to four weeks. Patients receive weekly family and individual sessions with their primary therapist. Treatment is mainly group based consisting of morning safety assessments, cognitive-behavioral and dialectical-behavioral skills groups, non-directive processing groups, and recreational therapy groups.

As part of standard clinical care, patients and caregivers complete a clinical assessment battery designed to inform the patients' treatment plan in the PHP. They are also asked for permission to include their responses to the assessment battery in a clinical research databank maintained by the behavioral health facility. Data for the current study was drawn from this clinical research databank. A total of 156 patients were assessed over an eleven-month period, and 143 (92%) patients and caregivers provided informed assent/consent to include their information in the clinical research databank. Reasons for not consenting included privacy concerns ($N = 7$) and safety concerns ($N = 1$). Four patients did not specify a reason for not providing consent ($N = 5$). Patients and parents

completed baseline assessments at the time of admission, and patients completed a discharge assessment on their last day in the program. All assessments were completed by trained clinical research staff and were uninvolved with the participants' treatment. Study procedures were approved by the affiliated hospital and University IRBs.

Inclusion criteria for the current sample included the following: (1) English speaking adolescents (ages 12-18) and (2) at least one caregiver to provide consent. Exclusion criteria included youth with: (1) current psychosis; and those (2) cognitively unable to provide assent. Participants were 64% female and identified themselves as approximately 81% White, 4% Black, 6% Asian, or 9% from other racial backgrounds. Approximately 8% of the sample identified themselves as Hispanic or Latino in ethnicity. Mean family income was between \$80,000- \$90,000, with a range of 0-\$10,000 to \$100,000+.

Measures

Interpersonal Needs Questionnaire (INQ). The INQ was specifically developed to assess the constructs of thwarted belongingness and perceived burdensomeness included in the IPTS (Joiner et al., 2009). The current study used the 18-item version of the INQ, which has excellent psychometric properties in adult samples (Van Orden et al., 2008). The burdensomeness (e.g., “These days I think I am a burden on society) and the belongingness (e.g., “These days, I feel disconnected from other people”) subscales each include nine items. Participants are asked to rate the degree to which each statement is true for them using a 7-point Likert scale (1 = “Not at all true for me” to 7 = “very true for me”). Higher scores reflect a higher degree of perceived burdensomeness and

thwarted belongingness. Internal reliabilities for the thwarted belongingness and perceived burdensomeness subscales in the current sample were acceptable ($\alpha = .85$ and $\alpha = .92$, respectively).

Youth Inventory-4 (YI-4). The Youth's Inventory-4 (YI-4; Gadow et al., 2002) is a self-report rating scale that assesses symptoms of DSM-IV emotional and behavioral disorders in youths between 12 and 18 years old. The YI-4 has excellent psychometric properties and has shown strong reliability and convergent validity (Gadow et al., 2002). The YI-4 contains 120 items that assess symptoms of 18 disorders. The YI-4 yields Symptom Count scores that are summed to derive criteria for diagnosis (diagnostic model) or Symptom Severity scores (normative data model). Major Depressive Disorder (MDD) diagnosis (yes/no) was included as a covariate in tests of hypothesis 1 and 2. The MDD symptom severity scores were used to test the third hypothesis. Cronbach's alpha at T1 and T2 for the MDD symptom severity scale was acceptable ($\alpha = .83$ and $\alpha = .86$, respectively).

Suicide Ideation Questionnaire (SIQ). The SIQ (Reynolds, 1988) is a self-report measure that assesses the degree to which junior high (grades 7-9; SIQ junior) and high school-aged (grades 10-12; SIQ Senior) adolescents report thoughts about suicide (e.g., "I thought about killing myself," "I wished I were dead") within the last month. The SIQ senior contains 30-items and the SIQ junior has 15-items. Higher scores represent more severe SI. Internal consistency in a validation sample of 2,400 adolescents ($\alpha = .97$; Reynolds, 1988) and the current sample ($\alpha = .98$ T1; $\alpha = .96$ T2, SIQ senior; $\alpha = .86$

T1; $\alpha = .94$ T2, SIQ junior) was excellent. Raw scores on the SIQ senior and junior were mean centered to create a summary SIQ score comparable across all adolescents.

Data Analytic Strategy

All analyses used the SPSS statistical package. Preliminary bivariate analyses were conducted to examine distributional assumptions for linear regression analyses. Covariates (e.g., sex) that were significantly correlated with SI were statically controlled in the main analyses. All continuous variables were normally distributed with skewness and kurtosis values less than 1.1. To test hypotheses 1 and 2, we conducted linear regression analyses controlling for sex and MDD diagnosis. For hypothesis 1, T1 SIQ scores were regressed onto sex and MDD diagnosis (Step 1), thwarted belongingness, perceived burdensomeness (Step 2), and their interaction (Step 3). For hypothesis 2, T2 SIQ scores were regressed onto sex, T2 MDD diagnosis, SIQ T1 (Step 1), thwarted belongingness, perceived burdensomeness (Step 2), and their interaction (Step 3). Consistent with recommendations by (Cohen, Cohen, West, & Aiken, 2003), predictors were mean centered prior to forming their interaction term.

The mediation analysis to test hypothesis 3 was conducted with macros recommended by (Hayes & Preacher, 2013) and bootstrapping of indirect effects with 1,000 resamples consistent with recommendations by MacKinnon (2008). Mediation effects are evaluated with significance testing of both direct and indirect effects through multiple regression analyses. Direct effects represent the association of the independent variables with the outcome variables while accounting for the proposed mediating variable and any covariates (c' path; Baron & Kenny, 1986). Indirect effects represent the

effect of the predictor variable on the outcome variable via the proposed mediating variable (a*b path). The Hayes and Preacher (2013) method provides a biased corrected significance test of the indirect (a*b) path through bootstrapping. The resulting 95% confidence interval provided for each indirect effect allows examination of whether the confidence interval contains 0. If the resulting interval does not contain 0, the indirect effect is significant at the .05 probability level.

Results

Descriptive Statistics

Means and standard deviations of study variables were within the expected ranges for a clinical population (Table 1). A total of 143 individuals completed the T1 assessment at admission into the PHP program. A total of 127 individuals completed the T2 assessment (89% retention). Seventeen individuals did not complete the full discharge battery. Reasons for not completing the full discharge battery included withdrawal from the program against medical advice ($N = 3$), being psychiatrically hospitalized ($N = 3$), placement in long term residential care ($N = 4$), and administrative or unexpected discharge from the program ($N = 5$). Chi-square and independent samples t-tests revealed that individuals who did not complete the T2 assessment did not significantly differ on T1 study variables compared to individuals who completed the discharge assessment. The average length of stay in the program was approximately 22 days (range = 1 to 48, SD 8.10). At T1, 49 individuals completed the SIQ junior with 53% reporting clinical significant SI (total score ≥ 31). Ninety-three individuals completed the SIQ senior with 63% reporting clinical significant SI (total score ≥ 41). At T2, approximately 29%

(junior) and 37% (senior) of participants reported clinical significant SI. Individuals who completed the SIQ junior versus senior did not significantly differ on any study variables.

Table 1: Descriptive Statistics and Bivariate Correlations of Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Age	-										
2. Sex	-.09	-									
3. MDD Symptoms T1	-.07	.40**	-								
4. MDD Symptoms T2	-.06	.20*	.64**	-							
5. MDD Diagnosis T1	.05	.32**	.78**	.53**	-						
6. MDD Diagnosis T2	-.15	.26**	.53**	.82**	.42**	-					
7. Suicidal Ideation T1	-.12	.23**	.59**	.43**	.48**	.33**	-				
8. Suicidal Ideation T2	-.05	.15	.51**	.63**	.38**	.50**	.68**	-			
9. Burdensomeness T1	-.07	.09	.57**	.36**	.43**	.26**	.65**	.42**	-		
10. Belongingness T1	-.07	.07	.53**	.45**	.43**	.40**	.47**	.41**	.63**	-	
11. Time in Treatment	.07	-.01	-.01	-.06	.02	-.02	-.05	-.12	-.04	.03	-
<i>N</i>	143	143	143	128	143	128	142	126	141	141	127
Mean	15.38	+	15.44	11.80	++	+++	.22	-.25	3.60	4.00	22.06
Standard Deviation	1.43	-	5	5.37	-	-	1.06	.86	1.55	1.33	8.11
Range	12-18	-	2-26	0-23	-	-	-1.30-2.57	-1.30-2.80	1-7	1-7	1-48

Note. T1 = Time 1; T2 = Time 2; MDD = Major Depressive Disorder; + 49 Males, 94 females; ++ 46 no, 97 yes; +++78 no; 50 yes; * $p < .05$, ** $p < .01$; Suicidal ideation scores are standardized.

Preliminary Bivariate Analyses

Pearson's bivariate correlation coefficients (r) were computed to examine the relationships between SI (T1 and T2), demographic variables, time in treatment, MDD symptom severity and diagnosis (T1 and T2), perceived burdensomeness, and thwarted belongingness (Table 1). Adolescents who were female (vs. male) and depressed (vs. non-depressed) reported significantly higher SIQ scores at T1 and T2. Higher MDD symptom severity was associated with higher T1 and T2 SIQ scores. Perceived burdensomeness and thwarted belongingness were positively correlated with each other and with SIQ scores at both T1 and T2. Perceived burdensomeness had a notably strong

correlation with T1 SIQ ($r = .65$) compared to thwarted belongingness and T1 SIQ ($r = .47$). Neither age nor time in treatment was significantly correlated with study variables. All correlations were consistent with past research and in the expected direction.

Regression Analyses Testing Moderators

Hypothesis 1. The first cross-sectional linear regression analysis provided the traditional test of the SI portion of Joiner's IPTS, with thwarted belongingness, perceived burdensomeness, and their interaction predicting T1 SI. Results revealed a unique effect of perceived burdensomeness accounting for MDD diagnosis and biological sex (Table 2). There was no unique effect of belongingness, and there was no significant interaction of the two IPTS constructs. This model accounted for about 50% of the variance in T1 SI.

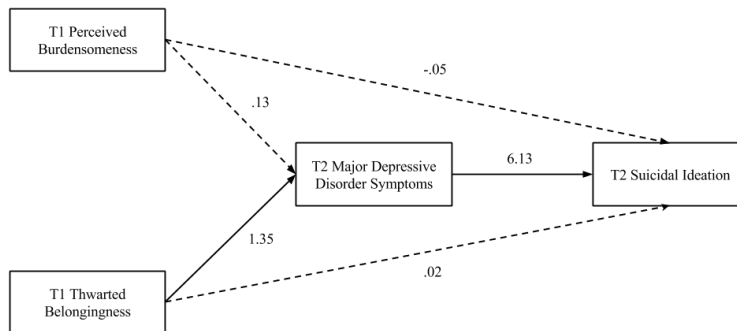
Hypothesis 2. The second linear regression analysis provided a more conservative, prospective test of the IPTS. This analysis revealed that there was no unique effect of T1 perceived burdensomeness, thwarted belongingness, or their interaction on T2 SI, controlling for sex, T1 SI, and T2 MDD diagnosis. Only T2 MDD diagnosis and T1 SI were significantly associated with T2 SI (Table 2). This model accounted for about 55% of the variance in T2 SI.

Table 2: Linear Regression Analyses predicting Time 1 and Time 2 Suicidal Ideation

	Predictor	B	Beta	SE Beta	Adj. R ²	Δ R ²
Hypothesis 1 Predicting T1 Suicidal Ideation						
Step 1	Sex	.15	.07	.08	.21	.22**
	MDD Diagnosis T1	1.01	.44**	.08		
Step 2	Belongingness	.04	.05	.08	.46	.26**
	Burdensomeness	.38	.54**	.08		
Step 3	Belongingness X Burdensomeness	-.08	-.09	.07	.46	.01
Hypothesis 2 Predicting T2 Suicidal Ideation						
Step 1	Sex	-.03	-.02	.07	.53	.55**
	MDD Diagnosis T2	.59	.29**	.07		
	Suicidal Ideation T1	.47	.59**	.07		
Step 2	Belongingness	.05	.07	.08	.53	.00
	Burdensomeness	-.04	-.07	.09		
Step 3	Belongingness X Burdensomeness	-.00	-.00	.07	.53	.00

Note. T1 = Time 1; T2 = Time 2; MDD = Major Depressive Disorder; ** $p < .001$

Hypothesis 3. In the third analysis, MDD symptom severity at T2 (Figure 1) was examined as a potential mediator of the relationship between T1 perceived burdensomeness and thwarted belongingness, and T2 SI controlling for T1 SI and sex. There was an initial significant direct effect of T1 thwarted belongingness (c path; $b = .11, p < .05$) on T2 SI accounting for T1 perceived burdensomeness. There was no direct effect of T1 perceived burdensomeness (c path; $b = -.04, p = .50$).



Note. T1 = Time 1, T2 = Time 2. All solid lines represent significant paths, $p < .05$. All dashed lines represent nonsignificant paths, $p > .05$. The model above included T1 suicidal ideation and biological sex as covariates.

Figure 1: Mediation Model Predicting Time 2 Suicidal ideation

As can be seen in Figure 1, the direct effect of T1 thwarted belongingness was reduced to non-significance when including T2 MDD symptoms as a mediator. T1 thwarted belongingness significantly predicted T2 MDD symptom severity (a path). There was a significant indirect effect of T1 thwarted belongingness on T2 SI (via T2 MDD symptom severity), $a*b = .09$, 95% CI [.03, .14] bootstrapped. T1 perceived burdensomeness did not predict T2 MDD symptom severity (a path) or T2 SI (c' path). Further, the indirect effect of T1 perceived burdensomeness on T2 SI (via T2 MDD symptom severity) was non-significant, $a*b = .01$, 95% CI [-.05, .07]. Overall, the final model accounted for about 79% of the variance in T2 SI.

Discussion

This is the first study to formally examine whether perceptions of burdensomeness and thwarted belongingness, two socially-based cognitive distortions included in the interpersonal psychological theory of suicide (IPTs) (Joiner, 2005),

predict suicidal ideation (SI) in a clinical adolescent sample. While the IPTS has gained substantial support in the adult suicide literature, it has not been tested in an adolescent sample. Results generally suggest that the IPTS may not explain SI in adolescents as well as it does in adults. In the present study, perceived burdensomeness was positively associated with SI, even after controlling for MDD diagnosis and sex, using a cross-sectional but not a longitudinal design. Perceptions of thwarted belongingness were not associated with SI either independently or in interaction with perceived burdensomeness after controlling for the same covariates. However, when major depressive disorder symptom severity was examined as a mediator of the association between these two socially based cognitive distortions and SI using a short-term, prospective design, a significant indirect effect of thwarted belongingness on T2 SI (via T2 MDD symptom severity), controlling for covariates (T1 SI and sex), was found. These findings add uniquely to theoretical literature on adolescent suicide and suggest that a slightly revised model of the IPTS may help better explain SI in clinical samples of adolescents.

Traditional Test of the IPTS in Adolescents

In an effort to directly replicate the first formal test of the IPTS (Van Orden et al., 2008) conducted with adults, the first set of analyses examined whether perceived burdensomeness, thwarted belongingness, and their interaction predicted concurrent SI. In partial support of the first hypothesis, only perceived burdensomeness was directly associated with SI and no interaction with thwarted belongingness was found, after controlling for MDD diagnosis and sex. Interestingly, neither perceived burdensomeness, thwarted belongingness, nor their interaction predicted future SI (T2 SI), after controlling

for T2 MDD diagnosis and sex, which was inconsistent with the second hypothesis. The only significant predictor of T2 SI was T1 SI, which is consistent with past research that suggests that prior SI is a strong predictor of future SI (Prinstein et al., 2008).

Though Van Orden et al. (2008) also found a direct association between perceived burdensomeness but not belongingness in cross-sectional analyses conducted with college students, more recent cross-sectional and longitudinal research conducted with adults has found a direct association between both socially base cognitive distortions and concurrent SI (Kleiman et al., 2013; Monteith, Menefee, Pettit, Leopoulos, & Vincent, 2013). The lack of an interaction between these two types of cognitive distortions in the current sample is also inconsistent with studies which found that adults with high (versus low) perceptions of thwarted belongingness *and* high (versus low) perceptions of burdensomeness report the highest levels of SI (Monteith et al., 2013; Van Orden et al., 2012).

The context of the present study may have had a significant influence on findings. Participants in the current study completed baseline assessments upon intake into a partial hospitalization program. To be eligible for the program, teens must be in a socio-emotional or behavioral crisis (e.g., suicidal, school refusal, severe anxiety), which often results in significant discord and strain within the family system. In this heightened emotional state, the perception that one is a burden on others appeared to be strongly linked to concurrent SI over an above other predictors, including sex and MDD diagnosis. Moreover, it is also reasonable to assume that the actual admission process into the PHP program exerts significant stress on the family system, requiring parents to

alter their daily schedule to accommodate an intake assessment, psychiatric evaluation, family therapy sessions, and transportation to and from the program on a daily basis for multiple weeks. Further, given that treatment is predominantly focused on the adolescent and initiated by the parent, the adolescent may initially view him/herself as a problematic member of the family. Under these circumstances, a teenager may perceive him/herself as a burden on his/her family system, or an “expendable” member as suggested in prior research (Sabbath, 1969) and contemplate suicide.

Test of an Alternate Developmentally Informed Model of Suicide

As is evident, tests of the traditional model of the IPTS in our clinical adolescent sample did not replicate findings in the adult literature. This is surprising given developmental research that suggests that the formation of strong interpersonal relationships in the context of rapid physical and emotional development during adolescence is needed for normative growth (Steinberg, 1987). However, difficulties in interpersonal relationships during adolescence have been shown to lead to many known risk factors for SI, including depression (Armsden, McCauley, Greenberg, Burke, & Mitchell, 1990; Bosacki et al., 2007; King & Merchant, 2008). Thus, it is possible that the association between perceptions of thwarted belongingness and perceived burdensomeness, and SI, is better explained through an association with depression. Indeed, consistent with the third study hypothesis, MDD symptom severity was found to fully mediate the association between thwarted belongingness and T2 SI after controlling for T1 SI and sex. This suggests that lower levels of perceived belongingness at baseline

were associated with higher MDD symptom severity, which in turn, predicted higher SI at discharge from the treatment program.

Interestingly, perceived burdensomeness had no effect on MDD symptom severity or SI over this short prospective time frame. Thus, as described above, perceived burdensomeness may be more important for understanding concurrent SI among adolescents in socio-emotional crisis. The lack of longitudinal association may also reflect that the treatment program was successful for most youth who learned that they were valuable (not expendable) members of the family system over the course of therapy. Though change in the IPTS constructs was not measured, most participants did report reductions in SI from T1 to T2. Interestingly, perceptions of thwarted belongingness appeared to become relatively more important in explaining severity of SI over time through an association with depression. It is possible that after a period of stabilization and family work in treatment, adolescents may begin to focus their concerns on their broader social networks, including school and peer relationships. This may be particularly true as they near discharge and must return to their schools and social circles. Larger systems issues take considerable time to address and if the adolescent perceives significant problems within these areas upon discharge, it may negatively affect their mood, and in turn levels of SI. Overall, these findings have important implications for future research with the IPTS model, particularly for prospective study designs across various settings and contexts.

Limitations

Results from the present study should be interpreted within the context of several limitations and methodological considerations. First, the current sample included clinically distressed adolescents in a partial hospitalization program. Though this is one of the highest risk groups for suicidal behavior and thus warrant significant attention, the results of this study should be considered context dependent until replicated with relatively healthier community samples. Second, this sample was predominantly female, white, and socio-economically advantaged. Results may not generalize to more heterogeneous samples. It would be worthwhile for future research to examine the IPTS across more racially and economically diverse adolescent samples. Third, although the short-term prospective design of the study followed an ecologically valid assessment schedule, future research would benefit from extending the time between follow-ups to examine potential long-term effects on adolescent SI. Fourth, the sample size for the current study was relatively small, and may have been underpowered to detect significant interactions. Future research with larger samples of adolescents would be beneficial.

Clinical Implications

This study holds important clinical implications. First, results highlight the importance of assessing for perceptions of burdensomeness and belongingness among clinically referred youth. These two constructs can be conceptualized as socially based cognitive distortions, and thus, may be amenable to change through cognitive-behavioral therapy. Second, results suggest that short-term interventions for adolescents during a time of socio-emotional crisis should address adolescent perceptions of burdensomeness when present. Family systems interventions and/or those that facilitate family

communication and positive family interactions may help improve an adolescent's sense of importance to the family system. Third, results suggest that over the course of a short treatment program, feelings of thwarted belongingness continue to influence depression symptom severity and SI. Cognitive-behavioral therapy, family systems therapy, or interpersonal therapy for depressed adolescents may be particularly effective in addressing perceptions of thwarted belongingness.

A CLOSER LOOK AT THE ROLE OF SOCIAL SUPPORT IN ADOLESCENT SUICIDAL IDEATION AND SUICIDE ATTEMPTS

Suicidal ideation (SI) and suicide attempts (SA) are common occurrences among teenagers. Suicide is the third leading cause of death among individuals ages 10-24 years old (Eaton et al., 2012), and SI and SA are the most common mental health emergencies among adolescents (King, Kerr, Passarelli, Foster, & Merchant, 2009). For each completed suicide, it is estimated that 100 to 200 adolescents make non-lethal SA (McIntosh, 2012). Data from the 2011 national Youth Risk Behavior Survey, administered to high school students across the United States, suggests that 15.8% of high school students seriously considered suicide in the prior 12 months, 12.8% made a suicide plan, and 7.8% attempted suicide (Eaton et al., 2012). Thus, research efforts aimed at addressing this significant public health concern is warranted. The purpose of the present study is to examine the relative contributions of perceptions of parent, school, and close friend support in relation to SI and SA in an adolescent clinical sample.

The importance of social support emerges as a consistent theme across multiple theories of suicidal behavior as well as developmental psychopathology research. The sociological theory of suicide (Durkheim & Simpson, 1951), the psychache theory of suicide (Shneidman, 1993), and the interpersonal-psychological theory of suicide (IPTS) (Joiner, 2005) all suggest that inadequate social support and strong interpersonal relationships increase risk for SI and SA. The need to belong, in particular, is a central

theme in Joiner's IPTS. These theories complement developmental research which suggests that the maintenance of strong relationships with parents while concurrently establishing an independent network of close friends and close community connections (often within school settings) (Steinberg & Morris, 2001) is needed for normative socio-emotional growth. When this key developmental task is not successfully navigated and youth perceive low social support, they are at heightened risk for a host of negative outcomes, including depression (Rueger, Chen, Jenkins, & Choe, 2014) and SI and SA (Czyz et al., 2012).

Recent reviews of the literature conclude that perceived social support from parents and peers plays an important role in the development of adolescent SI and SA (King & Merchant, 2008). In general, lower perceived parent and peer support have been associated with higher SI and greater risk for SA in cross-sectional (Bonanno & Hymel, 2010; Sharaf, Thompson, & Walsh, 2009) and longitudinal (Czyz et al., 2012; Winfree & Jiang, 2010) research with community and clinical samples. Results of studies examining school support have been less consistent. In school based samples drawn from the Longitudinal Study of Adolescent Health (Add Health), low perceived teacher support has been associated with greater odds of a SA in one study (McNeely, Nonnemaker, & Blum, 2002), while others failed to find an association between perceptions of school connectedness and SI or SA (Kidd et al., 2006; Winfree & Jiang, 2010). Inconsistency in results across these studies appear to be related to differences in covariates included in the models under investigation (e.g., depression, other support variables, school size, etc.

(Kidd et al., 2006; McNeely et al., 2002; Winfree & Jiang, 2010)) and the measure of social support used (i.e., teacher support versus school connectedness).

The relative contributions of peer, family, and school support have been less well studied in the adolescent suicide literature. Some studies find that both peer and parental support maintain independent associations with adolescent SI when included in the same model in both community (Babiss & Gangwisch, 2009; Fotti, Katz, Afifi, & Cox, 2006) and clinical (Pettit et al., 2011) samples. Other studies with clinical samples find that perceptions of family support may be somewhat more important than peer support in understanding SI severity and SA risk (Czyz et al., 2012; Kerr, Preuss, & King, 2006). In two school based studies that included all three sources of support, parent but not school or close friend support, was independently associated with SI or a SA (Kidd et al., 2006; Winfree & Jiang, 2010). As is evident, the relative importance of various types of support to adolescent SI and SA is not clear and warrants further investigation, particularly in clinical samples at heightened risk for SI and SA.

Given that the maintenance of healthy interpersonal relationships across social networks (parent, peer, school) is important for healthy adolescent socio-emotional development (Collins & Steinberg, 2006), it stands to reason that the confluence of low support across multiple domains (i.e., low parent support *and* low peer support) would be associated with the greatest levels of SI and SA. To our knowledge, only two studies have examined the interactive effects of perceptions of social support from various sources. Kidd et al. (2006) examined the interactive effects of connectedness to parents, peers, and school in predicting the odds of SA within the last year among 12,105

adolescents drawn from Add Health. Only greater school *and* parent connectedness were associated with lower odds of SA among a subgroup of boys with a previous SA history ($N = 96$) who reported lower connectedness. Kerr et al. (2006) examined the relation between perceptions of support from three sources (parents, non-parent adults, and peers) and SI in a sample of 220 psychiatrically hospitalized adolescents. They found no interactions between these various sources of support. The present study will build upon this literature to examine the relative importance of perceptions of parent, close friend, and school support in relation to adolescent SI and SA, as well as whether low support across these social domains increases this risk in a clinical sample of adolescents. Knowledge of the relative importance of various types of social support to SI and SA may help inform suicide assessment and treatment strategies with clinically distressed adolescents.

Hypotheses

Drawing from interpersonal theories of suicidal behavior and prior empirical research, the following hypotheses were offered:

Low parent support, close friend support, and school support will each be independently and negatively related to SI. There will be significant interactions between each type of support. Specifically, we hypothesized that the relationship between school support and SI would be stronger among youth who report higher (vs. lower) parent support. Similarly, the relationship between school support and SI would be stronger among youth who report higher (vs. lower) close friend support. Finally, the relationship

between close friend support and SI would be stronger among youth who report high (vs. low) parent support.

Low parent support, close friend support, and school support each will be independently associated with increased odds of SA history. Similar to hypothesis 1, the relationship between school support and odds of SA would be stronger among youth reporting lower (vs. higher) parent support. School support would be strongly related to odds of SA among youth reporting lower (vs. higher) close friend support. Finally, the relationship between close friend support and SA would be stronger among youth reporting high (vs. low) parent support.

Method

Participants

Participants were 143 adolescents (range = 12-18 years, $M = 15.38$, $SD = 1.43$) consecutively admitted to a partial hospitalization program (PHP) in an outpatient behavioral health facility in the Mid-Atlantic area. The PHP is a short term, crisis stabilization program for adolescents stepping down (e.g., inpatient hospitalization) or up (e.g., outpatient, intensive outpatient) in level of services. The behavioral health center from where participants were drawn is located in a large suburban area outside of a major city and accepts patients who are uninsured, privately insured, or on Medicaid. Patients generally present to the PHP with a variety of severe symptomatology including SI and suicidal behavior, self-harming behavior, school refusal, severe depression and anxiety, and/or externalizing behavior.

As part of standard clinical care, patients and caregivers complete a clinical assessment battery designed to inform the patients' treatment plan in the PHP at the time of admission. They are also asked for permission to include their responses to the assessment battery in a clinical research databank maintained by the behavioral health facility. Data for the current study was drawn from this clinical research databank. A total of 156 patients were assessed over an eleven-month period, and 143 (92%) patients and caregivers provided informed assent/consent to include their information in the clinical research databank. Reasons for not consenting included privacy concerns ($N = 7$) and safety concerns ($N = 1$). Four patients did not specify a reason for not providing consent ($N = 5$). All assessments were completed by trained clinical research staff and were uninvolved with the participants' treatment. Study procedures were approved by the affiliated hospital and university IRBs.

Inclusion criteria for the current sample were (1) English speaking adolescents (ages 12-18) and (2) at least one caregiver to provide consent. Exclusion criteria included youth with: (1) current psychosis; and those (2) cognitively unable to provide assent. Participants were 64% female and identified themselves as 81% White, 4% Black, 6% Asian, or 9% from other racial backgrounds. Approximately 8% of the sample identified themselves as Hispanic or Latino in ethnicity. Mean family income was between \$80,000- \$90,000, with a range of 0-\$10,000 to \$100,000+.

Measures

Child and Adolescent Social Support Scale (CASSS). The CASSS (Malecki, Demaray, Elliott, & Nolten, 2000) measures social support from parents, close friends,

and school. For each scale there are 12 items that measure emotional, informational, appraisal, and instrumental support. Items on the CASSS consist of statements such as, “My parent(s) help me make decisions;” “People in my school nicely tell me when I make mistakes;” and “My close friend helps me when I’m lonely.” Participants respond by rating how frequently they receive support from the indicated source using a six-point Likert scale (1 = Never to 6 = Always). Reliability for the CASSS is excellent in validation samples ($\alpha = .92$ to $.96$; Malecki & Demary, 2002) and the current sample ($\alpha = .94$ to $.96$).

Scale for Suicidal Ideation (SSI). The SSI (Beck, Kovacs, & Weissman, 1979) is a 19-item self-report scale which assesses the intensity of a person’s specific attitudes, behaviors, and plans in relation to committing suicide in the last week. Items are rated on three point likert scale, with higher scores reflecting more intense thoughts about suicide. The SSI has strong psychometric properties, including excellent internal consistency ($\alpha = .90$; (Beck et al., 1979). Internal consistency in the current sample was excellent ($\alpha = .94$).

Self-Injurious Thoughts and Behaviors Interview – Short Form (SITBI). The SITBI (Nock, Holmberg, Photos, & Michel, 2007) is a structured clinical interview that assess SI, suicide plans, gestures, and attempts, as well as non-suicidal-self injury. Each content area begins with a screening question that assesses lifetime presence of self-injurious thoughts or behavior. SA with intent to die were coded as present/absent. Only actual (not aborted or interrupted) SAs were examined. The STIBI has strong convergent

validity, inter-rater reliability ($K=.90$), and test-retest reliability ($K=.70+$) (Nock et al., 2007).

Youth Inventory-4 (YI-4). The Youth's Inventory-4 (YI-4; Gadow et al., 2002) is a self-report rating scale that assesses symptoms of DSM-IV emotional and behavioral disorders in youths between 12 and 18 years old. The YI-4 has excellent psychometric properties and has shown strong reliability and convergent validity (Gadow et al., 2002). The YI-4 contains 120 items that assess symptoms of 18 disorders. The YI-4 yields Symptom Count scores that are summed to derive criteria for diagnosis (diagnostic model). Major Depressive Disorder (MDD) diagnosis (yes/no) was used in the current study. Internal consistency for the MDD symptom count scale was acceptable ($\alpha = .83$).

Data Analytic Strategy

All analyses used the SPSS statistical package. Preliminary bivariate analyses were conducted to examine distributional assumptions for linear and logistic regression analyses. Given that SI and SA have been shown to consistently vary by depression (O'Connor et al., 2013) and sex (Nock et al., 2013), these factors were statistically controlled in main study analyses when significantly correlated with SI or SA. Multivariate analyses were restricted to individuals with valid responses on all study variables ($N = 125$). To test hypothesis 1, BSS scores were regressed onto sex and MDD diagnosis (Step 1), parent support, school support, and close friend support (Step 2), and their interactions (Step 3). To test hypothesis 2, SA history was regressed onto parent support, school support, and close friend support (Step 1) and their interactions (Step 2). Consistent with recommendations by Cohen, Cohen, West, and Aiken (Cohen et al.,

2003), predictors were mean centered prior to forming their interaction term. Significant interactions were probed with simple slopes analyses.

Results

Descriptive Statistics

Means and standard deviations of study variables were within the expected ranges for a clinical population (Table 3). All continuous variables were normally distributed with skewness and kurtosis values less than 1. Eighty-five percent of individuals in the current study reported some degree of SI in the past seven days. Forty-three individuals (30%) reported a history of at least one SA with intent to die. Of the 43 SAs, 80% ($N = 34$) occurred within the prior year, 40% ($N = 17$) were within the last month, and 12% ($N = 5$) were within the prior week. Only 20% of the 43 ($N = 9$) occurred prior to the last year. Methods of SA included: overdose ($N = 27$), sharp object ($N = 7$), hanging ($N = 4$), poison ($N = 2$), suffocation ($N = 1$), train/car ($N = 1$), and jumping from a significant height ($N = 1$).

Table 3: Descriptive Statistics and Bivariate Correlations of Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.
1. Age	-							
2. Sex	-.15	-						
3. MDD Diagnosis	.05	.35**	-					
4. Suicide Attempt	-.01	.08	.10	-				
5. Suicidal Ideation	-.15	.29**	.47**	.38**	-			
6. Parent Support	.09	.00	-.15	-.22*	-.27*	-		
7. Close Friend Support	.13	.11	-.05	-.02	-.13	.30**	-	
8. School Support	.20	-.16	-.27*	-.09	-.41**	.40**	.30*	-
<i>N</i>	143	143	143	142	142	142	140	130
Mean	15.38	+	++	+++	10.58	3.54	4.34	2.64
Standard Deviation	1.43	-	-	-	8.91	1.03	1.31	1.07
Range	12-18	-	-	-	0-40	1-6	1-6	1-6

Note. T1 = Time 1; T2 = Time 2; MDD = Major Depressive Disorder; + 49 Males, 94 females; ++ 46 no, 97 yes; +++99 no; 43 yes; * $p < .05$, ** $p < .01$; Suicidal ideation scores are standardized.

Preliminary Bivariate Analyses

Pearson's bivariate correlation coefficients (r) were computed to examine the relationships between SI, SA, demographic variables, MDD diagnosis, and parent, close friend, and school support. Adolescents who were female (versus male) and depressed (versus non-depressed) reported significantly higher BSS scores (Table 3). Sex and MDD diagnosis were not correlated with a history of SA. Age was not correlated with either SI or SA. Parent support was significantly negatively associated with both SI and SA. School support was significantly and negatively associated with SI, but not SA. Close friend support was not correlated with SI or SA.

Regression Analyses Testing Moderators

Social Support and SI (Hypothesis 1). In the model testing the main effects (parent, close friend, school) and interactions among types of social support controlling

for covariates (sex, MDD diagnosis)(Table 4), there was a main effect of MDD diagnosis and school support on severity of SI. Specifically, individuals with versus without an MDD diagnosis reported significantly more severe SI. Further, higher school support was associated with less severe SI. There was no unique effect of parent support or close friend support on SI. The only significant interaction was between parent and school support. A simple slopes analysis of this interaction revealed that low school support was associated with greater severity of SI among youth who reported lower (vs. higher) parent support. Specifically, under low levels of parent support, the relationship between school support and SI was significantly negative (slope = -5.11, $t = -4.47$, $p < .001$, 95% CI [-7.38, -2.85]). Conversely, under higher levels of parent support, the association between school support and SI was not significant (slope = -1.60, $t = -1.80$, $p = .07$, 95%CI [-3.35, .16]). Youth with high levels of school support did not report significantly different levels of SI based on parent support (Figure 2: Simple Slopes Interaction of School Support and Parent Support on Suicidal Ideation Severity). Overall, this model accounted for about 40% of the variance in SI.

Table 4: Linear Regression Analysis of Social Support on Suicidal Ideation Severity

	Predictor	B	Beta	SE Beta	Adj. R ²	Δ R ²
Step 1	Sex	1.94	.10	.08	.23	.24**
	MDD Diagnosis	6.71	.35**	.08		
Step 2	School Support	-3.30	-.39**	.09	.30	.08*
	Parent Support	-.42	-.05	.08		
	Close Friend Support	.29	.04	.09		
Step 3	School Support X Parent Support	1.91	.26*	.10	.38	.07*
	School Support X Close Friend Support	.77	.09	.10		
	Parent Support X Close Friend Support	-.37	-.05	.09		

Note. N = 125; MDD = Major Depressive Disorder; **p < .001, * p < .01

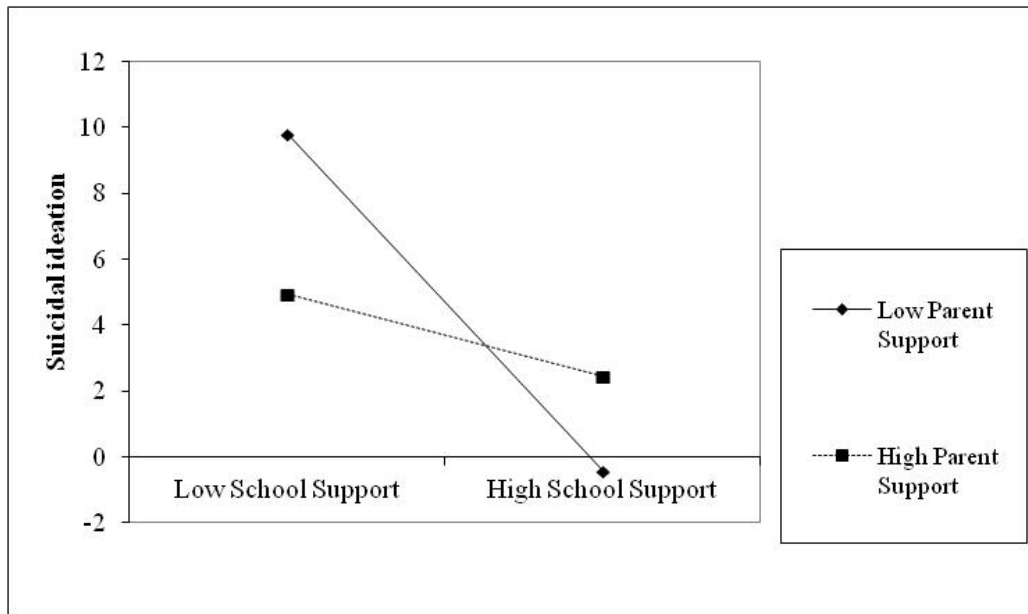


Figure 2: Simple Slopes Interaction of School Support and Parent Support on Suicidal Ideation Severity

Social Support and SA (Hypothesis 2). Results from the logistic regression suggested a unique effect of parent support, but not close friend or school support on odds of SA history. Specifically, low perceived parent support increased the odds of SA history. The only significant interaction across the three types of social support on SA

history was between school support and close friend support. A simple slopes analysis of the significant interaction revealed that low school support was associated with greater odds of a SA history among youth who reported lower but not higher close friend support (Figure 3). Specifically, under low levels of close friend support, the relationship between school support and odds of SA history was significantly negative (slope = -1.06, $z = -2.76$, $p < .01$, 95%CI [-1.81, -.31]). Conversely, under high levels of close friend support, the association between school support and odds of SA was not significant (slope = .22, $z = .97$, $p = .33$, 95%CI [-.22, .66]).

Table 5: Logistic Regression Analysis of Social Support Variables on Odds of Suicide Attempt History

	Predictor	B	SE	Wald χ^2	OR	95% CI
Step 1	School Support	-.01	.21	.00	.99	.65-1.51
	Parent Support	-.47	.23	4.18*	.63	.40-.98
	Close Friend Support	.07	.16	.17	1.07	.78-1.45
Step 3	School Support X Parent Support	.03	.25	.01	1.03	.63-1.67
	School Support X Close Friend Support	.64	.29	4.69*	1.89	1.06-3.36
	Parent Support X Close Friend Support	.07	.26	.07	1.07	.65-1.78

Note. $N = 125$; MDD = Major Depressive Disorder; * $p < .05$

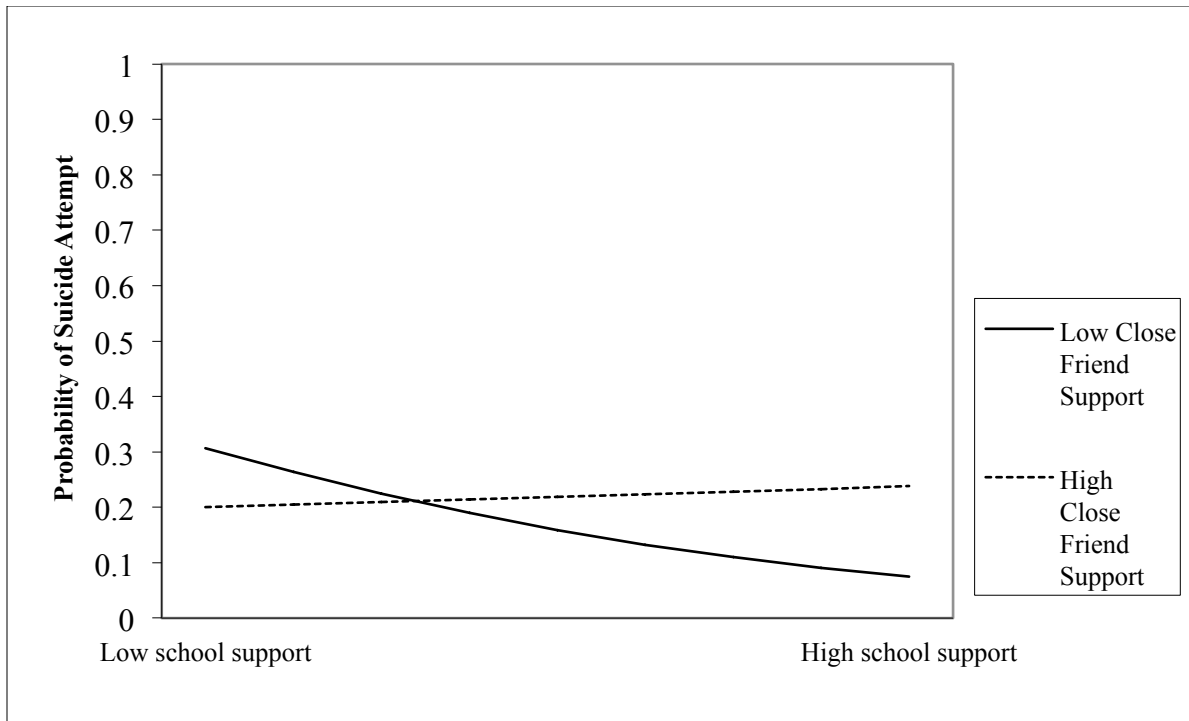


Figure 3: Simple Slopes Interaction of School Support and Close Friend Support on Odds of Suicide Attempt History

Discussion

This study is among the first to examine the relative importance of perceptions of school, parent, and close friend support in understanding SI and the odds of relatively recent SA history in a clinical adolescent sample. While there exists empirical evidence for an association between each of these forms of support and SI or SA, their relative importance remains unclear. Results from the current study suggest that perceptions of school support are independently and negatively associated with SI even after controlling for MDD diagnosis and sex. Moreover, this relationship is particularly strong among adolescents who also report perceptions of low parent support. Notably, results also suggest that parent support was independently associated with greater odds of a SA in the

sample as a whole, and that the confluence of low school *and* low close friend support distinguished adolescents with versus without a SA history. These findings build uniquely upon existing literature and suggest that perceptions of school, parent, *and* close friend support are important to understanding adolescent SI and SA in a clinical sample.

Suicidal Ideation

In partial support of the first hypothesis, low perceived school support was independently associated with higher SI after controlling for MDD and sex. The association between school support and SI is consistent with some prior research in community samples (McNeely et al., 2002). Notably, the confluence of low perceived school and parent support was particularly salient in understanding SI. Individuals who perceived low support from school *and* parents reported the highest levels of SI compared to all other individuals.

These study results may be best understood when considered within the context of the current sample. Adolescents were assessed at intake into a PHP. To be eligible for the program, teens must be in a socio-emotional or behavioral crisis (e.g., suicidal, school refusal, severe depression), which is often precipitated by negative interpersonal events. These adolescents also live in school districts with a national reputation for being academically rigorous and demanding. It can be quite difficult for adolescents with socio-emotional difficulties to meet these academic demands. It is conceivable that adolescents with socio-emotional difficulties who experience significant academic stress and perceive low support within the school system may think about suicide as a means of escape. These suicidal thoughts are further heightened when adolescents do not perceive that

their parents offer needed support to help with academic problems or other forms of stress. Such a process is consistent with that suggested by the cognitive-behavioral theory of adolescent SI. Specifically, this theory suggests that predisposed adolescents (i.e., those with socio-emotional difficulties) who experience a significant stressor may develop SI when their thoughts patterns (i.e., no one cares about me) and coping strategies (e.g., isolation or acting out behavior) are maladaptive.

Surprisingly, perceptions of close friend support and parent support were not independently associated with concurrent SI after controlling for MDD and sex. Notably, there was an initial bivariate relationship between perception of parent support and SI, suggesting potential shared variance with covariates and other sources of support. It may also reflect that parent support plays a larger direct role in suicidal behavior as suggested by study results. Further, there were no interactions of school support *and* close friend support or parent support *and* close friend support. This finding is consistent with one prior study that also failed to find interactions between parent and peer support and adolescent SI (Kerr et al., 2006).

Suicide Attempts

Relative to SI, a different pattern of findings emerged when examining correlates of SA. In partial support of hypothesis 2, perception of low parent support was independently associated with the odds of SA history in the sample as a whole. These results are consistent with prior research that has also found an association between low perceived parent support and SA (Czyz et al., 2012; Kidd et al., 2006). Moreover, perceptions of low school support only played a role in SA history when paired with low

perceived close friend support. This latter finding is unique to the literature.

Cumulatively, these results suggest that adolescents with a SA history in socio-emotional crises appear to perceive low support across all three areas. In general, they may perceive their home environment as lacking in warmth and high in conflict (Miller, McCullough, & Johnson, 2012), which may negatively affect their perceptions of support. Against this backdrop, the addition of low perceived school support *and* lack of close friends to confide in may leave adolescents feeling alone and isolated. Social isolation among these youth may increase risk for a SA when they perceive no alternative escape from their painful circumstances. This conceptualization is consistent with the IPTS, which suggests that lack of support and isolation (i.e., thwarted belongingness) is associated with SI and SA, especially when paired with painful and provocative experiences (PPEs) (Van Orden et al., 2010). Indeed, many youth requiring a PHP level of care have a history of PPEs (e.g., traumas, non-suicidal self-injury, etc.), which, according to the IPTS, increases the likelihood that SI will progress to SA.

Limitations

Results from the present study should be interpreted within the context of several methodological limitations. First, the current sample included clinically distressed adolescents in a partial hospitalization program. Though this is one of the highest risk groups for suicide and thus warrant significant attention, the results of this study should be considered context dependent until replicated with relatively healthier community samples. Second, this sample was predominantly female, white, and socio-economically advantaged. Results may not generalize to more heterogeneous samples. Third, the

sample size for the current study was relatively small, and may have been underpowered to detect multiple significant interactions. Future research with larger samples of adolescents would be beneficial. Fourth, this study examined history of SA rather than prospective SA. However, the majority of SA in the current sample were relatively recent (within the month to year). Finally, adolescent reports of their perceptions of social support could have been biased by concurrent depressive symptoms (Brendgen, Vitaro, Turgeon, & Poulin, 2002). However, prior research suggests that perceptions of social support yield variance unique of concurrent psychopathology (Cutrona, 1989; Kerr et al., 2006).

Clinical Implications

Results from this study have several important clinical implications. First, results highlight the importance of assessing for perceptions of social support from close friends, family, *and* school staff among clinically referred youth. Moreover, all three areas of social support should be targeted in the context of intervention when indicated. This may include family work to facilitate improved communication, positive interactions, and consistency in limit setting, to increase cohesion. Individual work to improve problem-solving, affect regulation, and assertive communication skills, as well as decrease socially based cognitive distortions, may also be needed to increase perceptions of support and facilitate meaningful connections with others. Successful school intervention may include facilitating needed psychoeducational evaluations and academic accommodations, as well as promoting positive interactions between adolescents, parent, and school staff. Finally,

efforts to build and promote positive prosocial peer support networks may also be important to the prevention and treatment of adolescent suicidality.

APPENDIX A

Background and Literature on Social Support and Adolescent Suicidal Ideation and Behavior

Suicide is currently the third leading cause of death among individuals 10-24 years old (Eaton et al., 2012). Suicidal thoughts and attempts are the most common mental health emergencies among adolescents (King, Kerr, Passarelli, Foster, & Merchant, 2009). For each completed suicide, it is estimated that 100-200 adolescents make non-lethal suicide attempts. Even more youth actively engage in SI (McIntosh, 2012). According to the 2011 Youth Risk Behavior Survey (YRBS), administered nationwide by the CDC, 15.8% of high school students seriously considered suicide in the prior 12 months, 12.8% made a suicide plan, and 7.8% attempted suicide (Eaton et al., 2012). Thus, it is clear that research is needed to understand factors that contribute to an adolescent's desire for death.

Several studies have demonstrated that severity (frequency and specificity) of suicidal ideation (SI) predicts subsequent suicide attempts (King, Kerr, et al., 2009). In a community based sample of 345 adolescents, (Reinherz, Tanner, Berger, Beardslee, & Fitzmaurice, 2006) found that individuals with a history of SI at age 15 were 12-times more likely to attempt suicide by age 30 compared to those without a history of SI. Similarly, in a large community based sample of adolescents ($N = 1709$), (Lewinsohn, Rohde, & Seeley, 1996) found that 88% of adolescents who attempted suicide reported

SI. This pattern is similar in clinical samples. Among 270 adolescent psychiatric inpatients, SI at the time of hospitalization predicted suicide attempts at 6-month (Huth-Bocks, Kerr, Ivey, Kramer, & King, 2007) and 15-month (Kerr et al., 2007) follow-ups. Similarly in a sample of 143 adolescents hospitalized for suicidal thoughts and behaviors, those who did not show a marked decrease in SI over the first six months post-hospitalization were more likely to attempt suicide in the following 9-18 months compared to individuals who did show a marked decrease in SI post-hospitalization (Prinstein et al., 2008). Thus, understanding factors that contribute to increased SI and addressing these factors may help prevent suicide attempts and completions.

This paper will review the literature in the area of adolescent social support and SI. This paper begins with an overview of leading theories of suicidal thoughts and behavior. Next, a recent theory of suicide is reviewed in detail, including research supporting this theory. From the framework of the IPTS, a review of the recent social support and adolescent SI literature is offered followed by a brief discussion of important developmental factors to consider for future research. Finally, a brief summary and recommendations for future research are offered.

Leading Theories of Suicide

Our knowledge of why individuals take their own lives has grown in recent years. Much of these gains in understanding can be attributed to the creation and tests of theories of suicide throughout the last several decades. While theories of suicide abound in adults, fewer have been put forth and tested in adolescents. Suicide has been examined from the perspective of several classical schools of thought. Indeed, (Durkheim &

Simpson, 1951; Durkheim, 1897) classified suicide as stemming from social causes, including isolation, altruism, and anger/frustration. Psychoanalytic theory suggests that repressed aggression and guilt tax psychic energy resulting in a desire for death and suicidal behavior (Menninger, 1933). Behavioral theorists suggest that suicide is a learned behavior rooted in childhood experiences and environmental factors (Lester, 1987). Cognitive theorists state that ingrained depressive schemata lead individuals to feel hopeless and suicidal as means to end the hopelessness (Beck, Kovacs, & Weissman, 1979). (Shneidman, 1993) posits that suicide is driven by a desire to escape psychological pain or “psychache.” At least one cause of this psychache is rooted in a lack of nurturing relationships. Specific to adolescents, the cognitive-behavioral theory of suicide (Spirito, Esposito-Smythers, Weismore, & Miller, 2012) suggests that “predisposed” adolescents (i.e., those with psychiatric disorders, trauma history, etc.) turn to suicide as a means to cope with severe negative affective arousal, cognitive distortion (e.g., catastrophizing), and maladaptive behavior (e.g., substance use), triggered by a significant stressor. The latter theory has received some support in the adolescent suicide literature (Miller & Esposito-Smythers, 2013; Spirito, Esposito-Smythers, Wolff, & Uhl, 2011)

As is evident, a number of theories have been proposed to explain SI and behavior, though only one was developed specifically to explain SI and suicidal behavior among adolescents. Interestingly, the importance of interpersonal relationships and connectedness is a common theme across several theories. A more recent theory of suicide focuses on the importance of interpersonal relationships in particular—the Interpersonal-Psychological Theory of suicide (IPT) (Joiner, 2005; Van Orden et al.,

2010). The IPT suggests that the desire for death results from the confluence of perceived burdensomeness and thwarted belongingness (Figure 4). Thwarted belongingness refers to feelings of alienation from friends, family or other valued social contacts. Perceived burdensomeness refers to the belief that one is highly ineffective and incompetent and that this incompetence negatively affects other people. Both of these interpersonally-related, cognitive distortions may lead one to question the value of one's life and contemplate suicide (Joiner, 2005). Moreover, when these distortions are paired with the ability to enact lethal self-injury, an individual is at risk for suicide attempts and completion (Joiner, 2005; Van Orden, Witte, Gordon, Bender, & Joiner, 2008). While this theory has gained extensive support in the adult literature in the past several years (Van Orden et al., 2010), it has not been adequately tested in adolescents.

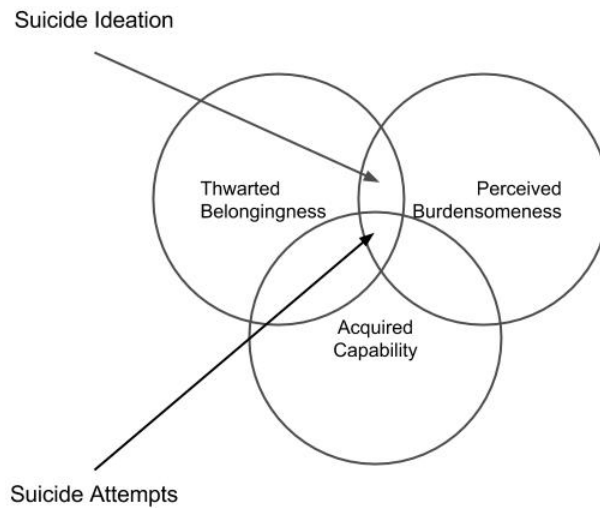


Figure 4: Interpersonal Psychological Theory of Suicide

Support for the IPT in Adults

Recent reviews of studies that examine the IPT (Ribeiro & Joiner, 2009; Van Orden et al., 2010) conclude that there is substantial support for the links among variables that tap aspects of perceived burdensomeness, thwarted belongingness, and SI in adult samples. Indeed, associations between measures of these constructs and SI have been found using adult samples comprised of undergraduates, suicide attempters, suicide completers, drug addicted outpatients, and psychotherapy outpatients. Specifically, (Van Orden et al., 2010) conclude that social isolation, a proxy for thwarted belongingness, is a strong, reliable predictor of SI and behavior. Greater than 30 empirical studies with adults found a strong relationship between social isolation and increased risk for SI and behavior. Similarly, perceptions of poor family support, a proxy for thwarted belongingness from ones family unit(Joiner, 2005), has been associated with SI and

suicidal behavior. (Van Orden et al., 2010) note that 18 studies with adults show a significant relationship between lack of supportive relationships with family members and SI and behavior.

The Interpersonal Needs Questionnaire (INQ; (Van Orden et al., 2008) is a specific measure of both perceived burdensomeness and thwarted belongingness described by the IPT and was developed by Joiner's research group. Four studies to date have tested the IPT using the INQ (Van Orden, Cukrowicz, Witte, & Joiner, 2012). Those that have used the INQ in samples of undergraduates, older adults, and military personnel (see Van Orden et al., 2012) have found a significant direct relationship between perceived burdensomeness, thwarted belongingness, and SI. The INQ has not been used in a sample of adolescents to date.

While there appears to be ample support for the IPT in adult samples, it has yet to be tested with adolescents. The constructs of social support from peers and family, both proxies of perceived belongingness, have been examined in relation to adolescent SI. However, no study to date has examined the association between belongingness and adolescent SI, nor examined the specific constructs of thwarted belongingness *and* perceived burdensomeness in relation to suicidal ideation in an adolescent sample.

Support for Developmentally Sensitive IPT in Adolescents

Belongingness. One factor consistently implicated in adolescent SI is lack of or insufficient social support, which represents one measure of belongingness. Social isolation is one of the strongest and most reliable predictors of suicide ideation and attempts across ages. The IPT (Joiner, 2005) asserts that when the fundamental

psychological need to belong is unmet, SI may develop. For adolescents, the need to belong is particularly salient. Maintaining a supportive relationship network including supportive bonds with family members, strong interpersonal ties with peers, and close connections with a community is a key developmental task during adolescence. In a recent review of the literature, (King & Merchant, 2008) conclude that there is strong support for the importance of social variables, including social connectedness and perceptions of family and peer support, in understanding risk for SI among adolescents. In this review, (C. A. King & Merchant, 2008) summarize research completed between the years 1998-2008. The main findings of this paper will be summarized and studies published since 2008 will be reviewed below.

Method

Eligibility Criteria

To identify research articles on social support and suicidal behavior during adolescence, *PyscINFO*, *PsychARTICLES*, and *MEDLINE* were searched. Keywords included the stems of *adolescen** and *suicid** in combination with *social support*, *parent support*, *peer support*, *community support*, *social connectedness*, and *school support*. The wildcard term *adolescen** returned results that included *adolescent* and *adolescence*. The wildcard term *suicid** yielded results that included *suicidal ideation*, *suicide attempt*, *suicide completion*, and *suicidality*. Next, relevant reference lists were searched for any additional studies that were not identified in the electronic database search. Finally, major literature reviews were searched to include all relevant empirical studies.

Results

Family Support. Lack of family support has been well studied as a risk factor for SI in adolescents (Spirito et al., 2011). King & Merchant (2008) reviewed 46 studies that examined family support and adolescent SI. Sample sizes ranged from 36 to 124,881 (Mean sample size = 4,683.51) and included both community ($N = 35$) and clinical samples ($N = 11$). All 46 studies, 34 of which were cross-section and 12 of which were longitudinal, found a significant relationship between family support variables and SI. Results did not significantly vary across clinical versus community samples. In general, less positive family environments (e.g., King et al., 2001), less family cohesion (e.g., (Lee, Wong, Chow, & McBride-Chang, 2006), and lower levels of family support (e.g., (Perkins & Hartless, 2002) were found to be associated with an increased risk for SI and attempts.

Although there is substantial support for the link between family support and adolescent SI, limitations in this literature are noteworthy. For example, only 15 studies used an empirically validated assessment instrument for examining severity of SI (e.g., SI Questionnaire, Self-injurious Thoughts/Behavior Inventory; (Kerr, Preuss, & King, 2006; Prinstein, Boergers, Spirito, Little, & Grapentine, 2000; Wedig & Nock, 2007). Compared to the assessment of suicide, more studies used an empirically validated assessment of family functioning. Indeed, 24 studies used an empirically validated assessment of family functioning variables (e.g., Perceived Social Support-Family; Survey of Children's Social Support, Perceived Emotional/Personal Support Scale; (Eskin, 1995; Esposito & Clum, 2002).

Eleven studies have been published since (King & Merchant, 2008) literature review. These 11 studies (Table 6) include two cross-sectional studies with clinical samples (Hetrick, Parker, Robinson, Hall, & Vance, 2012; Pettit, Green, Grover, Schatte, & Morgan, 2011), six cross-sectional studies with community samples (Babiss & Gangwisch, 2009; Bonanno & Hymel, 2010; Cho & Haslam, 2010; Sharaf, Thompson, & Walsh, 2009; Tang et al., 2010; Teasdale & Bradley-Engen, 2010), and two longitudinal studies with community samples (Lasgaard, Goossens, & Elklit, 2011; Winfree & Jiang, 2010). Sample sizes ranged from 56-14,594 ($M = 3096.27$, $Median = 399$).

All eight cross-sectional studies found a negative, bivariate relationship between family support variables and SI. At the multivariate level, several studies found evidence that family support may function as a mediator and/or moderator of the relationship between risk/protective factors of SI and reported SI. Babiss and Gangwisch (2009) found that among 14,594 7th and 12th graders, family support partially mediated the relationship between sports participation and SI (dichotomous yes/no). Specifically, the strength of the negative relationship between sports participation and SI decreased when the authors included family support in the multivariate model, suggesting partial mediation. However, it should be noted that the authors did not provide a statistical test of the indirect path from sports participation to family support to SI. Bonanno and Hymel (2010) found that social support from family (but not friends) moderated the relationship between peer victimization and SI, such that individuals with higher (vs. lower) victimization and lower (vs. higher) family support reported higher levels of SI. Finally, Sharaf et al. (2009) found that family support moderated the relationship between self-

esteem and suicide risk (composite measure of ideation and behavior). Specifically, high self-esteem was a strong buffer against suicide risk in individuals with low (vs. high) parent support.

The relationship between family support and adolescent SI has also been found to be rather robust. In many studies, the direct relationship between family support and SI remained significant after controlling for demographic variables including age, sex, race/ethnicity (Babiss & Gangwisch, 2009; Bonanno & Hymel, 2010; Pettit et al., 2011; Tang et al., 2010; Teasdale & Bradley-Engen, 2010), psychiatric symptoms or diagnoses (Hetrick et al., 2012; Pettit et al., 2011), past suicide attempts (Pettit et al., 2011), life event stress (Pettit et al., 2011), peer victimization (Teasdale & Bradley-Engen, 2010), and sexual orientation status (Teasdale & Bradley-Engen, 2010). Czyz, Liu, and King (2012) followed 338 recently hospitalized adolescents drawn from the Youth Nominated Support Team-II study, a support based intervention study for suicidal youth (King, Klaus, et al., 2009), over the course of 1 year. They found that greater increases in family connectedness at the 3-month follow-up predicted less severe SI at the 1-year follow-up, but only for individuals with single (vs. multiple) suicide attempt histories. Winfree and Jiang (2010) found that parental expressive support (but not behavioral support) was negatively associated with the odds of reporting SI over the course of a one year follow up period among 4,318 adolescents drawn from the Add Health study. This relationship was independent of prior SI, suicide attempts, friends' or family members' suicide attempt, cigarette use, and school safety.

Only one study failed to find a significant independent association between perceived family support and SI. This study included 227 Korean immigrants living in America, high school students in Korea, and high school students living in America. There was a significant negative bivariate relationship between family support and SI. However, living with both parents, but not perceived family support, was *independently* associated with SI (Cho & Haslam, 2010) in multivariate models. Perceived family support was marginally independently associated ($p < .10$) with psychological symptoms, but not SI. The authors note that for Korean adolescents the presence of both parents in the home appears to be more important than perceived support from parents, which they note may be part of the cultural milieu of Korean families.

Relative to the studies included in the review conducted by King and Merchant (2008), more of these recent studies tend to be methodologically sound. Seven of 11 studies included a validated measure of SI (e.g., SIQ, Suicide Probability Scale; (Bonanno & Hymel, 2010; Cho & Haslam, 2010; Czyz et al., 2012; Lasgaard et al., 2011; Pettit et al., 2011; Sharaf et al., 2009; Tang et al., 2010). Only four studies included a single question or an instrument developed by study investigators (Babiss & Gangwisch, 2009; Hetrick et al., 2012; Teasdale & Bradley-Engen, 2010; Winfree & Jiang, 2010). Eight of 11 studies included validated assessment instruments to measure family support related variables (e.g., Family Apgar Scale, Family Assessment Device; (Bonanno & Hymel, 2010; Cho & Haslam, 2010; Czyz et al., 2012; Hetrick et al., 2012; Lasgaard et al., 2011; Pettit et al., 2011; Sharaf et al., 2009; Tang et al., 2010). Only four studies

included a single question or study derived scores to assess family support variables (Babiss & Gangwisch, 2009; Teasdale & Bradley-Engen, 2010; Winfree & Jiang, 2010).

Overall, results from studies that examined family support variables show a generally consistent, negative association with SI. However, significant methodological limitations are evident in this literature. Specifically, a large number of studies failed to utilize validated assessment instruments for measuring SI and family support variables, particularly those that are older. Further, the majority of studies reviewed are cross-sectional. Although some studies reviewed controlled for potential confounding variables (e.g., depression; Hetrick et al., 2012)), a number of studies did not report statistical controls. Thus, findings must be interpreted within the context of the methodological limitations in this literature.

Table 6: Overview of Social Support from Family Studies

Study	Sample (%f)	Design	Suicide Measures	Support Measures	Relevant Findings
Babiss & Ganwisch, 2009	14,594 (49) 7 and 12 grade from Add Health Survey	Cross-sectional, community	Single question	Derived index score for perceived parental support	BV: Less perceived parental support between SI and Non-SI MV: Support variables (including family support) partially mediated relationship between sports

					participation and SI CV: sex, age, race/ethnicity, public assistance, physical limitations
Bonanno & Hymel, 2010	399 (57) 8-10 graders from Canada	Cross-sectional, community	SIQ-Jr	Relational Provisions Loneliness Questionnaire (RPLQ)	BV: social support from family negatively associated with SI MV: Social Support from family, but not friends, moderated the relationship between victimization and Si (higher victimation and lower family support= increase SI) CV: Gender
Cho & Halsam, 2010	227 (56.8) Korean immigrants and American high school students	Cross-sectional, Community	SIQ	Multidimensional Scale of Perceived Social Support	BV: perceived support from family (but not peer) correlated with SIQ MV: Living with both parents related to

					less SI; perceived support marginally related to fewer psychological symptoms, but not SI.
Czyz et al., 2012	338 (71) hospitalized adolescents drawn from the YNST-II	Longitudinal, Clinical	SIQ-Jr	Perceived Emotional/Personal Support Scale	MV: Greater increases in family connectedness at 3-month follow-up predicted less severe SI at 1-year follow-up, but only for individuals with single (vs. multiple) SA histories.
Hetrick et al., 2012	56 (41) depressed adolescents	Cross-sectional, clinical	Developed questionnaire measured suicide related behaviors (which included SI)	Family Assessment device (overall family functioning, including support)	BV: Group with more SRB reported greater family dysfunction MV: family dysfunction independently associated with SRB above age, gender, depressive symptoms,

					hopelessness .
Lasgaard et al., 2011	1009 (57) high school students from Denmark	Community, cross-sectional & longitudinal	SI subscale from Suicide Probability Scale	UCLA Loneliness scale; MSPSS family	BV: Family support negatively correlated with SI MV: None noted with family support (depression mediated)
Pettit et al., 2011	131 (70) consecutively admitted psychiatric inpatients	Cross-sectional, Clinical	Modified Scale for Suicide Ideation; Suicide Intent Scale	Chronic Stress and Episodic Life Events Interview for Adolescents (measured relationship distress in family and companions)	MV: family stress and support associated with SI after controlling covariates CV: demographics, diagnostic status, past history of attempt, and life event stress
Sharaf et al., 2009	849 (46) high school students	Cross-sectional, Community	Measure of Adolescent Potential for Suicide	Family Apgar Scale	BV: family support negatively correlated with suicide risk MV: family support moderated relationship between self esteem and

					suicide risk, effect of high self-esteems was stronger among adolescents with low (vs high) parent support)
Tang et al., 2010	277 (54) adolescents affected by Typhoon Morakot in southern Taiwan	Cross-sectional, Community	Suicide module of MINI-KID	Family Apgar Scale	MV: Family support had an independent negative association with "suicide risk" CV: Gender
Teasedale & Bradley-Engen, 2010	11911 (52%) adolescents from Adolescent Health Survey	Cross-sectional, community	Suicidal tendencies, which included 1 ? About SI	Single Item	MV: "parents care" negatively associated with suicidal tendencies. CV: Other variables included in model including peer victimization , sexual orientation, demographic variables
Winfrey et al., 2010	4318 (ns) Add Health survey respondents	Longitudinal, Community	Single question	derived index score for parental support	MV: parental expressive (but not behavioral)

					support negatively associated with odds of SI. CV: prior SI, SA, friends attempt, family members attempt, cigarette use, school safety
<i>Note.</i> BV = bivariate; MV = Multivariate; CV = Control Variables; SIQ = Suicidal Ideation Questionnaire; SI = Suicidal ideation; SA = suicide attempts; SRB = Suicide related behaviors; NS = Not Specified					

Peer Support. Similar to family support, peer relationships are also important for adolescent mental health. As adolescents develop, peer relationships become increasingly important. A lack of social support has consistently been associated with adolescent SI (Esposito & Clum, 2002; Prinstein & Aikins, 2004). King and Merchant (2008) examined 63 studies that tested the association between adolescent SI and peer support. Sample sizes ranged from 40 to 14,922 ($M = 2,181.94$) and included 14 longitudinal and 49 cross-sectional designs. Out of 63 studies, only 6 studies did not find a significant relationship between peer support variables and SI, and this was only after other variables were controlled, such as family support (e.g., Perkins & Hartless, 2002), gender (e.g., Haynie, South, & Bose, 2006; Kerr et al., 2007), and depression (e.g., Grøholt, Ekeberg, Whichstrm, & Haldorsen, 2000).

Although there is substantial support for the link between peer relationships and SI, some limitations in this literature are noteworthy. For example, only 9 out of 63 studies used an empirically validated assessment instrument to examine severity of SI (e.g., SI Questionnaire, Scale for SI; DiFilippo & Overholser, 2000; Kerr et al., 2006). Only 20 out of 63 studies used an empirically validated assessment of peer support variables (e.g., Perceived Social Support from Friends, Social Support Questionnaire; Armstrong & Manion, 2006; Eskin, 1995; Prinstein et al., 2000).

Eleven studies examining the link between peer support and SI have been published since King and Merchant's (2008) review. These 11 studies (Table 7) include one cross-sectional study with a clinical sample (Pettit et al., 2011), eight cross-sectional studies with community samples (Armstrong & Manion, 2006; Babiss & Gangwisch, 2009; Bonanno & Hymel, 2010; Langhinrichsen-Rohling, Lamis, & Malone, 2011; Logan, Crosby, & Hamburger, 2011; Pinheiro et al., 2012; Teasdale & Bradley-Engen, 2010; Winterrowd, Canetto, & Chavez, 2010), one longitudinal study with a clinical sample (Czyz et al., 2012), and one longitudinal study with community samples (Dupéré, Leventhal, & Lacourse, 2009). Sample sizes ranged from 131-14,594 ($M = 3249.91$; $Median = 871$).

Eight out of 9 cross-sectional studies found a significant bivariate association between peer support and SI. One study included a measure of perceived social support and found a significant negative relationship with SI (e.g. Bonanno & Hymel, 2010). Another study included a measure of social acceptance (Teasdale & Bradley-Engen, 2010) and found a significant negative relationship with SI. Studies that included

measures of friendship problems (Winterrowd et al., 2010) and social life stress (Pettit et al., 2011) found a significant positive relationship with SI. The one study that failed to find a significant bivariate relationship between peer support and SI was conducted by (Cho & Haslam (2010). The authors note that their sample was comprised of 227 Korean immigrants living in America, high school students in Korea, and high school students living in America. It is possible that Korean families ascribe to a collectivist society mindset, which places higher importance on family unity compared to peers.

Similar to family support, the association between peer support and adolescent SI is quite robust. The relationship between peer support and SI remained significant after controlling for a variety of potential confounds, including sex (Babiss & Gangwisch, 2009; Bonanno & Hymel, 2010; Pettit et al., 2011), age (Babiss & Gangwisch, 2009; Langhinrichsen-Rohling et al., 2011; Logan et al., 2011), race/ethnicity (Babiss & Gangwisch, 2009; Langhinrichsen-Rohling et al., 2011; Logan et al., 2011), public assistance status (Babiss & Gangwisch, 2009), physical limitations (Babiss & Gangwisch, 2009), childhood trauma (Langhinrichsen-Rohling et al., 2011), mental distress (Logan et al., 2011), substance use (Logan et al., 2011), peer violence (Logan et al., 2011), psychiatric diagnoses (Pettit et al., 2011), past suicide attempt (Pettit et al., 2011), and life event stress (Pettit et al., 2011). In multivariate analyses, (Babiss & Gangwisch, 2009) found that among 14,594 7th and 12th graders, social support variables (including family and peer support) partially mediated the relationship between sports participation and SI. In a sample of 1,533 court-involved youth, social support moderated the mediating effect of depression on same-sex sexual attraction and suicide proneness.

Specifically, the mediating effect of depression on the relationship between same-sex sexual attraction status and SI was stronger among individuals with low (vs. high) levels of peer support (Langhinrichsen-Rohling et al., 2011).

Results from longitudinal studies are more equivocal. Czyz et al. (2012) found that among 338 hospitalized adolescents drawn from the Youth Nominated Support Team—II study (i.e., support based intervention study for suicidal youth; King, Klaus, et al., 2009), post-hospitalization increases in peer connectedness was associated with less severe SI among female (but not male) adolescents but only at the 3-month follow up period. At the 12-month follow-up, increased social connectedness was associated with more severe SI for females but not males. The authors' note that this could be due to the increased stress of managing ongoing relationships after the initial positive effects of these new friendships decline. In a second study that included a sample of 2,776 community adolescents, social support in early adolescence (12-14) was independently associated with SI in late adolescence (16-18) after controlling for depression, substance use, gender, age, and race (Dupéré et al., 2009).

This literature is also subject to a number of methodological limitations. Only four of 11 studies included a validated measure of SI (Bonanno & Hymel, 2010; Cho & Haslam, 2010; Czyz et al., 2012; Pettit et al., 2011), while the remaining studies included single questions or composite measures of SI developed by study investigators (Babiss & Gangwisch, 2009; Dupéré et al., 2009; Logan et al., 2011; Pinheiro et al., 2012; Teasdale & Bradley-Engen, 2010; Winterrowd et al., 2010). Seven out of 11 studies included a validated assessment of social support (Bonanno & Hymel, 2010; Cho & Haslam, 2010;

Czyz et al., 2012; Dupéré et al., 2009; Langhinrichsen-Rohling et al., 2011; Pettit et al., 2011; Pinheiro et al., 2012), while four studies included a single question or study developed index score (Babiss & Gangwisch, 2009; Logan et al., 2011; Teasdale & Bradley-Engen, 2010; Winterrowd et al., 2010).

Overall, results from cross-sectional studies show a relatively consistent association between peer support variables and SI. One longitudinal study found an increased risk for SI among adolescents with higher social connection at 1-year follow-up. Another study found the relationship between peer support and SI remained significant and negative after controlling for other psychiatric problems. However, methodological limitations in this literature temper findings. Specifically, a large number of studies do not include empirically validated assessment instruments, and the majority of studies are cross-sectional. Similar to the family support literature, many studies did not include statistical controls for well-known risk factors for SI.

Table 7: Overview of Social Support from Peers Studies

Study	Sample (%f)	Design	Suicide Measures	Support Measures	Relevant Findings
Babiss & Ganwisch, 2009	14,594 (49) 7 and 12 grade from Add Health Survey	Cross-sectional, community	Single question	Social Acceptance and Perception of Friends caring (single question, each)	BV: Less perceived acceptance and caring between SI and Non-SI MV: Support variables (including peer support) partially mediated

					relationship between sports participation and SI CV: sex, age, race/ethnicity, public assistance, physical limitations
Bonanno & Hymel, 2010	399 (57) 8-10 graders from Canada	Cross-sectional, community	SUQ-Jr	Relational Provisions Loneliness Questionnaire (RPLQ)	BV: social support from friends negatively associated with SI MV: Social Support from family, but not friends, moderated the relationship between victimization and Si (higher victimization and lower family support= increase SI) CV: Gender
Cho & Halsam, 2010	227 (56.8) Korean immigrants and American high school students	Cross-sectional, Community	SIQ	Multidimensional Scale of Perceived Social Support	BV: Perceived support from friend (same ethnic or different) not correlated with SIQ score MV: No significance in multivariate analyses
Czyz et al.,	338 (71)	Longitudinal	SIQ-Jr	Perceived	MV:

2012	hospitalized adolescents drawn from the YNST-II	al, Clinical		Emotional/Personal Support Scale	Posthospitalization increase in connectedness with peers was associated with lower severity of SI among female (vs male) adolescents but only at the 3-month follow-up. At the 12-month follow up, increased connectedness was associated with more severe SI for females.
Dupere et al., 2008	2776 (NR) adolescents from the National Longitudinal Survey of Children and Youth	Longitudinal, Community	Single question	Derived from Social Provision Scale	BV: Social Support correlated with SI MV: Social Support independently associated with SI (above depression, substance abuse, etc. CV: Gender, age, race, rural vs. urban
Langhinrichsen-Rohling et al., 2011	1,533 (48) urban high school, truant, and court involved youth	Cross-sectional, Community (high risk youth)	Single question for SI; measure of suicide proneness	Social Bonding subscale of the Individual Protective Factors Index	BV: social support negatively correlated with SI MV: Social support

			s via Life Attitudes Schedule		moderated (high vs. low) the mediating effect of depression on same-sex sexual attraction and suicide proneness CV: age, race/ethnicity, data collection site, childhood trauma, sexual partners
Logan et al., 2011	2,598 (50.58) 7th and 9th graders from an identified high risk high school	Cross-sectional, community	Single question	Adapted from Social Support Behaviors Scale	BV: SI less likely among those reporting high levels of peer support MV: High social support independently associated with decreased odds of SI CV: age, sex, race/ethnicity; mental distress; substance use; peer violence
Pettit et al., 2011	131 (70) consecutively admitted psychiatric inpatients	Cross-sectional, Clinical	Modified Scale for Suicide Ideation; Suicide Intent Scale	Chronic Stress and Episodic Life Events Interview for Adolescents (measured relationship distress in family and companions	MV: social life stress and close friend stress associated with SI after controlling covariates CV: demographics, diagnostic

					status, past history of attempt, and life event stress
Pinheiro et al., 2012	871 (100) pregnant teens in Brazil	Cross-sectional, Community	Suicidal behavior composite which includes SI (5 items)	Medical Outcomes Survey Social Support Scale	MV: higher social support predicted less suicidal behavior; independent of psychiatric disorder diagnoses, obstetric history, education, age, parents marital status.
Teasedale & Bradley-Engen, 2010	11911 (52%) adolescents from Adolescent Health Survey	Cross-sectional, community	Suicidal tendencies, which included 1 ? About SI	Single Item	MV: Feeling socially accepted negatively associated with suicidal tendencies
Winterrowd et al., 2010	338 (55) Mexican American adolescents	Cross-sectional, Community	Single question about SI and SA combined into composite index (y/n)	Single questions combined into composite index of friendship problems	MV: Friendship problems significantly increased odds of SI for girls but not boys.
<p><i>Note.</i> BV = bivariate; MV = Multivariate; CV = Control Variables; SIQ = Suicidal Ideation Questionnaire; SI = Suicidal ideation; SA = suicide attempts; SRB = Suicide related behaviors; NS = Not Specified</p>					

Community Support. The role of belongingness to an adolescent's community has not been examined in relation to SI. However, active involvement and connection with one's community has been associated with greater psychological health among adolescents (e.g., Scales, Benson, & Mannes, 2006). In a sample of 370 high school students, greater community involvement in volunteering, youth programs, and religious organizations was associated with lower levels of risk behavior (e.g., alcohol use, antisocial behavior, sexual intercourse, and violence; (Scales et al., 2006). Among 200 African-American middle school students, greater church attendance, greater sense of school belonging, and more frequent community involvement were significantly associated with higher self-esteem, fewer internalizing symptoms, and a heightened sense of empowerment, respectively, across a two-year prospective study McMahon, Singh, Garner, and Benhorin (2004). The protective effects of community involvement have also been studied in the context of HIV risk behavior (Ramirez-Valles, 2002), substance related behavior (Chung & Elias, 1996), and dating violence related maladjustment (Chiodo et al., 2011).

Though community belongingness has not been directly examined in relation to SI, work from other areas clearly demonstrates the potential protective benefits of being involved in one's community. Thus, it is likely that an adolescent who does not feel that he or she belongs to his/her community may engage in less community related behaviors. This in turn may lead to further feelings of social isolation and greater overall psychological maladjustment resulting in an increased likelihood of experiencing SI.

Burdensomeness. According to the IPT, people who perceive that they are a burden on loved ones are more likely to think about suicide than people without this belief (Van Orden et al., 2012). This construct has been shown to predict SI in adult samples (Van Orden et al., 2010; Van Orden, Lynam, Hollar, & Joiner, 2006). Though this construct has not been directly tested with adolescents, Van Orden et al. (2010) suggest that it may apply equally well. In support of this premise, they cite Sabbath's (1969) family systems theory of adolescent suicidal behavior, which suggests that SI arises when adolescents perceive that they are an “expendable” family member. In other words, the adolescent may believe that s/he is invaluable or a burden; therefore, the adolescent thinks about suicide.

Developmental Considerations

Developmental Risk Factors. Adolescence is a time of rapid biological, emotional, and cognitive development and re-organization. It is well established that youth who fail to show normative developmental growth patterns are at greater risk for socio-emotional maladjustment (Steinberg, 2005). They also may be at heightened risk for perceptions of low belongingness to their social systems and disruptions in these relationships. Yet, at this point we know relatively little about how these factors interrelate and may influence the development of SI in adolescents.

Pubertal Development. Early pubertal development can affect a youth's relationships with parents, peers, and community. In his seminal work on pubertal development, Steinberg (1987) found that early maturing boys were more likely to have distant relationships and higher conflict with their mothers, as well as less frequent

positive interactions with their fathers, than boys who matured on time. Similarly, early maturing females reported more emotional distance and diminished closeness with their parents compared to females who matured on time. However, physical maturation in daughters, regardless of timing, was associated with increased conflict with mothers. Based on this early work as well as recent studies in the area (Arim & Shapka, 2008), early maturation may be associated with greater conflict in parent-adolescent relationships, as parents attempt to exert greater behavioral control in response to adolescent attempts to establish autonomy pre-maturely. This conflict may also increase risk for early maturing adolescents to develop unhealthy peer and community relationships (deviant peers in boys) and diminished social support (ostracized by same aged peers for girls). Adolescents who mature early and attempt to pre-maturely de-individuate from their parents, may experience low belongingness due to troubled family and peer relationships, increasing risk for subsequent SI.

Emotional Reactivity. Similar to timing of pubertal maturation, degree of negative emotional reactivity during adolescence may affect belongingness to family, peers, and community. Emotional reactivity can be defined as autonomic and affective responses to different events and contexts (Rothbart, 1989). Negative emotional reactivity is reflected in responses such as anger, frustration, sadness, and lack of inhibitory control to interpersonal stressors. A key developmental task during adolescence is to transition from relying on one's parents to help manage emotional responses to stressors to relying on oneself (Allen & Miga, 2010; Hill & Holmbeck, 1986). If this task is thwarted, youth with greater negative emotional reactivity are less likely to have supportive parental and

peer relationships, face greater peer rejection, and establish healthy community involvement (Nolan, Flynn, & Garber, 2003; Prinstein & Aikins, 2004; Scales et al., 2006; Scaramella & Conger, 2003). If such adolescents rely on others to aid in emotion regulation, but do not perceive that family, peer, or community support is available (i.e., low belongingness), they may be at higher risk for the development of SI.

Poor Effortful Control. Immature cognitive self-regulation, such as poor effortful control, may also affect perceptions of belongingness. Effortful control refers to the executive-based cognitive functioning ability to regulate attention, behavior, and emotion. Effortful control is reflected in one's level of attention (shift and focus), inhibitory control (capacity to plan & suppress inappropriate responses), pleasure sensitivity (pleasure obtained from activities or stimuli), and perceptual sensitivity (perceptual awareness of low-intensity stimuli) (Rothbart & Rueda, 2005). Poor effortful control has been associated with greater impulsivity, less prosocial behavior, conduct problems, and poor school performance (Eisenberg et al., 2005; Loukas & Roalson, 2006; Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Valiente et al., 2006). Associated troublesome behavior may also incite greater conflict within the family, which can negatively affect perceptions of belongingness. Externalizing behavior may also negatively influence choice of peers and community involvement, as deviant youth tend to select similar peers (Fergusson & Horwood, 1999). If poor peer choices are made, adolescents may be less likely to receive adequate support from their peer networks, or may be forced to end unhealthy peer relationships by their parents. Thus, adolescents

may end up in a situation where they perceive inadequate support or belongingness to family, peers, and community, which in turn may increase risk for SI.

As is evident, off-time pubertal maturation, negative emotional reactivity, and poor effortful control may negatively affect perceptions of social relationships (belongingness and potentially burdensomeness), which in turn, may increase risk for maladaptive mental health outcomes, such as SI. This hypothesis has yet to be tested in an adolescent sample.

Discussion

As adolescent suicide is a significant public health problem, theoretical work is necessary to improve our understanding of the development of suicidality. One promising theory is Joiner's (2007) IPT of suicidal behavior. This theory provides a framework for examining the importance of thwarted belongingness (to family, peers, and community) and perceived burdensomeness to adolescent SI, but has not been tested in full in an adolescent population. To date, research suggests that a lack of support from family and peers is a strong predictor of SI. These relationships have been found across a variety of samples—community and clinical—and methodologies—cross-sectional and longitudinal studies. However, there are noteworthy limitations in this research, including the inconsistent use of empirically validated instruments to assess SI and social support, and a lack of statistical control of potential confounding variables (e.g., depression, anxiety). Moreover, the relative importance of peer versus family support is not yet clear as the large majority of studies fail to include both types of support in analyses. Further, no

studies to date have examined whether community support or perceived burdensomeness are associated with adolescent SI.

Improving our ability to understand and predict SI, through theory building, may help prevent completed adolescent suicides. Indeed, others have advocated for the creation and testing of theoretical informed, developmentally sensitive models of adolescent SI and behavior using multiple methodological tools (e.g., King & Merchant, 2008; Nock et al., 2010) King & Merchant, 2008; Nock et al., 2010). Results of such research could be used to inform the manner in which suicidal behavior is assessed, conceptualized, and targeted in treatment. It may also yield information to help better identify youth at greatest risk for SI and effectively intervene in the trajectory toward this outcome.

APPENDIX B

Exploratory Structural Equation Modeling Testing Joiner's Interpersonal Psychological Theory of Suicidal Ideation

Study Hypotheses

Based on the prior literature review (Appendix A), the following study hypotheses were offered.

1. High perceptions of thwarted belongingness, high perceived burdensomeness, and low levels of social support would be related to Time 2 (T2) suicidal ideation (SI) controlling for Time 1 (T1) SI.
2. In a more developmentally sensitive model, higher scores on a developmental risk index would be related to high perceptions of thwarted belongingness, high perceived burdensomeness, and low levels of social support and in turn, T2 SI controlling for T1 SI. In other words, the IPTS constructs and social support would mediate the relationship between developmental risk and SI.
3. Model fit between the developmental model and the more traditional

Method

Participants were 143 adolescents (range = 12-18 years, $M = 15.38$, $SD = 1.43$) consecutively admitted to a partial hospitalization program (PHP) in an outpatient behavioral health facility in the Mid-Atlantic area. The PHP is a short term, crisis stabilization program for adolescents stepping down (e.g., inpatient hospitalization) or up (e.g., outpatient, intensive outpatient) in level of services. The behavioral health center from where participants were drawn is located in a large suburban area outside of a major city. The center is one of the largest providers of mental health services for children, adolescents, and families in this metropolitan area. The center accepts patients who are

uninsured, privately insured, or on Medicaid. Patients generally present to the PHP with a variety of severe symptomatology including SI and suicidal behavior, self-harming behavior, school refusal, severe depression and anxiety, and/or externalizing behavior. Patients in the program are assigned a primary therapist and an attending psychiatrist for medication management. Patients participate in treatment for six hours a day, five days a week, over the course of three to four weeks. Patients receive weekly family and individual sessions with their primary therapist. Treatment is mainly group based consisting of morning safety assessments, cognitive-behavioral and dialectical-behavioral skills groups, non-directive processing groups, and recreational therapy groups.

As part of standard clinical care, patients and caregivers complete a clinical assessment battery designed to inform the patients' treatment plan in the PHP. They are also asked for permission to include their responses to the assessment battery in a clinical research databank maintained by the behavioral health facility. Data for the current study was drawn from this clinical research databank. A total of 156 patients were assessed over an eleven-month period, and 143 (92%) patients and caregivers provided informed assent/consent to include their information in the clinical research databank. Reasons for not consenting included privacy concerns ($N = 7$) and safety concerns ($N = 1$). Four patients did not specify a reason for not providing consent ($N = 5$). Patients and parents completed baseline assessments at the time of admission, and patients completed a discharge assessment on their last day in the program. All assessments were completed by trained clinical research staff and were uninvolved with the participants' treatment. Study procedures were approved by the affiliated hospital and University IRBs.

Inclusion criteria for the current sample included the following: (1) English speaking adolescents (ages 12-18) and (2) at least one caregiver to provide consent. Exclusion criteria included youth with: (1) current psychosis; and those (2) cognitively unable to provide assent. Participants were 64% female and identified themselves as approximately 81% White, 4% Black, 6% Asian, or 9% from other racial backgrounds. Approximately 8% of the sample identified themselves as Hispanic or Latino in ethnicity. Mean family income was between \$80,000- \$90,000, with a range of 0-\$10,000 to \$100,000+.

Measures

Interpersonal Needs Questionnaire (INQ). The INQ was specifically developed to assess the constructs of thwarted belongingness and perceived burdensomeness included in the IPTS (Van Orden, Cukrowicz, Witte, & Joiner, 2012)). The current study used the 18-item version of the INQ, which has excellent psychometric properties in adult samples (Van Orden et al., 2012). The burdensomeness (e.g., “These days I think I am a burden on society) and the belongingness (e.g., “These days, I feel disconnected from other people”) subscales each include nine items. Participants are asked to rate the degree to which each statement is true for them using a 7-point Likert scale (1 = “Not at all true for me” to 7 = “very true for me”). Higher scores reflect a higher degree of perceived burdensomeness and thwarted belongingness. Internal reliabilities for the thwarted belongingness and perceived burdensomeness subscales in the current sample were acceptable ($\alpha = .85$ and $\alpha = .92$, respectively).

Scale for Suicidal Ideation (SSI): The SSI (Beck, Kovacs, & Weissman, 1979) is a 19-item self-report scale, which assesses the intensity of a person's specific attitudes, behaviors, and plans about committing suicide in the last week. Items are rated on a 0,1,2 scale, and total scores reflect more intense thoughts about suicide. Alpha for the current sample was acceptable (.94).

Self-Injurious Thoughts and Behaviors Interview – Short Form (SITBI): . The SITBI (Nock, Holmberg, Photos, & Michel, 2007) is a structured interview that assesses SI, plans, gestures, and attempts, as well as non-suicidal self-injury. Each content area begins with a screening question that assesses lifetime presence of one type of self-injurious thought or behavior. Follow-up questions regarding frequency (past year, month, 2-weeks) and severity are asked only if the initial screening question is positively endorsed. The SITBI item assessing suicidal ideation in the last 7 days was used for the current analyses. It has strong convergent validity, inter-rater reliability ($K=.90$ for all subscales), and test-retest reliability ($K=.70+$ for all subscales except suicidal gesture) (Nock et al., 2007).

Suicide Ideation Questionnaire (SIQ). The SIQ (Reynolds, 1988) is a self-report measure that assesses the degree to which junior high (grades 7-9; SIQ junior) and high school-aged (grades 10-12; SIQ Senior) adolescents report thoughts about suicide (e.g., “I thought about killing myself,” “I wished I were dead”) within the last month. The SIQ senior contains 30-items and the SIQ junior has 15-items, Higher scores represent more severe SI. Internal consistency in a validation sample of 2,400 adolescents ($\alpha = .97$; Reynolds, 1988) and the current sample ($\alpha = .98$ T1; $\alpha = .96$ T2, SIQ senior; $\alpha = .86$ T1;

$\alpha = .94$ T2, SIQ junior) was excellent. Raw scores on the SIQ senior and junior were mean centered to create a summary SIQ score comparable across all adolescents.

Child and Adolescent Social Support Scale (CASS): The CASSS (Malecki, Demaray, Elliott, & Nolten, 2000) is a 60-item rating scale measuring perceived social support from five sources: parents, teachers, classmates, close friends, and school. Items on the CASSS (2000) consist of statements such as, "My parent(s) help me make decisions." Support from parents, close friends, and school were included in the current analyses. Participants rate frequency of support from the respective areas on a six-point Likert scale (1 = Never to 6 = Always) Reliability analyses have revealed evidence that scores on the CASSS (2000) demonstrate strong internal consistency from .92 to .96 on the subscale scores (Malecki & Demary, 2002). Alpha in the current sample was acceptable, .94 to .96.

Puberty Assessment Scale (PAS). The male and female versions of the PAS (Morris & Udry, 1980) were used to assess pubertal status and establish pubertal timing. Consistent with recommendations in the developmental literature (Cance, Ennett, Morgan-Lopez, Foshee, & Talley, 2013; Ge, Conger, & Elder Jr, 2001), perceptions of pubertal status was standardized within adolescents by age and sex to create a new timing variable. Adolescents were divided into early (one SD below the sample mean), late (one SD above the sample mean), or on time (within 1 SD above and below the sample mean) pubertal status. Adolescents were dichotomized into on time (0) and early or late (1) pubertal status.

Early Adolescent Temperament Questionnaire-Revised (EATQ-R): The self- and parent report versions of the EATQ-R (Capaldi & Rothbart, 1992; Ellis & Rothbart, 1999) were administered to assess effortful control and negative emotional reactivity. Following recommendations by (Muris, Meesters, & Blijlevens, 2007), the effortful control (attention control, activation control) and negative reactivity (fear and frustration) factors were computed from the indicated scales in the current study. Higher scores indicate more difficulties with effortful control and negative reactivity, respectfully. Alpha was acceptable (.61 to .78)

Data analytic plan

Data were prepared and simple analyses were conducting using SPSS Version 22.0. Structural equation modeling (SEM) was conducted using Mplus Version 7. Model fit was evaluated with a variety of indices. A non-significant chi-square suggests the model fits the data. Significant chi-squares within smaller samples generally represent model misspecification (Kline, 2011). A Root Mean Square Error of Approximation (RMSEA) under 0.05, a Comparative Fit Index (CFI) over 0.95, and a Standardized Root Mean Square Residual (SRMR) under 0.08 indicate close fitting models (Hu & Bentler, 1999). All regression coefficients are presented as standardized simple effects (z-scores).

Burdensomeness and belongingness were model as manifest indicators. Measurement models of the SI and social support latent constructs were constructed using confirmatory factor analysis to ensure that the measured indicators loaded onto the hypothesized latent constructs. Measurement models for the suicide and social support latent constructs were estimated using a Full Information Likelihood (FIML) algorithm.

Consistent with recommendations by (Kline, 2011), when models are fully saturated, factor loadings of 0.50 and greater of all indicators represent an acceptable measurement model.

Because developmental risk is formative not reflective (Bollen & Davis, 2009; McDonald, 1996), a linear combination of the pubertal timing, effortful control, and negative emotional reactivity variables was computed to create a composite risk variable. Specifically, pubertal timing was added to the average parent and adolescent report of effortful control and negative emotional reactivity. Higher scores on this composite variable represented more developmental risk.

Results

Descriptive Statistics

Means and standard deviations of study variables were within the expected ranges for a clinical population (Table 8). A total of 127 individuals completed the T2 assessment (89% retention). Seventeen individuals did not complete the full discharge battery. Reasons for not completing the full discharge battery included withdrawal from the program against medical advice (N = 3), being psychiatrically hospitalized (N = 3), placement in long term residential care (N = 4), and administrative or unexpected discharge from the program (N = 5). Chi-square and independent samples t-tests revealed that individuals who did not complete the T2 assessment did not significantly differ on T1 study variables compared to individuals who completed the discharge assessment. The average length of stay in the program was approximately 22 days (range = 1 to 48, SD

8.10). Individuals who completed the SIQ junior versus senior did not significantly differ on any study variables.

Table 8: Descriptive statistics and bivariate correlations of study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Time in Tx	-														
2. Age	.07	-													
3. Sex	.01	-.15	-												
4. T1 SIQ	-.12	-.05	.21*	-											
5. T2 SIQ	-.06	.12	.30**	.68**	-										
6. T1 SSI	.01	-.15	.29**	.63**	.79**	-									
7. T2 SSI	-.12	-.10	.14	.78**	.49**	.64**	-								
8. T1 SITBI	.05	-.01	.21*	.39**	.54**	.63**	.39**	-							
9. T2 SITBI	.04	-.08	.03	.64**	.48**	.54**	.69**	.35**	-						
10. Burdensomeness	.04	-.07	.16	.42**	.65**	.61**	.41**	.41**	.32**	-					
11. Belongingness	.03	-.07	.08	.41**	.47**	.43**	.33**	.25**	.36**	.63**	-				
12. Parent Support	.07	.09	.00	-.03	-.17*	-.23**	-.13	-.08	.03	-.35**	-.39**	-			
13. CI Friend Support	-.09	.13	.11	-.09	-.01	-.13	-.10	-.08	-.12	-.24**	-.51**	.30**	-		
14. School Support	.01	.20*	-.16	-.27**	-.39**	-.41**	-.27**	-.22*	-.11	-.48**	-.54**	.40**	.30**	-	
15. Dev Risk	-.06	-.13	.16	.06	.18*	.10	-.05	.02	-.04	.10	.08	.09	-.01	-.18*	-
N	126	143	143	126	142	142	127	142	121	141	141	142	140	130	144
Mean	22.04	15.38	.64	-.25	.22	10.58	5.82	9.56	1.26	3.60	4.00	3.54	4.34	2.64	5.90
Standard Deviation	8.14	1.43	.50	.86	1.06	8.91	6.74	16.29	1.70	1.55	1.33	1.03	1.31	1.07	.82

Note. Tx = treatment, SIQ = Suicidal Ideation Questionnaire, SSI = Scale for Suicidal Ideation, SITBI = Selfinjurious thoughts and behavior interview, CI = close, Dev = developmental; SIQ junior and senior scores were mean centered to form a composite variable, the mean is below zero.

Preliminary Bivariate Analyses

Measurement Models.

Suicidal ideation. A SI model was estimated using scores from three separate measures of SI (SIQ, SSI, SITBI). Separate models were estimated for T1 and T2. For T1, all indicators, SIQ ($\beta = 0.82$, $SE = 0.04$, $p < .001$), SSI ($\beta = 0.96$, $SE = 0.04$, $p < .001$), and SITBI ($\beta = 0.66$, $SE = 0.05$, $p < .001$), loaded positively and significantly onto the SI factor. For T2, all indicators, SIQ ($\beta = 0.85$, $SE = 0.04$, $p < .001$), SSI ($\beta = 0.92$, $SE = 0.04$, $p < .001$), and SITBI ($\beta = 0.78$, $SE = 0.05$, $p < .001$), loaded positively and significantly onto the SI factor. Due to only having three indicators, the SI factor was estimated as a fully saturated model, precluding evaluation of overall model fit. However,

all factors loaded above 0.50, signifying that the latent SI factor explains a substantial and significant portion of the variance in each indicator.

Social Support. A social support construct was estimated using scores from the Close Friends, Parent, and School Support scales of the CASS administered at T1. All indicators, Parent Support ($\beta = 0.64$, $SE = 0.11$, $p < .001$), Close Friend Support ($\beta = 0.47$, $SE = 0.10$, $p < .001$), and School Support ($\beta = 0.62$, $SE = 0.11$, $p < .001$), loaded significantly and positively onto the factor. Within this fully saturated model, Parent Support and School Support loaded above 0.50, but Close Friend Support was just below this cutoff, 0.47. Because this factor still explained a significant portion of the variance in Close Friend Support, the indicator was retained.¹

Structural Model

Model 1. Model 1 (Figure 4) was estimated by regressing T2 SI onto T1 SI, Social Support, perceived burdensomeness, and thwarted belongingness. In the initial model without the developmental risk indicator, the structural model failed to converge with default iterations and start values specified. After increasing the number of iterations to 1,000 and allowing Mplus to randomly select start values up to 50, the estimation process converged resulting in an admissible solution. Initial model fit was poor, $\chi^2(40) =$

¹ An alternative social support variable initially included Parent Support, Close Friend Support, School Support, and Thwarted belongingness, given theoretical evidence that social support and the cognitive distortion of thwarted belongingness are related constructs (Van Orden et al., 2010). Although two indices suggested acceptable fit ($\chi^2(2) = 4.33$, $p = 0.11$) and CFI = 0.98), model RMSEA (0.90, 95% CI [0.00, 0.21]) suggested poor fit. Additionally, thwarted belongingness loaded at a value of -.85, compared to .50, .57, and .64 for Parent Support, Close Friend Support, and School Support, respectively. Based on these observations, the decision was made to model support with the three social support variables.

216.85, $p < .001$, CFI = .75, RMSEA= 0.17. Modification indices suggested that allowing the residual variances between each T1 SI indicator to correlate with each T2 SI indicator to correlate would significantly improve model fit. Because it is reasonable to assume that these errors would be theoretically related given measurement error at both time points, these modifications were deemed acceptable. Further modification indices suggested allowing the indicators of burdensomeness and belongingness to correlate with each other and with the social support construct would significantly improve model fit. Given literature supporting associations among these constructs (Van Orden et al., 2010), these modifications were made. The resulting model showed improved, but still poor model fit, $\chi^2(33) = 52.18$, $p < .05$, CFI = .97, RMSEA= 0.06. No other modifications to the model were deemed statistically or theoretically justified.

Results from fit statistics suggest that the specified model does not adequately reproduce the covariance structure in the data, and thus, the resulting parameter estimates are unreliable (Kline, 2011). As a result, Model 1 was rejected, and hypothesis 1 was not supported.

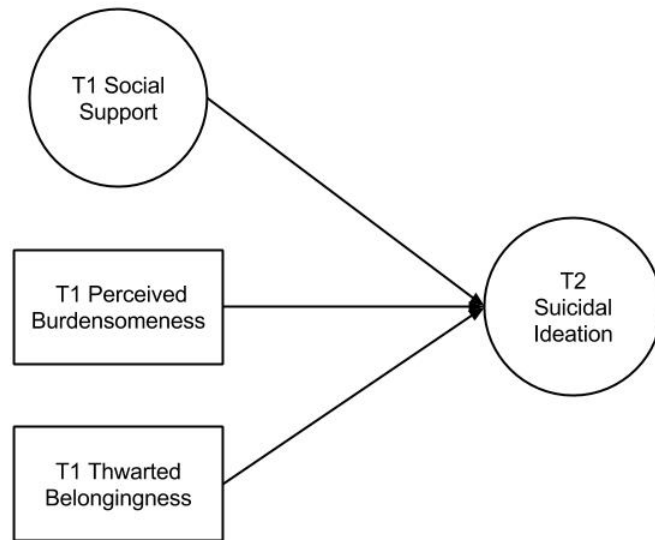


Figure 5: Structural Equation Model 1 Predicting Time 2 Suicidal Ideation

Model 2. Model 2 (Figure 6) was estimated with Social Support, perceived burdensomeness and thwarted belongingness as mediators of the relationship between developmental risk and T2 SI. Similar to Model 1, the number of estimation iterations were increased to 1,000 and random start values to 50 in order to allow the estimation process to converge and produce an admissible solution. Initial model fit was poor, $\chi^2(49) = 298.58, p < .001, CFI = .58, RMSEA = 0.18$. Modification indices suggested that allowing the errors for each of the social support constructs to correlate would substantially improve model fit. Because it is reasonable to assume that error variances resulting from scales within the same assessment instrument will covary, these

modifications were deemed appropriate. Additional modification indices were suggested by allowing belongingness and burdensomeness to correlate with each other and with the social support construct would significantly improve model fit. The resulting model showed improved, but still poor fit $\chi^2(40) = 171.96, p < .001, CFI = .84, RMSEA = 0.14$. No other modifications to the model were deemed statistically or theoretically justified. Results from fit statistics led to the rejection of Model 2.

Because neither proposed model was retained, comparison of model fit (Hypothesis 3) could not be evaluated.

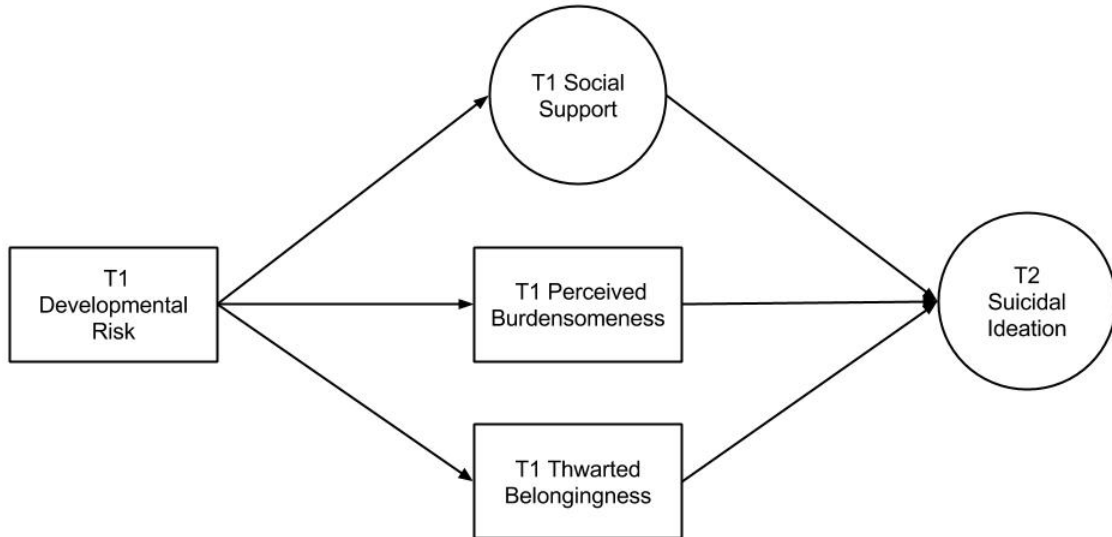


Figure 6: Alternative Structural Equation Model Predicting Time 2 Suicidal Ideation

Discussion

As noted in Kline (2011) SEM is a large sample technique, and the accepted rule of thumb is that SEM analyses with less than 200 participants are likely underpowered. The models tested in the current sample were complex with several latent constructs. Although the measurement model appeared to fit the data well, it is likely that power was the main issue in the full structural model. Future research may benefit from recruiting larger samples of adolescents to test the current proposed model.

Aside from statistical issues of power, it is also possible that the specified model does not adequately explain SI in the current sample. This would suggest that an alternative model that incorporates other known risk factors for suicidal SI clinical youth, such as child maltreatment (Miller, Esposito-Smythers, Weismore, & Renshaw, 2013) or substance use (Effinger & Stewart, 2012) may potentially provide a more tenable model. Future research with larger sample sizes may benefit from incorporating such risk factors into competing models of adolescent SI.

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