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Social anxiety and non-suicidal self-injury in college students: Loneliness mediation and positive coping moderation

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Abstract: We examined positive coping styles and loneliness effects on the relationship between social anxiety and non-suicidal self-injury (NSSI) behaviors among young adults. A sample of 1129 Chinese college students (females = 42.52%; mean age = 20.00 years, SD = 1.61 years; 53.32% from rural areas) completed the Chinese Revised Social Anxiety Scale for Adolescents (SAS-A), the UCLA Loneliness Scale (ULS-6), the Simplified Coping Style Questionnaire (SCSQ), and the Adolescent Non-suicidal Self-injury Assessment Questionnaire (ANSSIAQ). Controlling for gender, age, onlychild status, and residence, regression analysis revealed that social anxiety is associated with higher levels of NSSI behaviors. Loneliness mediated this relationship, making it more pronounced. Positive coping styles moderated the effect of social anxiety on loneliness. Specifically, high levels of positive coping attenuated the social anxiety effect on loneliness. This study affirms Nock's integrated theoretical model of NSSI, demonstrating that social anxiety (an interpersonal vulnerability factor) and limited positive coping (an intrapersonal vulnerability factor) are significant predictors of NSSI. By implication, college student counselors should provide developmental activities for reducing social anxiety in students, thereby lowering their risk for loneliness and NSSI.

Keywords: social anxiety; NSSI; loneliness; positive coping

Introduction

Social anxiety is a prevalent emotion in interpersonal scenarios and has been shown to be associated with an increased risk for self-injury (Morrison & Heimberg, 2013; Wang et al., 2023), particularly with a sense of loneliness (McClelland et al., 2021). However, the outcomes can vary depending on how stress is managed through coping behaviors (Taylor et al., 2018).

College students are vulnerable partly due to the stressors associated with emerging adulthood, including the transition from high school to university and from adolescence to adulthood (Aldiabat et al., 2014). Some may engage in self-injury as a way of negative coping. Non-suicidal self-injury (NSSI) refers to the direct and deliberate destruction of one's own body tissue without lethal intent (Nock, 2010). NSSI has been listed in the DSM-5 and is known to predict future psychiatric disorders and suicide attempts (Kiekens et al., 2023a). It is a growing public health concern, especially among individuals aged 20–24, who have the second-highest prevalence after adolescents (Gandhi et al., 2018). A survey of first-year students from nine countries reported a 17.7% lifetime prevalence of NSSI (Kiekens et al., 2023b). However, how and which social anxiety characteristics predict self-injury may depend on the cultural context, and few studies have been conducted in collectivist cultures. This study aimed to examine the relationship between social anxiety and self-injury risk within collectivistic Chinese culture.

Social anxiety and NSSI

Social anxiety is the uneasiness, nervousness, or fear experienced in the presence of others (Schlenker & Leary, 1982). It is a common human experience that exists on a continuum (McNeil, 2001), with severe impairment of social functioning developing into social anxiety disorder (Morrison & Heimberg, 2013). Social anxiety can lead to serious consequences, such as suicide and self-injury (Buckner et al., 2017; Holt-Lunstad et al., 2015). For example, a large-scale survey of 20,130 adults found that individuals with generalized anxiety disorder and social anxiety disorder are more likely to engage in NSSI and suicide attempts compared to those with other anxiety disorders (Chartrand et al., 2012). Moreover, research by Zou et al. (2024) indicates that social anxiety among college students is linked to NSSI, and a study by Tatnell et al. (2024) shows that reductions in social anxiety are associated with decreases in NSSI.

Mediating role of loneliness

Loneliness is an emotional state in which individuals feel disconnected from others due to unmet personal needs

(Copel, 1988). Loneliness is different from social isolation. Loneliness refers to the subjective perception of lacking a desired social network or companionship, whereas social isolation is the objective lack or paucity of social contacts and interactions with other persons (Valtorta & Hanratty, 2012). Loneliness is strongly associated with social anxiety (Maes et al., 2019). The experience of loneliness is unpleasant and painful (Younger, 1995), and it is linked to an increased risk of depression, anxiety, suicide, and even mortality (Moeller & Seehuus, 2019; McClelland et al., 2020; Holt-Lunstad et al., 2015). Interestingly, a recent five-year longitudinal study found that while social anxiety predicts loneliness, loneliness does not significantly predict social anxiety (Reinwarth et al., 2024), suggesting a need for further studies. Loneliness has also been identified as a potential risk factor for NSSI (Costa et al., 2021; Tang et al., 2018). Social anxiety represents an interpersonal vulnerability factor, while loneliness is a highly aversive intrapersonal emotion. However, how these two factors jointly influence NSSI among college students remains unclear.

The moderating role of positive coping

Coping styles refer to the actions individuals take to manage stressful events and maintain well-being (Folkman & Lazarus, 1986). Positive coping can effectively reduce social anxiety (Li, 2020) and lessen feelings of loneliness (Dong et al., 2023), which may, in turn, reduce the risk of NSSI (Castro & Kirchner, 2018; Wu & Liu, 2019).

However, the role of positive coping in relation to NSSI remains inconclusive. One study of Chinese college students suggested that positive coping acts as a protective factor against NSSI (Wu & Liu, 2019). In contrast, another study found no significant difference in the use of positive coping between adolescents with and without a history of NSSI, although those with a history of NSSI were more likely to use negative coping (Giordano et al., 2022). Surprisingly, a study of American college students found that those who engaged in NSSI reported using more positive coping than those who did not (Trepal et al., 2015). However, little is known about whether positive coping can buffer the effects of social anxiety (an interpersonal vulnerability factor) and loneliness (an intrapersonal aversive emotion) on NSSI among college students.

Theoretical foundations

According to Nock's integrated theoretical model of NSSI (Nock, 2009), interpersonal vulnerability factors—such as poor communication skills and inadequate social problem-solving—can lead to NSSI. Social anxiety falls within this category of interpersonal vulnerability factors. The integrated theoretical model of NSSI (Nock, 2009) would lead to the expectation that high aversive emotions and interpersonal vulnerabilities, combined with an inability to cope or the use of poor coping styles, may lead individuals to engage in NSSI as a temporary means of stress regulation. These theoretical propositions warrant examination in collectivist cultural contexts.

The Chinese context

Chinese society is characterized by collectivist values and Confucian principles that emphasize interpersonal harmony (Huang, 2024). However, rapid modernization has prompted a shift toward individualization, creating a context of cultural dissonance for contemporary college students (Yan, 2010). This unique socio-cultural context is associated with heightened psychological challenges. Research indicates that collectivist orientations may intensify the impact of loneliness on adverse health outcomes (Lee et al., 2021), while cultural dimensions also moderate the relationship between loneliness and social anxiety among adolescents (Wang et al., 2024).

Structural factors such as the urban-rural divide and the legacy of the One-Child Policy (OCP) further compound these challenges. Urban areas have a significantly higher proportion of only-child families (64.95%) compared to rural regions (9.80%) (Lee, 2012). While only children often receive more familial support, they may lack opportunities to develop coping skills for social adversity, increasing their vulnerability to social anxiety and NSSI (Cameron et al., 2013; Huang et al., 2022). Conversely, rural students often experience social defeat and struggle to adapt to urban college life, potentially exacerbating loneliness.

When facing these combined socio-cultural and psychological pressures—namely, social anxiety and loneliness—individual coping styles become crucial. However, the role of positive coping within the Chinese context appears complex and, at times, paradoxical. Although typically associated with better mental health (Meng et al., 2011) and reduced loneliness (Zhang et al., 2021), positive coping has paradoxically been linked to elevated NSSI risk among rural adolescents (Zhou et al., 2022), underscoring the need for context-specific investigations.

Given the high prevalence of NSSI among Chinese college students (11.8%; Qu et al., 2023), it is essential to examine, within the Chinese context, how social anxiety and loneliness influence NSSI and how positive coping may moderate these relationships.

Goal of the Study

Grounded in Nock's (2009) integrated theoretical model of NSSI, this study seeks to develop a moderated mediation model to explore the impact and mechanisms of social anxiety on NSSI among college students. Based on this conceptual framework, the following hypotheses were tested (see Figure 1 for the conceptual model):

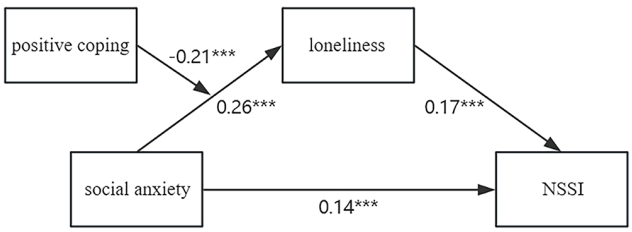

Figure 1. A simple mediation model showing the effects of social anxiety on NSSI via loneliness. *Note*. ***$p < 0.001$.

Hypothesis 1: College students with elevated social anxiety are at an increased risk of engaging in NSSI.

Hypothesis 2: Loneliness mediates the relationship between social anxiety and NSSI, such that higher social anxiety increases loneliness, which in turn increases NSSI risk.

Hypothesis 3: Positive coping moderates the mediating pathway from social anxiety to NSSI through loneliness, such that the indirect effect is weaker among students with higher levels of positive coping.

Methods

Participants and setting

A total of 1129 college students from three universities in China participated in the study. The participants' ages ranged from 18 to 25 years (M = 20.00, SD = 1.61). Of the participants, 480 were female (42.52%); 414 were only children (36.67%), and 715 had siblings (63.33%). Regarding residence, 602 students were from rural areas (53.32%), and 527 were from urban areas (46.68%).

Measures

Social anxiety

Social anxiety was assessed using the 12-item Social Anxiety Scale for Adolescents (SAS-A; Benner & Graham, 2009; Sun et al., 2017). An example item is: "I worry about what others think of me." The scale uses a 5-point Likert rating scale ranging from 1 (not at all) to 5 (all the time), with higher scores indicating greater social anxiety. In this study, the Cronbach's α coefficient for SAS-A was 0.96.

Loneliness

Loneliness was measured using the 6-item UCLA Loneliness Scale (ULS-6; Hudiyana et al., 2022; Xiao & Du, 2023). An example item is: "I lack companionship." The scale uses a 4-point Likert rating scale ranging from 1 (never) to 4 (always), with higher scores indicating stronger feelings of loneliness. In this study, the UCLA scale scores achieved a Cronbach's α coefficient of 0.95.

Positive coping

The Simplified Coping Style Questionnaire (SCSQ; Xie, 1998) consists of 20 items, including a Positive Coping subscale (12 items) and a Negative Coping subscale (8 items). Only the Positive Coping subscale was used in this study to measure positive coping styles among college students. An example item is: "Escape through work, study, or other activities." The scale uses a 4-point Likert rating scale ranging from 0 (never use) to 4 (always use), with higher scores reflecting a greater tendency to use positive coping when dealing with stress. In this study, the Cronbach's α for the Positive Coping subscale was 0.93.

Non-Suicidal Self-Injury (NSSI)

The Adolescent Non-suicidal Self-injury Assessment Questionnaire (ANSSIAQ; Wan et al., 2018) consists of 12 items, each representing a different type of NSSI behavior. An example item is: "Deliberately pinched yourself." Each item is rated on a five-point scale from 0 (never) to 4 (always), with higher scores indicating more frequent engagement in NSSI. In this study, the Cronbach's α for the ANSSIAQ was 0.86.

Control variables

Prior research suggests that sex, age, only-child status, and type of residence may influence NNSI (Han et al., 2017). Therefore, these variables were included as controls. Variables were coded as follows: sex (1 = male, 2 = female), only-child status (1 = only child, 2 = has siblings), and residence (1 = rural, 2 = urban).

Procedure

This study was approved by the Ethics Committee of Shanghai Normal University (Approval No. 2025-005). All participants provided informed consent, and confidentiality was strictly maintained. Participation was voluntary, and data were collected anonymously through an online survey platform (wjx.cn).

Data analysis

Data analysis was performed using IBM SPSS Statistics 26.0. First, Harman's one-factor test was conducted to assess common method bias. The results revealed six factors with eigenvalues greater than 1, and the first factor accounted for 34.20% of the total variance, below the 40% threshold, indicating no serious common method bias. Next, multicollinearity was assessed. The variance inflation factor (VIF) values for all predictor variables ranged from 1.19 to 1.50, well below the threshold of 5, and tolerance values ranged from 0.67 to 0.85, above the 0.20 threshold, indicating no multicollinearity concerns.

Following Hayes (2013), the SPSS macro PROCESS (Model 4) was used to test the mediating role of loneliness in the relationship between social anxiety and NSSI, controlling for gender, age, only-child status, and residence. The mediation effect of loneliness was examined using a non-parametric percentile bootstrap method (N = 5000, 95% CI) and Model 4 of the PROCESS macro (Hayes, 2013). Also, using the SPSS macro program PROCESS (Model 7), the moderated mediating role of positive coping and loneliness was tested while controlling for gender, age, only-child status, and residence (Hayes, 2013).

Results

Descriptive statistics and correlation analysis

Table 1 presents the statistical measures of the study's correlated variables, including the means, standard deviations, and Pearson's correlation coefficients. The results showed that social anxiety was significantly and positively correlated with NSSI ($r = 0.46$, $p < 0.001$) and loneliness ($r = 0.53$, $p < 0.001$), but significantly and negatively correlated with positive coping ($r = -0.31$, $p < 0.001$). Loneliness was also significantly and positively correlated with NSSI ($r = 0.53$, $p < 0.001$). Furthermore, positive coping was significantly and negatively correlated with both NSSI ($r = -0.38$, $p < 0.001$) and loneliness ($r = -0.38$, $p < 0.001$).

Table 1. Descriptive statistics and correlation analysis (N = 1129)

No.	Variable	*M*	*SD*	1	2	3
1	Social anxiety	2.03	0.90			
2	NSSI	0.07	0.28	0.46***		
3	Loneliness	1.41	0.64	0.53***	0.53***	
4	Positive coping	3.03	0.72	−0.31***	−0.38***	−0.38***

Note. ***$p < 0.001$.

Table 2. Results of regression analysis

Regression equation		Regression coefficients				
Dependent variable	**Independent variable**	R^2	*β*	*t*	*LL*	*UL*
NSSI	Sex	0.26	−0.17	−8.62***	−0.21	−0.13
	Age		0.00	0.91	−0.00	0.01
	Only child		−0.03	−2.11*	−0.06	−0.00
	Resident		0.01	0.55	−0.02	0.04
	Social anxiety		0.21	18.98***	0.18	0.23
Loneliness	Sex	0.40	0.02	0.58	−0.06	0.11
	Age		−0.02	−2.15*	−0.04	−0.00
	Only child		−0.03	−0.93	−0.09	0.03
	Resident		−0.00	−0.14	−0.06	0.06
	Social anxiety		0.26	10.77***	0.21	0.31
	Positive coping		−0.22	−10.07***	−0.27	−0.18
	Social anxiety× Positive coping		−0.21	−10.84***	−0.25	−0.17
NSSI	Sex	0.37	−0.16	−8.55***	−0.19	−0.12
	Age		0.01	1.64	−0.00	0.02
	Only child		−0.03	−1.84	−0.05	0.00
	Resident		0.00	0.26	−0.02	0.03
	Social anxiety		0.14	12.16***	0.11	0.16
	Loneliness		0.17	13.93***	0.15	0.20

Note. *$p < 0.05$; ***$p < 0.001$; LL = low limit, UL = upper limit.

Social anxiety effects on NSSI

The regression analysis results are shown in Table 2. After controlling for gender, age, only-child status, and residence, social anxiety significantly and positively predicted NSSI ($\beta = 0.21$, $p < 0.001$), supporting Hypothesis 1.

Mediation effect of loneliness

The results revealed that social anxiety significantly and positively predicted loneliness ($\beta = 0.41$, $p < 0.001$, 95% CI [0.36, 0.45]). When both social anxiety and loneliness were entered into the regression equation, loneliness significantly and positively predicted NSSI ($\beta = 0.17$, $p < 0.001$, 95% CI [0.15, 0.20]), and social anxiety remained a significant predictor ($\beta = 0.14$, $p < 0.001$, 95% CI [0.11, 0.16]). These findings indicate a partial mediating effect. The indirect effect of social anxiety on NSSI through loneliness was $\beta = 0.07$, 95% CI [0.00, 0.11], accounting for 33.87% of the total effect. Therefore, Hypothesis 2 was supported.

Moderated mediation effect of positive coping

The results showed that social anxiety positively predicted loneliness ($\beta = 0.26$, $p < 0.001$, 95% CI [0.21, 0.31]), and the interaction between positive coping and social anxiety was significant ($\beta = -0.21$, $p < 0.001$, 95% CI [−0.25, −0.17]). The main effect of loneliness on NSSI remained significant when all variables were included in the regression equation ($\beta = 0.17$, $p < 0.001$, 95% CI [0.15, 0.20]). These results suggest that positive coping moderates the first stage of the mediation pathway, influencing the strength of the relationship between social anxiety and loneliness. Thus, Hypothesis 3 was supported.

To further examine the moderating effect, a simple slopes analysis was conducted by dividing participants into high and low positive coping groups based on their positive coping scores. As shown in Figure 2, social anxiety significantly predicted loneliness among participants with low positive coping ($\beta = 0.41$, $t = 17.18$, $p < 0.001$). In contrast, for participants with high positive coping, this relationship was weaker but remained significant ($\beta = 0.11$, $t = 3.56$, $p < 0.01$).

As shown in Table 3, for the low positive coping group, social anxiety significantly influenced NSSI through loneliness ($\beta = 0.07$, 95% CI [0.05, 0.09]). For the high positive coping group, the indirect effect was smaller ($\beta = 0.02$, 95% CI [0.01, 0.03]). The difference in the indirect effects between the two groups was significant, with a difference coefficient of −0.04 (95% CI [−0.05,

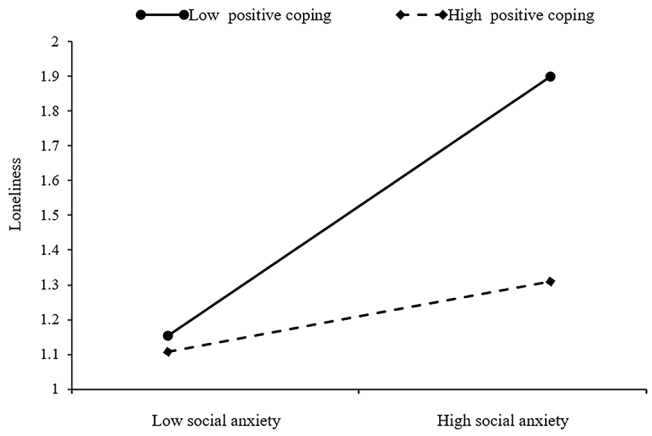

Figure 2. Analysis of the moderating effect of positive cope

−0.02]), confirming the moderated mediation effect and further supporting Hypothesis 3.

Discussion

This study found social anxiety to significantly and positively predict NSSI in college students. Both the direct and indirect effects were highly significant. Findings are consistent with Nock's (2009) integrated theoretical model of NSSI and previous research (Nock, 2009; Wang et al., 2023; Zou et al., 2024). For instance, a large-scale survey of 2717 Chinese university students confirmed the positive correlation between social anxiety and NSSI (Zou et al., 2024). In college environments, where students are constantly surrounded by peers, negative societal biases against NSSI can make those who engage in NSSI more self-conscious and hypervigilant during social interactions (Burke et al., 2019). This heightened awareness, both physical and emotional, can exacerbate social anxiety, thereby strengthening the link between social anxiety and NSSI.

This study found loneliness to mediate the relationship between social anxiety and NSSI among college students. This finding supports Nock's integrated theoretical model of NSSI and aligns with previous research (Nock, 2009; Reinwarth et al., 2024; Wang et al., 2023; Costa et al., 2021; McClelland et al., 2021). For instance, loneliness is associated with a sense of being physically and psychologically "helpless," which further increases the likelihood of NSSI. College students are particularly susceptible to feelings of loneliness (Qualter et al., 2015). Within Chinese culture, which emphasizes harmony, interdependence, and collective belonging (Huang, 2024), loneliness is not merely an emotional experience but may also be perceived as a failure in social adaptation and an absence of identity integration, thereby amplifying its detrimental effects and association with NSSI (Beller & Wagner, 2020). For individuals with pre-existing social anxiety, who are already fearful of negative evaluation (Villarosa-Hurlocker et al., 2018), the collective cultural expectation to conform may lead them to be viewed as incompetent if they fail to meet the core cultural ideal of sociability (Hu et al., 2024). Such experiences can intensify feelings of frustration and worthlessness, prompting avoidance behaviors that worsen loneliness. This cycle reinforces both interpersonal (social anxiety) and intrapersonal (loneliness) vulnerabilities as outlined in Nock's (2009) model, ultimately elevating NSSI risk.

The results also revealed that positive coping moderated the first stage of the mediating pathway (social anxiety → loneliness → NSSI). Specifically, students with high levels of positive coping experience a weaker effect of social anxiety on loneliness compared to those with low levels of positive coping. This finding suggests that positive coping buffers the impact of social anxiety on loneliness among college students, a finding consistent with previous research (Zhang et al., 2021; Li, 2020; Dong et al., 2023). Without positive coping, discrepancies between social relationship expectations and lived experiences can widen, contributing to chronic loneliness (Van Buskirk & Duke, 1991). When individuals adopt positive coping strategies, such as proactive problem-solving or seeking support, collectivist cultures can provide a robust social support environment for such strategies. In collectivist contexts like China, stress coping is often viewed as a shared responsibility, and family and social networks are expected to provide emotional and instrumental support (Taylor et al., 2004). However, collectivist norms emphasizing restraint and indirect communication can sometimes inhibit help-seeking behaviors (Kim et al., 2008). Nevertheless, against the backdrop of increasing individualization and the growing prominence of the one-child generation, more Chinese college students are beginning to actively express psychological needs or seek support (Zhu et al., 2015). Positive coping may therefore enable students to mobilize collective resources, such as family and peer support, to alleviate the helplessness and loneliness triggered by social anxiety.

Implications for students' counseling and development practice

Our study findings suggest a need for college mental health professionals to prioritize teaching positive coping to help alleviate the impact of negative emotions on NSSI. Specifically, College mental health education programs could focus on enhancing interpersonal skills as a starting point, enabling students to better manage social

Table 3. Results of moderating effect analysis

	Social anxiety → Loneliness → NSSI			
	Indirect effect	**SE**	**95% CI**	
Low positive coping (M – 1 SD)	0.07	0.01	0.05	0.09
positive coping (M)	0.04	0.01	0.03	0.06
High positive coping (M + 1 SD)	0.02	0.01	0.01	0.03

anxiety, reduce loneliness, and ultimately decrease NSSI. Moreover, college students should be recognized as a high-risk population for NSSI. NSSI serves both intrapersonal functions (e.g., emotion regulation, avoidance of aversive emotions, self-punishment) and interpersonal functions (e.g., communication pain, influencing others, or seeking support) (Nock & Prinstein, 2005; Klonsky & Glenn, 2009).

For students experiencing social anxiety, consciously increasing the use of positive coping can help reduce the loneliness associated with social anxiety, thereby weakening its impact on NSSI.

Limitations and future recommendations

Social anxiety, loneliness, and NSSI exhibit dynamic changes over time. The cross-sectional design employed in this study limits the ability to assess these variables dynamically. Future research should employ longitudinal or diary study designs to assess these variables more dynamically and clarify their temporal relationships. Second, positive coping is multidimensional, and state social anxiety often varies across situations. While this study examined the overall effect, future research should differentiate between coping types (e.g., problem-focused vs. emotion-focused) to identify the most effective forms of intervention. Finally, although this study focused on loneliness as a highly aversive emotion, other emotional and interpersonal factors—such as depression or social self-efficacy—should be explored in future studies to provide a more comprehensive understanding of NSSI mechanisms among college students.

Conclusion

In conclusion, social anxiety emerged as a significant predictor of NSSI among college students. Loneliness mediates the relationship between social anxiety and NSSI. Positive coping moderates the first stage of the mediation pathway (social anxiety → loneliness → NSSI). Specifically, students with high levels of positive coping show a weaker predictive effect of social anxiety on loneliness compared to those with lower levels of positive coping, indicating a buffering effect of positive coping.

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Availability of Data and Materials: The data that support the findings of this study are available from the corresponding author, Wenqin Chen, upon reasonable request.

Ethics Approval: This study was reviewed and approved by the Ethics Committee of Shanghai Normal University (Approval No. 2025-005), and was conducted in strict accordance with the Declaration of Helsinki.

Informed Consent: Informed consent was obtained from all participants included in the study.

Conflicts of Interest: The authors declare no conflicts of interest to report regarding the present study.

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