



# Association between anger and suicidal ideation

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## Abstract

Suicide ranks among the 10 leading causes of death, with rates increasing among middle-aged adults. Anger is associated with suicide risk, but few studies have investigated this association in a primarily middle-aged sample. The present study investigated the association between state or trait anger and suicidal ideation among a national sample of 1255 middle-aged adults. Participants ( $M = 54.5$ ,  $SD = 11.7$ ; range = 34–84) were from the Midlife in the United States (MIDUS) Biomarker sub-project (2004–2009). In a multivariate model including age, sex, depression symptoms, angry temperament, and externalized anger, only angry temperament significantly predicted suicidal ideation independent of depression symptoms ( $OR = 1.13$ ,  $p = .04$ ). The associations between anger subscales and suicidal ideation were not moderated by gender or depression symptoms and were not mediated by interpersonal difficulties. Among middle-aged adults, angry temperament is associated with risk of suicidal ideation, irrespective of gender or depression symptoms. Assessing and addressing angry temperament in treatment may help decrease suicide risk.

**Keywords** State · Trait · Anger · Depression · Suicidal ideation

## Introduction

Suicide rates are increasing in the United States, especially among middle-aged adults (Hempstead & Phillips, 2015). According to the interpersonal theory of suicide, suicidal ideation arises from thwarted belongingness and perceived burdensomeness (Van Orden et al., 2010). Anger could increase suicidal behavior by eroding social support (Maan Diong et al., 2005), which may lead to increased perception of burdensomeness (Hawkins et al., 2014).

Anger has state and trait characteristics (Spielberger, 1988). Anger-related personality traits include angry temperament, which is a predisposition to experience unprovoked angry feelings and a tendency to react with anger during stressful situations (Forgays et al., 1997). State anger consists of internalized and externalized expressions of anger. There is limited literature on the association between specific types of state and trait anger and suicide risk among

adults. Findings suggest that trait anger (Ammerman et al., 2015) and internalized anger (Hirsch et al., 2012) are risk factors for suicide attempts.

The association between anger and suicide risk may also differ by gender and depression symptomatology. Depression symptoms represent an important suicide risk factor (Cukrowicz et al., 2011), and anger among males may be a symptom of depression (Addis, 2008). Thus, anger may have a stronger association with suicide risk among males than females. Daniel et al.'s (2009) adolescent study provides support for the differential associations among anger, depression, and suicide risk among males and females. Higher trait and externalized anger were associated with suicide attempts in boys irrespective of depression, whereas trait, internalized, and externalized anger were associated with suicide attempts only in girls experiencing major depression.

The present study used a national sample of middle-aged adults to investigate the association between state and trait aspects of anger and suicidal ideation and whether gender and depression symptoms moderate these associations. Findings inform suicide risk assessment and prevention, especially among middle-aged adults, the age group currently with the highest rate of suicide in the United States.

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## Methods

### Participants and Procedures

Data for the present sample were from the Midlife in the United States (MIDUS) Biomarker sub-project ( $N = 1255$  adults) (Ryff & Kessler, 2004). Participants were a national sample of community-dwelling, English-speaking American adults.

### Measures

**Center for Epidemiologic Studies Depression (CES-D; Radloff, 1977)** CES-D is a 20-item self-report measure of depression symptoms experienced during the past week ( $\alpha = .89$ ). The CES-D has four subscales: depressed affect, positive affect, somatic, and interpersonal.

**Suicidal Ideation** Suicidal ideation was assessed with a single Likert-type item from the Mood and Anxiety Symptom Questionnaire (Watson & Clark, 1991): “During the past week, including today, have you thought about death or suicide.” In the present study, suicidal ideation was dichotomized 0 = no ideation versus 1 = any ideation present (i.e., endorsed “a little bit,” “moderately,” “quite a bit,” or “extremely”) due to high (87.5%) endorsement of no ideation, resulting in a heavily skewed distribution.

**State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988)** STAXI is a self-report measure of trait and state anger expression. Trait subscales, representing dispositions toward Angry Temperament ( $\alpha = .83$ ) and Angry Reaction ( $\alpha = .73$ ), consisted of four items each. State subscales Anger-Out (externalized;  $\alpha = .77$ ) and Anger-In (internalized;  $\alpha = .82$ ) consisted of eight items each. Item responses ranged from 1 (almost never) to 4 (almost always). Higher scores indicate greater anger.

### Data Analytic Plan

The Biomarkers sample consisted of 1255 participants, 6 of whom were siblings and 388 were twins. Generalized estimating equation (GEE) models were used to account for clustering of familial relations that may confound findings due to shared genetic and environmental influences that cluster within families (Schwartz, 2017). The variable included to account for clustering was family relationship coded dichotomously (no relation,  $N = 861$  versus related sibling/twin,  $N = 388$ ). Analyses with few clusters may have higher rates of type I error (Huang, 2021). Therefore, consistent with methods used in past MIDUS studies (Schwartz,

2017), analyses were rerun with a cluster variable of family household consisting of 897 clusters, of which 304 individuals (152 clusters) were from the same household/clusters. Separate GEE models investigated whether each anger subscale predicts suicidal ideation controlling for age, gender, and depression. Gender and depression symptoms were then tested as moderators, and CES-D interpersonal subscale was tested as mediator of any significant associations between anger subscale and suicidal ideation. The anger subscales that were significantly associated with suicidal ideation in their separate respective univariate models were entered into a single multivariate GEE model simultaneously to predict suicidal ideation, controlling for covariates. The independent variables had less than 5% missing; data were imputed using Expectation-Maximization.

## Results

The sample was primarily Caucasian (77.9%), middle-aged ( $M = 54.5$ ,  $SD = 11.7$ ), and female (56.8%). The majority were college educated (72% attended some college) and employed (54.1%). Suicidal ideation was endorsed by 151 participants (12.1%), and rates did not significantly differ by family relationship ( $p = .07$ ). Table 1 presents additional clinical information.

Depression symptoms demonstrated correlations with both trait and state anger subscales (Table 2). Correlations did not substantially differ when analyzed separately by gender.

Anger-Out and Angry Temperament were significantly associated with suicidal ideation in separate univariate models (OR = 1.07, 95% CI: 1.01–1.13,  $p = .01$ ; OR = 1.16, 95% CI: 1.05–1.25,  $p = .003$ , respectively). Four separate follow-up moderation models were conducted: Anger-Out by gender, Anger-Out by depression, Angry Temperament by gender, and Angry Temperament by depression interactions, none of which were significant ( $p > .05$  for all). In separate models, CES-D interpersonal subscale did not mediate the relation between Anger-Out and suicidal ideation or Angry Temperament and suicidal ideation ( $p > .05$  for

**Table 1** Sample descriptives

Clinical Measures	Sample <i>M(SD)</i>	Ideation present <i>M(SD)</i>	Ideation absent <i>M(SD)</i>
CES-D	8.73(8.19)	16.87(11.48)	7.56(6.82)
Anger-In	14.65(4.16)	17.05(4.90)	14.30(3.91)
Anger-Out	12.91(3.30)	14.13(3.68)	12.72(3.19)
Angry Temperament	5.15(1.72)	6.04(2.29)	5.01(1.57)
Angry Reaction	7.63(2.38)	8.63(2.67)	7.49(2.31)

CES-D = Center for Epidemiologic Studies Depression Scale

**Table 2** Depression symptoms by anger type

	Gender	Suicidal Ideation	Depression Symptoms	Anger-In	Anger-Out	Angry Temperament	Angry Reaction
Gender	1						
Suicidal Ideation	.03	1					
Depression Symptoms	-.05	.37**	1				
Anger-In	.04	.22**	.46**	1			
Anger-Out	-.02	.14**	.23**	.26**	1		
Angry Temperament	.02	.20**	.31**	.29**	.59**	1	
Angry Reaction	-.03	.16**	.29**	.45**	.34**	.31**	1

\*\* =  $p < .01$ ; Pearson correlations analyzed continuous variables, point biserial correlations analyzed dichotomous variables gender and suicidal ideation; Suicidal Ideation = Mood and Anxiety Symptom Questionnaire suicide item; Depression Symptoms = Center for Epidemiologic Studies Depression Scale. The results of the GEE models indicated that neither Anger-In (OR = 1.05, 95% CI: .99–1.09,  $p = .07$ ) nor Angry Reaction (OR = 1.07, 95% CI: .99–1.16,  $p = .07$ ) were significantly associated with suicidal ideation.

all). As Anger-Out and Angry Temperament were significant predictors in separate univariate GEE models, both variables were incorporated into a single multivariate GEE model predicting suicidal ideation. When entered into the multivariate model simultaneously, controlling for age, gender, and depression, Angry Temperament remained significant (OR 1.13, 95%CI: 1.01–1.26,  $p = .04$ ) however Anger Out was no longer significant (OR 1.03, 95%CI: .97–1.09,  $p = .39$ ).

Lastly, Anger-Out did not interact with Angry Temperament to predict suicidal ideation ( $p = .93$ ). Findings were consistent when using a cluster variable of family household instead of family relationship.

## Discussion

The present study investigated the association between state and trait anger and suicidal ideation in a national sample of middle-aged adults. Both state externalized anger and trait angry temperament separately predicted suicidal ideation in separate univariate models. However, in a single multivariate model incorporating both externalized anger and angry temperament as simultaneous predictors, only angry temperament remained significant in predicting suicidal ideation. Trait angry temperament may be more impactful given its chronic nature compared to state externalized anger's transient nature. Research has also shown that trait angry temperament is associated with avoidance coping strategies (Ferrer et al., 2010), that individuals with angry temperament are more likely to experience emotion dysregulation and subsequent self-harm (Blasco-Fontecilla et al., 2014), and that angry temperament and impulsivity are highly correlated with suicidal behavior (Gvion & Apter, 2011). Future research should consider these correlates of trait angry temperament as possible mediators in its association with suicidal ideation.

The interpersonal theory of suicide states that suicidal ideation arises from feelings of burdensomeness and lack of belonging (Van Orden et al., 2010). Outward expression of anger and having an angry temperament may be socially damaging, potentially leading to poorer social relations and greater perception of burdensomeness and thwarted belongingness (Hawkins et al., 2014). The interpersonal subscale of the CES-D did not mediate associations between anger and suicidal ideation. However, this two-item subscale is limited in measuring social support and does not assess burdensomeness. Future studies should investigate whether social support, burdensomeness, and belongingness mediate the association between anger and suicidal ideation using comprehensive measures of these constructs.

Neither externalized anger nor angry temperament were moderated by depression symptoms or gender, suggesting that, in middle-aged adults, they are risk factors for suicidal ideation irrespective of gender and depression symptom severity. Future studies may investigate whether assessing and addressing anger in treatment decreases suicide risk among high-risk individuals.

Several limitations are important to note. First, the measure of suicidal ideation was only one item and conflated passive and active suicidal ideation, and the majority of the sample did not endorse any ideation. The study included a disproportionate number of Caucasian participants. The GEE analysis clustering familial relations based on the dichotomous family relationship variable (related vs non-related) may have increased risk for type I error due to low number of clusters (Huang, 2021). Lastly, the cross-sectional design precludes drawing conclusions regarding causation or temporal precedence.

Nonetheless, this was the first study to investigate the association between types of anger and suicidal ideation in middle-aged adults and whether these associations were moderated by depression symptoms or gender. In summary, outward expression of anger and an overall angry disposition

were significantly associated with suicidal ideation independent of gender and depression symptom severity.

**Data Availability** The datasets generated during and/or analyzed during the current study are available in the Midlife in the United States (MIDUS) repository, <https://www.midus.wisc.edu/data/index.php>

## Declarations

**Declaration of Interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

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**Informed Consent** Informed consent was obtained from all individual participants included in the MIDUS study.

**Ethics Approval** This retrospective chart review study involving human participants was in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The Human Investigation Committee (IRB) of West Virginia University approved this study.

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