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INTRAPERSONAL AND FAMILY RESILIENCE IN PREVENTING SUICIDAL IDEATIONS AMONG U.S. HIGH SCHOOL ADOLESCENTS

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Abstract

Background: The risk and protective factors of suicidal ideations are not well understood. This study aimed to identify the extent to which adolescents' risk factors for developing suicidal ideations (stress, bullying, and hopelessness) influenced (passive and active) suicidal ideation indirectly through unmet intrapersonal needs, and then subsequently by family resilience and intrapersonal resilience.

Methods: A cross-sectional study was conducted with 128 participants who were recruited online (social media advertisements and online research registries) and in person (distribution of paper flyers). Data was analyzed using structural equation modeling with weighted least square mean and variance adjusted modeling.

Results: Unmet interpersonal needs had a direct and positive relationship with adolescents' suicidal ideations ($\beta = 1.27, p < .001$). Additionally, a direct and positive relationship emerged between risk factors and unmet interpersonal needs ($\beta = 0.99, p < .001$). Although high levels of intrapersonal ($\beta = -0.24, p = .076$) and family resiliencies ($\beta = -0.39, p = .077$) did not significantly mediate the correlation between unmet interpersonal needs and suicidal ideations, there were unexpected positive relationships between both forms of resilience (family: $\beta = 0.32, p = .071$; intrapersonal: $\beta = 0.44, p = .059$) and suicidal ideations.

Conclusions: With 28% of high school adolescents in this sample endorsing elevated risk for, or actual suicidal ideations, these findings underscore the ongoing public health urgency of

identifying both risk and protective mechanisms within adolescent populations. Although causal inferences cannot be drawn, the observed relational patterns provide a foundation for hypothesis-driven longitudinal and intervention research.

Background

Suicide is the second leading cause of death among high school adolescents aged 13–18 in the United States (1-3). Findings from the 2021 Youth Risk Behavior Survey indicated that 22% of adolescents seriously considered suicide (suicidal ideations) (4, 5).

Suicidal ideations are thoughts of death and a well-known precursor to the enactment of suicide attempts (6-8). Suicidal ideations range in acuity from passive to active (6). *Passive suicidal ideation* is characterized by a wish to die without intent or plans to engage in self-harm, often accompanied by indifference to accidental death (6, 9). *Active suicidal ideation* involves a conscious desire to inflict lethal self-harm (6). Taken together, the high prevalence and clinical significance of suicidal ideations among adolescents underscore the urgent need to understand the factors that contribute to their development. Beyond describing the scope of the problem, it is critical to identify the modifiable risk factors that heighten vulnerability during this developmental period.

It is well documented that perceived stress, bullying, and hopelessness are three risk factors contributing to the development of adolescents' suicidal ideations (10-19). *Perceived stress*, or “feelings or thoughts that an individual has about how much stress they are experiencing” (20) is instrumental in the development of suicidal ideations for adolescents (14, 17). Having persistently elevated levels of stress markedly increases the odds of developing suicidal ideations by 2.78 times (14). Next, *bullying* is characterized by unwanted, aggressive behavior among adolescents that involve a real or perceived power imbalance (21). Victims of *bullying* tend to be more depressed and suicidal than perpetrators (22). Lastly, *hopelessness* is defined as the feeling that one will not experience positive emotions or an improvement in condition (23). Adolescents experiencing hopelessness are more likely to have suicidal ideations

($B = -0.41, p < .01$) (24). Although these psychosocial risk factors are well established, emerging theoretical frameworks suggest that their influence on suicidal ideations may operate through adolescents' unmet interpersonal needs and related protective processes.

Feelings of *unmet interpersonal needs*, such as thwarted belongingness and perceived burdensomeness, are main drivers to the development of suicidal ideations (25-27). *Thwarted belongingness* is defined as the psychologically painful mental state stemming from an unmet "need to belong" (28, 29). *Perceived burdensomeness* is the belief that others would be "better off" if an individual is gone (30). A substantial body of literature supports the role of unmet interpersonal needs as key mechanisms linking psychosocial risk factors, such as stress, bullying, and hopelessness to suicidal ideations (26, 30-38). However, these models have largely examined direct mediation, without considering how protective processes may intervene within this pathway.

Unfortunately, adolescent community-based programs to prevent suicide have yielded minimal or mixed effects to date. Specifically, some resulted in the reduction in suicidal ideations (39-41), while others had no effects or worsened the incidences of suicidal ideations (40, 42-49). A common feature of community-based interventions that produced null or worsening outcomes is the utilization of a deficits-based approach, where risk factors were overemphasized, such as psychoeducation focused on suicide symptomology (48). The suboptimal effects resulting from these interventions underscore a need to examine other factors associated with suicidal ideations, such as those that are protective (50).

Resilience as a Protective Factor Against Suicidal Ideations

An important factor to combat suicidal ideations is a high level of *intrapersonal resilience* (51, 52), a strengths-based form of coping that results in one's inherent ability to

positively adapt to difficult or challenging life experiences (53). Some evidence indicates that intrapersonal resilience is a known correlate of suicidal ideations (54, 55), such that higher resilience attenuates the effects of thwarted belongingness and perceived burdensomeness on suicidal ideations (56). However, as indicated in a meta-analysis, effects of prior interventions on improving adolescent intrapersonal resilience ranged from small effects to even worsening mental health outcomes and risk factors for developing suicidal ideations, such as internalizing problems ($d = -0.19, p = .03$), distress ($d = -0.04, p = .72$), anxiety ($d = -0.02, p = .87$), and depression ($d = -0.02, p = .08$; (57). One plausible reason for the limited effectiveness of these interventions is their emphasis on intrapersonal resilience in the absence of interventions targeting interpersonal resiliencies (58). These mixed findings suggest that resilience-focused interventions may be more effective when they extend beyond the individual level and address the broader interpersonal contexts in which adolescents develop and cope.

Targeting *family resilience*, an interpersonal construct that views the family as a functional system, may strengthen long-term effectiveness of interventions designed to enhance adolescents' intrapersonal resilience. (59, 60). In this context, adolescents' family resilience functions by strengthening their capacity to adapt positively to stress, sustain connection, and maintain psychological well-being in the face of suicide vulnerability. Quantitative studies indicate significant relationships between family resilience and adolescents' intrapersonal resilience ($\beta = 0.59$ to 0.61 ; (61, 62). Family resilience is also known to correlate with improved mental health functioning among adolescents (63, 64). However, no family resilience-based interventions were found that targeted adolescent suicidal ideations in school and community settings. To set a foundation for developing such interventions, the influence of adolescents' family and interpersonal resilience on adolescent unmet interpersonal needs and its role on

suicidal ideations must be clarified first.

Despite the importance of family resilience, it is unclear how family and intrapersonal resiliencies mitigate the influence of risk factors (stress, bullying, and hopelessness) on suicidal ideations through both unmet interpersonal needs and resiliencies. Therefore, this study aimed to identify the extent to which adolescents' risk factors for developing suicidal ideations (stress, bullying, and hopelessness) influenced (passive and active) suicidal ideation, indirectly through unmet intrapersonal needs, then subsequently by family resilience and intrapersonal resilience. Clarifying these relationships is essential for informing strengths-based suicide prevention interventions.

Methods

Study Design

A cross-sectional study design was used to examine the mediating effects of family resilience and intrapersonal resilience on the relationships between risk factors (i.e., stress, bullying, and hopelessness), unmet interpersonal needs (thwarted belongingness and perceived burdensomeness), and suicidal ideations (passive and active) among adolescents. This study design was selected to provide an initial cross-sectional assessment of concurrent associations rather than to infer causal ordering. This approach allowed efficient examination of multiple latent constructs within a single model while minimizing participant burden and ethical risks associated with longitudinal monitoring of adolescents experiencing suicidal ideations.

Institutional Review Board (IRB) approval was obtained in July 2023.

Clinical trial number: Not applicable

Funding

Theoretical Framework

This study's framework, Resiliency Model for Adolescent Suicide Prevention (Figure 1), was adapted from three theories or models: Lazarus and Folkman's Transactional Stress/Coping Model, Interpersonal-Psychological Theory of Suicide, and McCubbins' Resiliency Model of Family Stress: Adjustment Phase.

The Transactional Stress/Coping Model has been well utilized to describe that coping processes, such as resilience, are needed to overcome stress and limit adverse mental health outcomes, including suicidal ideations (65). Adaptive coping processes (family and intrapersonal resilience) are needed to overcome stress and decrease adverse mental health outcomes, including suicidal ideations (66).

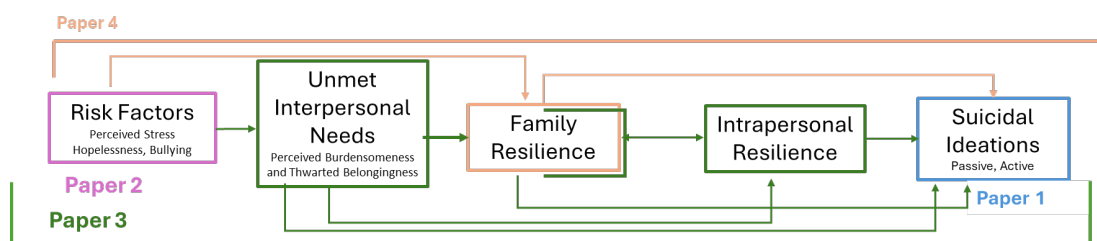
The Interpersonal-Psychological Theory of Suicide purports that when interpersonal needs are not met, feelings of thwarted belongingness and perceived burdensomeness may arise (25-27). The theory has been useful for predicting the type of suicidal ideations. If one form of unmet interpersonal needs, either thwarted belongingness or perceived burdensomeness, is present, adolescents may develop passive suicidal ideations (25, 67). However, if both forms of unmet interpersonal needs are present, they have a greater chance of developing active suicidal ideations (25, 67).

The McCubbins' Resiliency Model of Family Stress: Adjustment Phase (68), a successor of the Transactional Stress/Coping Model (66), was applied because a high stress level is a precursor to adolescent suicidal ideations (14, 17, 69, 70). According to the McCubbins' Resiliency Model of Family Stress (68): Adjustment Phase, when adolescents and their families are faced with stressors or risk factors (bullying, perceived stress, and hopelessness) that lead to unmet personal needs, successful deployment of family and interpersonal resilience promotes

positive adjustment (71). In this case, positive adjustment results in the absence or reduction of suicidal ideations. The Adjustment Phase in McCubbins' Resiliency Model of Family Stress informed the three attributes of family resilience included in this study: (a) collective family efficacy, (b) family coping, and (c) family support.

Figure 1

Resiliency Model for Adolescent Suicide Prevention



Note. Adapted from *The Transactional Stress/Coping Model, Interpersonal-Psychological Theory of Suicide, and McCubbins' Resiliency Model of Family Stress: Adjustment Phase.*

Sampling and Recruitment

Various methods were used to recruit participants across the United States, including research registries (ResearchMatch) and social media advertisements. Additionally, two paper flyers (see Supplement 1 & 2) were distributed in various community centers and public events across mid-Michigan and metro-Detroit. Due to current laws prohibiting advertisements toward minors, parents/caregiver/guardians (hereafter referred to as parents) of U.S. high school adolescents were non-randomly recruited online using ResearchMatch and Meta. These parents served as gatekeepers to allow their high school adolescents to participate in the study.

Social Media

A 40-second culturally inclusive recruitment video was created to highlight the study's

purpose and recruit participants. Targeted advertisements with the recruitment video were posted on Meta (Instagram and Facebook). To purposely target U.S. high school adolescents, advertisements included key words (e.g., wellness, teen, stress, mental health) specifying adolescent mental health.

ResearchMatch

A recruitment email was sent to U.S. parents of teenagers using ResearchMatch, a free and secure study tool that matches prospective participants with researchers (72). ResearchMatch was funded by the National Institutes of Health Clinical and Translational Science Award program.

Inclusion and Exclusion Criteria

Adolescent inclusion criteria were as follows: (a) able to read and understand English, (b) aged 13–18, and (c) residing in the United States. Adolescents and one of their parents had to be able to provide assent and consent, respectively. Because this study aimed to determine family resilience as a protective factor against suicidal ideations, adolescents who have had a lifetime hospitalization for suicide attempts were excluded.

Data Collection Procedures

The data collection procedure included the following five steps:

- Step 1: Parents accessed the initial Qualtrics survey, but their approach differed based on how they were recruited:
 - o Social media: Upon viewing the study advertisement video, interested parents clicked on the study link (located in the description box). Parents were directed to an initial Qualtrics parent survey including an informed consent form describing

the study purpose, procedures, potential risks and benefits, participant rights, and permission to collect eligibility and demographic information.

- ResearchMatch: Interested parents selected “Yes, I’m interested” on the recruitment email, which indicated to study team members that they needed to email the parent the initial Qualtrics parental study survey.
 - Physical flyers: Interested parents of teenagers scanned the flyer QR code, which directed them to the initial Qualtrics parental study survey.
- Step 2: Parents who met inclusion and exclusion criteria scheduled a Microsoft Teams meeting with the principal investigator (PI), through Microsoft Booking with Me. Because all adolescent participants were minors and this study involved the evaluation of suicidal ideations, this meeting served to ensure parents’ identity (via a form of government issued ID), explain the scope/nature of the study, and obtain informed parental consent. As a part of the consent process, parents two additional emergency contacts to facilitate the implementation of the IRB-approved suicide safety protocol in needed.
- Step 3: Following parental informed consent, adolescents received the Qualtrics link and provided informed assent before completing the eligibility screening, demographic survey, and study measures.

Study Variables and Measurements

Validated instruments with established reliability in adolescent populations were selected to enhance measurement precision and comparability with prior research.

Risk Factors

Risk factors were operationalized using perceived stress, bullying, and hopelessness. Perceived stress was operationalized based on the valid and reliable 10-item Perceived Stress Scale (10-PSS). The 10-PSS measures adolescents' perception of stress and the degree to which situations in one's life are appraised as stressful (73). The 10-PSS displayed predictive validity because high 10-PSS scores increase the odds of developing suicidal ideations by 1.16–1.18 times (14). Additionally, 10-PSS is a reliable measure with Cronbach's $\alpha = 0.70$ (74).

Next, bullying was evaluated using the victimization subscale (items 4, 5, 6, and 7) of the Illinois Bullying Scale (75), through the frequency of various bullying experiences, from 0 = *never* to 4 = *seven times or more* (76). The victimization subscale displayed predictive validity, as indicated by its correlation with internalizing ($r = 0.42, p < .001$) and externalizing mental health problems ($r = 0.36, p < .001$; (77). The Cronbach's α for the victimization subscale was 0.87 (76).

Lastly, hopelessness was evaluated using the valid and reliable 20-item Beck Hopelessness Scale (20-BHS). The 20-BHS assesses 3 domains of hopelessness: (a) feelings about the future, (b) loss of motivation, and (c) expectations (78). Among adolescents, the 20-BHS is associated with anxiety ($r = 0.42$), depression ($r = 0.58$; (79), and suicidal ideations ($B = -0.41, p < .01$; (24). Additionally, the Cronbach's α is 0.88 (78).

Unmet Interpersonal Needs

Unmet interpersonal needs were operationalized according to the 15-item Interpersonal Needs Questionnaire (15-INV). The 15-INV assesses both thwarted belongingness (9 items) and perceived burdensomeness (6 items). These two subscales have been used to determine the severity and risk of developing suicidal ideations. Cut-off scores for high risk of suicidal

ideations are ≥ 36 for the 15-INQ thwarted belongingness subscale and ≥ 12 for the perceived burdensomeness subscale (80). The subscales have demonstrated good reliability and validity in an adolescent sample (thwarted belongingness ICC = 0.83, perceived burdensomeness ICC = 0.90; correlation between perceived burdensomeness and thwarted belongingness = 0.52, $p < .001$) (81). Higher levels of thwarted belongingness and perceived burdensomeness were associated with greater odds of reporting suicidal ideations (thwarted belongingness OR = 1.59, $p < .01$; perceived burdensomeness OR = 2.21, $p < .01$; (27).

Family Resilience

Family resilience was operationalized according to three domains: family structure, family coping, and family social support. Family structure was assessed using the 20-item Collective Family Efficacy scale. Cronbach's α for the 20-item Collective Family Efficacy scale is 0.95 (82). Family coping was assessed by the McCubbin's Family Crisis Oriented Personal Evaluation Scale (F-COPES), which describes that adaptive family coping occurs when families "acquire family resources," "reframe stressful situations," "seek spiritual support," and "mobilize family to acquire and accept help" (83). The "passive appraisal" subscale of the 20-item F-COPES measure was excluded because it captured a maladaptive form of family coping. The Cronbach's α for each adaptive subscale, is as follows: acquiring family resources = 0.83; reframing of stressful situations = 0.82; seeking spiritual support = 0.80; and mobilizing family to acquire and accept help = 0.71 (83). Lastly, the category of family resources was operationalized as social support (84). Cronbach's α for each social support subscale ranged from 0.72 to 0.90. The subscales of social support are negatively correlated with anxiety and depression ($r = -0.25$ to -0.52 , $p < .001$; (84).

Intrapersonal Resilience

Intrapersonal resilience was operationalized according to the well-validated 10-item Connor–Davidson Resiliency Scale (CD-RISC; (85), which is a condensed version of the 25-item CD-RISC scale (85, 86). Inconsistencies have been reported regarding the factor structure for the original 25-item CD-RISC scale (85, 86); therefore, the condensed 10-item CD-RISC scale was used. Intrapersonal resilience is negatively correlated with depressive symptoms ($r = -0.47, p < .001$; (87). The Cronbach's α for the scale is 0.85 (86).

Suicidal Ideations

Suicidal ideations were assessed using the 16-item Suicidal Ideation Questionnaire (SIQ) (88-90), which includes both passive and active suicidal ideation subscales. The inter-total correlation is $r = 0.74$. Active suicidal ideations (AUROC = .717, SE = .046, $p < .001$) and passive suicidal ideations (AUROC = .727, SE = .044, $p < .001$) are strongly associated with the Columbia Suicide Severity Rating Scale (89).

Ethics

During the course of this study, adolescents disclosed an elevated risk for suicidal ideations through the INQ (91) or actual suicidal ideations through the SIQ (90). Adolescents were at an increased risk for suicidal ideations if they screened positive for thwarted belongingness and/or perceived burdensomeness (91). If adolescents had a combined score of ≥ 36 for the 15-INQ thwarted belongingness subscale and/or ≥ 12 for the perceived burdensomeness subscale, this finding indicated an elevated risk for suicidal ideations (80). Through Qualtrics, automatic triggers were set for the 15-INQ,

where the study team received emails of elevated risks for suicidal ideations. Within 1–4 min of receiving the mental health trigger email, the study team called the parents to either (a) initiate a warm handoff (direct transfer of care) to Lifeline (92) or (b) advised parents to follow their emergency mental health protocol (if they had one) that was developed by their mental health care team. If parents did not respond to the referral phone calls, the mental health team texted parents with similar handoff messages.

Adolescents screened positive for suicidal ideations through SIQ (90). They disclosed passive suicidal ideations if they scored 5–7 on items 7, 8, 9, 10, 11, 14, 16, and active suicidal ideations if they scored 5–7 on items 1, 2, 3, 4, 5, 6, 12, or 13. If adolescents disclosed passive suicidal ideations, the safety protocol was the same as it was for those who reported an elevated risk for developing suicidal ideations. If adolescents disclosed active suicidal ideations, parents and their emergency contacts had to respond to at least one referral message (email, phone call, text) within 1 hour of receiving these messages. If not, emergency services were contacted. If adolescents disclosed active suicidal ideations AND elevated risk for developing suicidal ideations OR passive suicidal ideations, they were treated as though they had active suicidal ideations.

Lifeline services is a nationally funded suicide and crisis lifeline where parents and high school adolescents can call crisis interveners (92). All crisis interveners are trained by Lifeline to identify adolescents' risk of harming themselves and employ the least invasive intervention to ensure the safety of adolescents. Such interventions include providing support by listening to the adolescents' narrative and identifying a suicide safety plan. If an adolescent is at imminent risk of harming themselves and is unwilling and/or unable to follow the recommendations of the crisis counselor to secure their own safety, Lifeline may initiate an emergency service

intervention with or without the caller/chatter/texter's consent.

Power and Data Analysis

With five latent and 11 observed variables, as well as an effect size of 0.35 ($r = -0.01$ to -0.39 ; (93-97), a sample size of 103 to 352 was needed to achieve a statistical power of 0.8 (98).

R Studio 4.2.1 was used for all data analysis. Preliminary data analyses involved cleaning and evaluating the data distributions. Descriptive statistics for observed variables (Table 1; range, mean, standard deviation, and Shapiro-Wilkson Test) and descriptive variables (Tables 3 & 4; number and percentage) were calculated. Additionally, independent t-tests (Table 5) were conducted to compare differences in unmet interpersonal needs and suicidal ideation scores by: (a) biological sex (female vs. male); (b) race (White vs. racial minorities (American Indian/Alaska Native, Asian, Black or African American, Hispanic/Latino, Native Hawaiian/Other Pacific Islander, Multiple Races, or other); and (c) sexual and gender (cisgender) status (heterosexual and cisgender vs. sexual [lesbian, gay, bisexual, asexual, transexual, pansexual, or queer] and gender [transgender, gender non-confirming, agender, or other] minority status).

Mardia's test indicated significant multivariate non-normality (skewness: 1258.25, $p < .001$; kurtosis: 21.89, $p < .001$; (99). However, univariate distributions were acceptable (skew/kurtosis $\approx \pm 1$); and given the sample size, no transformations were applied (100). Models were estimated using weighted least squares mean variance (WLSMV) to accommodate mild non-normality and ordinal responses (101).

Pearson's correlation and Variance Inflation Factor (VIF; see Table 1) were used to assess for multicollinearity (102). Because we evaluated two outcomes, including passive and active suicidal ideations, linear regression was performed for each outcome variable. A VIF of 10 indicated serious multicollinearity (103). No serious multicollinearity was detected in our dataset

(103).

Table 1*Correlation Table*

	1	2	3	4	5	6	7	8	9	10	11	VIF _{PSI}	VIF _{ASI}
1 Perceived stress	1	0.31**	0.66**	0.62**	0.65**	-0.73	-0.68	-0.73	-0.70	0.45**	0.39**	3.28	3.29
2 Bullying		1	0.24*	0.27*	0.21*	-0.23*	-0.17*	-0.28*	-0.28*	0.32**	0.31**	1.21	1.22
3 Hopelessness			1	0.70**	0.91**	-0.51**	-0.61**	-	-	0.50**	0.47**	3.09	3.12
4 Thwarted belongingness				1	0.64**	-	-	-	-	0.41**	0.47**		
5 Perceived burdensomeness					1	-	-	-	-	0.53**	0.45**	3.12	3.01
6 Collective family efficacy						1	0.47**	0.53**	0.63**	0.53**	-	2.68	2.55
7 Family coping							1	0.74**	0.79**	0.69**	-	3.72	3.74
8 Family social support								1	0.78**	0.66**	-	3.32	3.35
9 Intrapersonal resilience									1	0.71**	-	5.33	5.26
10 Passive suicidal ideations										1	-	2.65	2.66
11 Active suicidal ideations											1	1.80	1.74

Only 0.8% ($n = 1$) of the data was missing, so Little's MCAR test was not performed. Given the trivially small amount of missing data, no imputation was performed.

Before conducting structural equation modeling, item and parcel (subscale) confirmatory factor analysis (CFA) was performed to test the adequacy of the measurement model (104). Factors (items and parcels) with low factor loadings of < 0.3 were removed (104). The composite reliability, AVE, Cronbach's α , and McDonald's ω were reported. Under Cronbach's α , it was assumed that the item-factor loads were equal, thus underinflating the reliability of the subscales. Therefore, McDonald's ω was a better metric to evaluate reliability for ordinal data (105).

Structural equation modeling was performed to examine our study aim. The structural equation modeling procedure consists of six steps: model specification, determination of the covariance matrix, model identification, estimation, assessment/interpretation, and re-specification (106). Figure 2 is the tested model with unmet interpersonal needs as the exogenous latent variable, suicidal ideations being the endogenous latent variable, and family and adolescent intrapersonal resilience as latent mediators (107). We used a covariance matrix for analysis and WLSMV model estimations—as opposed to maximum likelihood—due to its robustness to ordinal (108) and non-normal data (109). Therefore, WLSMV algorithm leads to higher factor loadings and fit indices, due to the ordinal data structure (110-112).

Standardized coefficients were reported. As defined by Hair (113) in a structural model, coefficients ranging from 0 to 0.10; 0.11 to 0.30; 0.31 to 0.50; and >0.50 indicate weak, modest, moderate, and strong relationships between variables, respectively. The mediating effects of family resilience and adolescents' intrapersonal resilience were assessed using Sobel's test (significant Sobel's z -value indicates a significant mediator). Three indices were used to examine the model goodness of fit: $\text{SRMR} \leq 0.08$, Root mean square error of approximate (RMSEA) $< .05$,

comparative fit index (CFI) > .9, and Tucker Lewis index (TLI) > .9 (104, 114). Chi-square test ($p > .05$) was reported, but not used to evaluate model fit, as it is very sensitive to sample size. Although RMSEA and SRMR were reported, SRMR was described because it is more robust to ordinal data (115). Parameters were added (using Lagrange Multiplier [LM]) and removed (using Wald statistic) one at a time. Serial mediation models were tested in which unmet interpersonal needs and family resilience sequentially mediated the association between risk factors and suicidal ideations.

Results

Participant Demographics and Descriptives

Participant demographic information is shown in Table 2. A total of 128 adolescents participated in the study. Most participants were recruited through ResearchMatch ($n = 79$, 61.7%) followed by Meta ($n = 39$, 30.5%) and paper flyers ($n = 10$, 7.8%). Most of the participants were biologically female ($n = 78$, 60.9%) and younger in age with the majority being 13–15 years old ($n = 88$, 68.8%). Most participants identified as White ($n = 89$, 69.5%). Racial minority participants comprised the remaining 30.5%: Asian ($n = 1$, 0.8%), African American ($n = 29$, 22.7%), multiracial ($n = 6$, 4.7%), and other ($n = 3$, 2.3%). Roughly 91% ($n = 121$) of participants identified as cisgender, and 5% ($n = 7$) identified as either transgender male ($n = 1$, 0.8%), gender non-conforming ($n = 2$, 1.6%), multiple identities ($n = 2$, 1.6%), or other identities ($n = 2$, 1.6%). Four participants (3.1%) did not disclose gender identity. More participants disclosed minority sexual identity as follows: lesbian ($n = 8$, 6.3%), bisexual ($n = 17$, 13.3%),

asexual ($n = 4$, 3.1%), and pansexual ($n = 3$, 2.3%). Two participants did not disclose their sexual identity. Table 3 depicts the descriptive statistics for all observed variables. The Shapiro-Wilkson test statistics for all observed variables fell from 0 to +1.

Table 2

Participant Demographic Information

Demographic characteristics	N	%
Recruitment location		
Meta (Facebook and Instagram)	39	30.5%
Physical flyers	10	7.8%
ResearchMatch	79	61.7%
Biological sex		
Female	78	60.9%
Male	50	39.1%
Age		
13	28	21.9%
14	26	20.3%
15	34	26.6%
16	17	13.3%
17	16	12.5%
18	7	5.5%
Race		
Asian	1	0.8%
African American	29	22.7%
White	89	69.5%
Multiracial	6	4.7%
Other	3	2.3%
Gender identity		
Cisgender female	71	55.5%
Cisgender male	46	35.9%
Transgender male	1	0.8%
Gender non-conforming	2	1.6%
Other	2	1.6%
Multiple	2	1.6%

Table 2 (cont'd)

Missing	4	3.0%
Sexual identity		
Lesbian	8	6.3%
Bisexual	17	13.3%
Asexual	4	3.1%
Pansexual	3	2.3%
Heterosexual	94	73.4%
Missing	2	1.6%

Table 3*Descriptive Statistics of Observed Variables*

	Range	Mean (SD)	Shapiro-Wilkson Test
Stress	4–33	16.80 (7.06)	0.98, $p = 0.058$
Bullying	0–17	1.83 (3.07)	0.65, $p < 0.001$
Hopelessness	0–19	3.47 (3.73)	0.85, $p < 0.001$
Collective family efficacy	32–140	105.20(19.47)	0.96, $p < 0.001$
Family coping	53–144	91.46(19.25)	0.98, $p = 0.059$
Social support	43–144	85.76 (15.89)	0.96, $p = 0.002$
Intrapersonal resilience	4–40	28.03(6.83)	0.98, $p = .045$
Thwarted belongingness	9–51	24.88 (8.47)	0.92, $p < 0.001$
Perceived burdensomeness	6–37	8.70 (5.50)	0.57, $p < 0.001$
Passive suicidal ideations (PSI)	2–37	12.98 (6.43)	0.81, $p < 0.001$
Active suicidal ideations (ASI)	0–28	9.59 (3.39)	0.62, $p < 0.001$

Note. SD = Standard deviation.

Referrals to Mental Health Services

More than 28% of participants were referred to 988 (Suicide & Crisis Lifeline) or mental health services. Of those who were referred to mental health services, most of the participants disclosed passive suicidal ideations ($n = 17$, 13.3%), followed by active suicidal ideations ($n = 6$, 4.7%). Five participants disclosed perceived burdensomeness (3.9%) and five participants disclosed both thwarted belongingness and perceived burdensomeness (3.9%). Lastly, three participants only disclosed thwarted belongingness ($n = 3$, 2.3%).

Table 4

Referrals to Mental Health Services

Referrals to Mental Health Services	<i>n</i>	<i>%</i>
Referral to 988/Seek Mental Health Services		
No referral	92	71.9%
Referral	36	28.1%
Thwarted belongingness	3	2.3%
Perceived burdensomeness	5	3.9%
Thwarted belongingness and perceived burdensomeness	5	3.9%
Passive suicidal ideations	17	13.3%
Active suicidal ideations	6	4.7%

Group Differences in Unmet Interpersonal Needs and Suicidal Ideations

There were significant group differences according to race and sexual and gender minority status. Interestingly, White adolescents reported higher scores for passive suicidal ideations than those identifying as a racial minority (White: 13.98 [6.88]; racial minority: 10.69 [4.57]; $p = .002$). Additionally, compared to non-sexual minority adolescents, sexual and gender minority adolescents reported higher mean thwarted belongingness (non-sexual minority: 23.30 [8.27]; sexual and gender minority: 29.59 [8.91]; $p = .001$), perceived burdensomeness (non-sexual minority: 7.84 [4.23]; sexual and gender minority: 11.34 [7.78]; $p = .020$), and passive suicidal ideations (non-sexual minority: 12.02 [5.77]; sexual and gender minority: 16.06 (7.47); $p = .008$). There were no group differences in active suicidal ideation scores.

Table 5*Group Differences in Unmet Interpersonal Needs and Suicidal Ideations*

	Biological sex		t-statistic (95% CI)	df	p-value
	Female Mean (SD)	Male Mean (SD)			
Thwarted belongingness	25.51 (8.96)	23.88 (8.49)	1.04 (-1.48 to 4.75)	108.71	.301
Perceived burdensomeness	9.08 (6.12)	8.10 (4.38)	1.05 (-0.86 to 2.82)	124.4	.295
Passive suicidal ideations	13.47 (6.41)	12.20 (6.46)	1.09 (-1.04 to 3.59)	104.03	.277
Active suicidal ideations	9.86 (3.89)	9.16 (2.38)	1.26 (-0.40 to 1.80)	125.76	.210
	Race		t-statistic (95% CI)	df	p-value
	White mean (SD)	Racial Minority Mean (SD)			
Thwarted belongingness	21.19 (8.61)	24.15 (9.24)	0.60 (2.43 to 4.50)	68.20	.553
Perceived burdensomeness	8.43 (4.24)	9.31 (7.68)	-0.67 (-3.51 to 1.75)	48.46	.505
Passive suicidal ideations	13.98 (6.88)	10.69 (4.57)	3.18 (1.24 to 5.33)	105.84	.002
Active suicidal ideations	9.87 (3.79)	8.95 (2.11)	1.74 (-0.12 to 1.96)	118.77	.084
	Sexual and gender minority status (SGM)		t-statistic (95% CI)	df	p-value
	Non-Sexual and gender minority mean (SD)	Sexual and gender minority mean (SD)			
Thwarted belongingness	23.30 (8.27)	29.59 (8.91)	-3.51 (-9.89 to -2.70)	50.40	.001
Perceived burdensomeness	7.84 (4.23)	11.34 (7.78)	-2.43 (-6.43 to -0.58)	37.43	.020
Passive suicidal ideations	12.02 (5.77)	16.06 (7.47)	-2.79 (-6.96 to -1.12)	44.27	.008
Active suicidal ideations	9.21 (2.94)	10.78 (4.38)	-1.89 (-3.25 to 0.11)	40.91	.066

Confirmatory Factor Analysis

Item-Based Confirmatory Factor Analysis of the Included Measurements

Good model fit was observed for stress ($\chi^2/df = 1.44$, $p = .046$; CFI: 0.93, TLI: 0.91, RMSEA: 0.03 [95% CI: 0.00 to 0.05], SRMR: 0.05; Supplement 3), bullying ($\chi^2/df = 0.92$, $p = .400$; CFI: 1.00, TLI: 1.00, RMSEA: 0.00 [95% CI: 0.00 to 0.03], SRMR: 0.02), collective family efficacy ($\chi^2/df = 1.24$, $p = .157$; CFI: 0.98, TLI: 0.97, RMSEA: 0.03 [95% CI: 0.00 to 0.05], SRMR: 0.04), family coping ($\chi^2/df = 1.84$, $p < .001$; CFI: 0.94, TLI: 0.93, RMSEA: 0.09 [95% CI: 0.08 to 0.10], SRMR: 0.11), intrapersonal resilience ($\chi^2/df = 1.24$, $p = .157$; CFI: 0.96, TLI: 0.95, RMSEA: 0.06 [95% CI: 0.00 to 0.10], SRMR: 0.05), perceived burdensomeness ($\chi^2/df = 1.41$, $p = .0176$; CFI: 0.96, TLI: 0.95, RMSEA: 0.03 [95% CI: 0.00 to 0.07], SRMR: 0.05), passive suicidal ideations ($\chi^2/df = 2.46$, $p < .001$; CFI: 1.00, TLI: 1.00, RMSEA: 0.02 [95% CI: 0.00 to 0.05], SRMR: 0.02), and active suicidal ideations ($\chi^2/df = 0.92$, $p = .557$, CFI: 1.00, TLI: >1.00 , RMSEA: 0.08 [95% CI: 0.05 to 0.11], SRMR: 0.07).

Because all item-factor loadings were greater than 0.30, all items were retained. Factor structure of hopelessness showed fair fit ($\chi^2/df = 1.03$, $p = .361$, CFI: 0.86, TLI: 0.85, RMSEA: 0.02 [95% CI: 0.00 to 0.05], SRMR: 0.08). After removing item 8 ($\lambda = 0.30$), the fit improved ($\chi^2/df = 1.03$, $p = .378$; CFI: 0.99, TLI: 0.99, RMSEA: 0.02 [95% CI: 0.00 to 0.05], SRMR: 0.08). The following items were identified and removed for the social support ($n = 1$, item 22 $\lambda = 0.12$; pre-removal: $\chi^2/df = 4.04$, $p < .001$; CFI: 0.95, TLI: 0.94, RMSEA: 0.08 [95% CI: 0.07 to 0.09], SRMR: 0.10; post-removal: $\chi^2/df = 1.62$, $p < .001$; CFI: 0.99, TLI: 0.99, RMSEA: 0.08 [95% CI: 0.07 to 0.09], SRMR: 0.10) and thwarted belongingness ($n = 1$, item 9 $\lambda = 0.27$; pre-removal: $\chi^2/df = 9.11$, $p < .001$; CFI: 0.98, TLI: 0.98, RMSEA: 0.06 [95% CI: 0.04 to 0.09], SRMR: 0.07; post-removal: $\chi^2/df = 11.22$, $p < .001$; CFI: 1.00, TLI: 1.00, RMSEA: 0.06

[95% CI: 0.04 to 0.09], SRMR: 0.07).

In general, the subscales displayed good reliability with Cronbach's α : 0.85 to 0.95 (116), McDonald's ω : 0.85 to 0.95 (117), and composite reliability (CR: 0.82 to 0.95; Hair et al., 2013). The following four subscales had an average variance of extracted (AVE) < 0.5: collective family efficacy, social support, family coping, and active suicidal ideations. Because these subscales had an AVE < .05 and a CR of >0.60, they have acceptable convergent validity (118, 119). Following all data transformations (removal of items, updated means, standard deviations, correlations, and VIFs), descriptives are described in Supplement 4.

Parcel-Based Confirmatory Factor Analysis

The Parcel-based factor analysis for the total model displayed good model fit (CFI: 0.99, TLI: 0.99, RMSEA: 0.05, SRMR: 0.07). Results from the chi-squared test were significant with a test statistic of 1.70 ($p < .001$). All observed variables showed significant loading on their respective latent variables (0.32 to 1.00). The composite reliability for all latent variables ranged from 0.83 to 1.00, exceeding the acceptable level of 0.60 (120). The AVE of all subscales ranged from 0.64 to 1.00, indicating that constructs explained more than half of the variance of its items (121). For the included subscales, Cronbach's α was 0.63, 0.68, 0.90, 1.00, and 0.79. McDonald's ω for the included subscales was acceptable at 0.79, 0.83, 0.90, 1.00, and 0.89 (105, 122, 123).

Table 6

Parcel-Based Confirmatory Factor Loadings and Fit

Observed variable	λ	SE	AVE	CR	Cronbach's α	McDonald's ω
Risk factors			0.64	0.79	0.63	0.79
Stress	0.86	0.05				

	Bullying	0.32	0.06				
	Hopelessness	0.77	0.05				
Unmet interpersonal needs				0.74	0.83	0.68	0.83
Family resilience	Thwarted belongingness	0.91	0.06				
	Perceived burdensomeness	0.67	0.04				
	Collective family efficacy	0.83	0.03	0.75	0.90	0.90	0.90
	Family coping	0.83	0.04				
	Family social support	0.98	0.02				
Intrapersonal resilience				1	1	1	1
Suicidal ideations	Intrapersonal resilience	1	0				
				0.82	0.89	0.79	0.89
	Passive suicidal ideations	0.92	0.05				
	Active suicidal ideations	0.85	0.04				

Structural Model

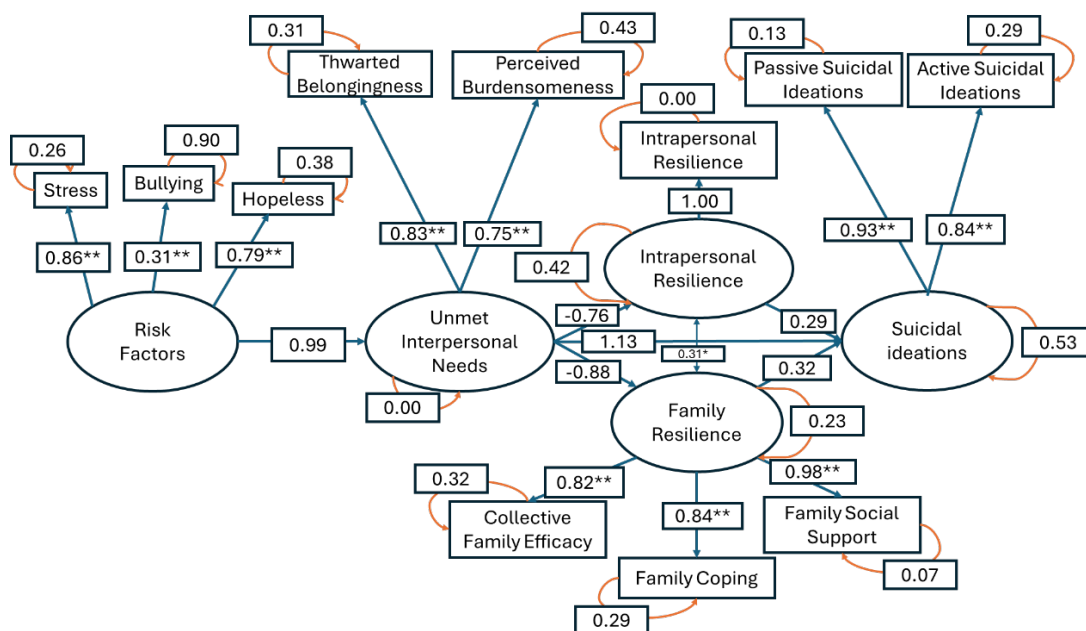
The hypothesized model displayed good fit (CFI = 0.99, TLI = 0.99, SRMR = 0.06). The chi-squared test was significant ($\chi^2 = 489.18$, $df = 55$, $p < .001$), which could be influenced by smaller sample sizes. The modification indices (LM and Wald statistics) did not show the need to add or remove pathways. Overall, this model (Figure 2) explained 46.7% of the variation for suicidal ideations. This model also explained 99.8% for unmet interpersonal needs; 77.1% for family resilience; and 58.2% for intrapersonal resilience.

No variables were significantly associated with suicidal ideations. Unmet interpersonal needs were positively correlated with suicidal ideations ($\beta = 1.13$ [95% CI: -2.88 to 3.01]).

Intrapersonal ($\beta = 0.29$ [95% CI: -0.01 to 0.53]) and family resilience ($\beta = 0.32$ [95% CI: -0.01 to 0.52]) had modest to moderate associations with suicidal ideations. Unmet interpersonal needs were strongly related to both intrapersonal ($\beta = -0.76$ [95% CI: -2.29 to 2.19]) and family resilience ($\beta = 0.88$ [95% CI: -3.58 to 3.42]). Lastly, risk factors for developing suicidal ideations were strongly correlated with unmet interpersonal needs ($\beta = 0.99$ [95% CI: -1.01 to 1.05]).

Figure 2

Structural Model for the Resiliency Model for Adolescent Suicide Prevention



Note. * $p < .05$, ** $p < .01$

While the associations of resiliencies (total indirect effect of resiliencies: $\beta = -0.50$, [95% CI: -1.35, 1.29]) on unmet interpersonal needs and suicidal ideations were not statistically significant, family ($\beta = -0.28$, [95% CI: -0.75, 0.71]; Table 7) and intrapersonal ($\beta = -0.23$, [95% CI: -0.60, 0.58]) resilience reduced the associations of unmet interpersonal needs and suicidal

ideations. The total associations (combined direct and indirect effects) of unmet interpersonal needs were also non-significant ($\beta = 0.62$, [95% CI: -1.59, 1.67]).

In contrast, the total influence of risk factors on suicidal ideations via unmet interpersonal needs and resiliencies was significant ($\beta = 0.62$, [95% CI: 0.40, 1.30]). Particularly, risk factors influenced suicidal ideations through unmet interpersonal needs ($\beta = 1.13$, [95% CI: 0.60, 2.48]). Although indirect pathways involving family resilience ($\beta = -0.28$, [95% CI: -0.96, 0.20]) and intrapersonal resilience ($\beta = -0.22$, [95% CI: -0.65, 0.03]) were not statistically significant, their inclusion did reduce the relationships between risk factors and suicidal ideations.

Table 7

Mediation Path Coefficients

Pathways	Indirect relationship	95% CI
Total associations of unmet interpersonal needs pathways to suicidal ideations	0.62, $p = .965$	-1.59, 1.67
Total indirect effect of unmet interpersonal needs to suicidal ideations via resiliencies	-0.50, $p = .965$	-1.35, 1.29
Unmet interpersonal needs-> Family resilience -> Suicidal Ideations	-0.28, $p = .965$	-0.75, 0.71
Unmet interpersonal needs-> Intrapersonal resilience -> Suicidal ideations	-0.23, $p = .965$	-0.60, 0.58
Total associations of risk factors on suicidal ideations	0.62, $p < .001$	0.40, 1.30
Risk factors -> Unmet interpersonal needs-> Suicidal ideations	1.13, $p < .001$	0.60, 2.48
Risk factors -> Unmet interpersonal needs-> Family resilience -> Suicidal ideations	-0.28, $p = .313$	-0.96, 0.20
Risk factors -> Unmet interpersonal needs-> Intrapersonal resilience -> Suicidal ideations	-0.22, $p = .078$	-0.65, 0.03

Discussion

This cross-sectional study utilized structural equation modeling to test the hypothesized mediation relationships of family and intrapersonal resiliencies on risk factors, unmet

interpersonal needs, and suicidal ideations. This study found that risk factors were significantly and indirectly related to suicidal ideations through unmet interpersonal needs. Although nonsignificant, resilience was meaningfully correlated with risk factors, unmet interpersonal needs, and suicidal ideations. However, these findings should be interpreted as indicative of relational patterns rather than causal mechanisms, given the cross-sectional nature of this data.

Similar to prior literature and the Interpersonal Theory of Suicide, findings of this study support the presence of indirect pathways linking risk factors to adolescents' suicidal ideations through unmet interpersonal needs (25-27). A novel contribution of this study involved the integration of adolescents' family and intrapersonal resiliencies within this already studied relationship. In the context of online and community-sampled high school adolescents, this study found strong negative relationships between unmet interpersonal needs and resilience. The study expands on the work by Gautam et al. showing that both forms of resilience, not just intrapersonal resilience, are negatively related to feelings of thwarted belongingness and perceived burdensomeness (56). These findings show some promise that comprehensive, multi-level resilience-based interventions may be protective against thwarted belongingness and perceived burdensomeness.

In contrast, relationships between both forms of resilience and suicidal ideations were unexpectedly positive. This occurrence may indicate a bidirectional relationship between resilience and suicidal ideations (51, 52). Although resilience can help reduce suicidal ideations, adolescents may also mobilize resilience processes as a protective mechanism in response to the presence of suicidal ideations (124, 125). One plausible explanation is compensatory activation, whereby resilience processes are mobilized in response to distress, rather than preceding it. Another possible explanation is that supportive environments developed through strong family

resilience may facilitate adolescents' willingness to disclose psychological distress and suicidal ideations. Prior literature suggests that supportive relationships increase help-seeking and disclosure of suicidal ideations, whereas social isolation is associated with non-disclosure (126, 127). Thus, the observed paradoxical positive association between social support and suicidal ideations may reflect greater disclosure of mental health symptoms when adolescents are in safe and supportive environments (127). Longitudinal testing is needed to examine the potentially reciprocal nature of resilience and suicidal ideations.

The differential associations observed between resilience and unmet interpersonal needs versus resilience and suicidal ideations indicate that unmet interpersonal needs and suicidal ideations are explicitly separate concepts with distinct functional roles, rather than interchangeable indicators of suicide risk. Unmet interpersonal needs serve as a state-like construct, which fluctuates based on adolescents' perceived interpersonal and family relationships (25-27). Conversely, suicidal ideations is a symptom of pathological cognition (128). Suicidal ideations are more episodic, fluctuating greatly over time. This conceptual distinction reinforces the importance of assessing unmet interpersonal needs and suicidal ideations concurrently, rather than as one single construct. This highlights that unmet interpersonal needs and suicidal ideations operate through different processes.

Similar to previous literature, when considering the influence of unmet interpersonal needs on suicidal ideations, high levels of intrapersonal and family resiliencies modestly decreased the relationship. The influences of both forms of resilience remained consistent with risk factors and unmet interpersonal needs on suicidal ideations. Consistent with previous literature, although resilience provides some protection against the impact of unmet interpersonal needs and risk factors on suicidal ideations, these protective effects do not completely eliminate

suicidal thoughts (6, 129, 130). This situation suggests that resilience alone may be insufficient to prevent suicidal ideation and that additional protective mechanisms against the development of adolescent suicidal ideation remain poorly understood (26).

This study found that there were moderate associations between family resilience and adolescents' intrapersonal resilience, weaker than those reported in prior studies (61, 62). The differences in the strength of these relationships may reflect variation in contextual stress exposure across samples (61, 62). Prior studies reported experiencing acute or shared stressors, such as mass casualty events, which may heighten perceived family resilience. In contrast, the present study did not assess a discrete stressful event, which may account for more modest associations. This information highlights that family resilience in relation to adolescents' intrapersonal resilience is context-dependent and still not well understood. Further research is needed to clarify how family resilience interacts with adolescents' intrapersonal resilience across varying levels of stress exposure, particularly in relation to adolescent suicide prevention.

A strength of this study was that it recruited a diverse sample of adolescents (i.e., racial and sexual and gender minorities [SGM]). This study found that White adolescents displayed higher passive suicidal ideation compared to their minority race counterparts; however, there were higher unmet interpersonal needs and passive suicidal ideations scores in SGM than non-SGM adolescents (131-133). This finding of higher passive suicidal ideation among White adolescents contrasts with nationally sampled studies indicating a higher prevalence of suicidal ideations in certain racial minority groups (Native American or Alaskan Native, Asians, and multiracial) (134-136). One plausible explanation is differential reporting influenced by social desirability bias (137), whereby racial minority adolescents may underreport suicidal ideations due to stigma or cultural norms surrounding mental health disclosure (138). In contrast, the

elevated unmet interpersonal needs and suicidal ideations observed among SGM adolescents align with the Minority Stress Model, which posits that chronic exposure to stigma and discrimination contributes to poorer mental health (131, 133). Due to limited power, subgroup analyses by racial minority and SGM status were not performed. Nevertheless, these study findings underscore the need for tailored suicide-prevention interventions based on racial and SGM characteristics.

Despite the importance of this study's findings, caution must be taken to interpret these results. First, the model is slightly under powered. Although the minimum sample size of 103 participants for achieving adequate statistical power was met, the optimal sample size for the model structure was 352. The small sample size and gender and racial imbalances influenced the model fit and generalizability of the study findings. Male adolescents and American Indian/Alaskan Native, Asian, Hispanic/Latino, and Native Hawaiian/Other Pacific Islander adolescents were under-represented. These trends were described in previous online studies, regardless of whether they focused on mental health (139-141). Future studies should oversample male and racial minority adolescents through utilizing male and racial minority-only targeted advertisements (139). Perhaps the nature of this study's recruitment attracted adolescents and parents who have interacted with mental health services. Therefore, there may be an over-representation of adolescents who reported elevated unmet interpersonal needs and suicidal ideation. Utilization of mental health treatment confounds the study results. Additionally, some measures captured observed variables (stress, bullying, hopelessness, and suicidal ideations) experienced in the *past month*, whereas other measures reflected *general or trait-level* unmet interpersonal needs and resiliencies. This temporal inconsistency may have attenuated relationships between model variables. The Cronbach's *a* for risk factors and unmet

interpersonal needs was low. When using Cronbach's α , underinflating the reliability of the subscales is a possibility because it assumes equal item-factor loads. But when taking into account McDonald's ω , composite reliability was acceptable. Because this study is cross-sectional in design, causality cannot be inferred. Longitudinal designs are needed to test mediation over time. Lastly, due to parental involvement and the use of self-report measures, there is potential for the under-reporting of suicidal ideations or unmet interpersonal needs due to selection bias or social-desirability effects.

Conclusion

To the best of the researchers' knowledge, this study is the first to evaluate the roles of family and intrapersonal resiliencies in the relationships between unmet interpersonal needs and suicidal ideations among high school adolescents. This study contributes preliminary empirical evidence that resilience operates across both individual and family contexts, rather than solely as an intrapersonal construct. Unmet interpersonal needs emerged as a strong correlate of high school adolescents' suicidal ideations; while family and intrapersonal needs demonstrated potential as important mediators between unmet interpersonal needs and suicidal ideations.

Although causal inferences cannot be drawn, the observed relational patterns provide a foundation for hypothesis-driven longitudinal and intervention research. Longitudinal studies with larger sample sizes are warranted to confirm the mediating role of resilience factors. Future efforts should oversample racial minority groups through targeted social media campaigns to increase the generalizability of these findings. With 28% of high school adolescents disclosing elevated risk for suicidal ideations, this cross-sectional study highlights the importance of continuing suicide prevention research for high school adolescents.

Declarations:

Human Ethics: This study was approved by Michigan State University Biomedical and Health Institutional Review Board (STUDY00009110). This IRB follows the ethical standards described in the Nuremberg Code (1949), the Declaration of Helsinki (1964), and the Belmont Report (1979). Furthermore, this IRB has found that this study protects the rights and welfare of human subjects and meets the requirements of MSU's Federal Wide Assurance (FWA00004556) and the federal regulations for the protection of human subjects in research (e.g., 2018 45 CFR 46, 21 CFR 50, 56, other applicable regulations).

Consent to participate: Informed assent to participate in this study was obtained from all participants (ages 13-18) in the study. Informed consent from all participants' parents were obtained prior to the start of participation. Respective participant assent and consent to publish study findings was granted to the study team.

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Author Contributions: TJN conceptualized and designed the study, recruited participants, collected and curated the data, performed statistical analyses, interpreted the findings, and wrote the original draft of the manuscript.

JL supervised the project, advised and contributed to the study design, assisted in the interpretation of the findings, and critical revision of the manuscript.

LBR, T-SAK, ACC, MH contributed to the study design, interpretation of the findings, and critical revision of the manuscript.

YG: Served as the senior consultant for this project and reviewed the manuscript.

JC and MAH assisted with participant recruitment, data collection, and data management.

All authors reviewed and approved the manuscript.

Data Availability Statement: The datasets generated during the current study are not publicly available because they contain sensitive information from minor participants. De-identified data may be available from the corresponding author on reasonable request and subject to institutional review board approval and applicable data use agreements.

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