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Original Article

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Efficacy of a Cognitive Stress Management Intervention for International Students

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Abstract: *Background:* Several studies reported high rates of acculturative stress and mental health issues among international students. *Aims*: The aim of the study was to investigate the feasibility and efficacy of a cognitive stress management intervention for international students. *Method:* Thirty-four international students (intervention group: *n* = 17, control group: *n* = 17) participated in a 4-week group-based face-to-face intervention. Cognitive strategies, mental health, acculturative stress, self-efficacy, and well-being were assessed at pre- and postintervention. Intervention effects were analyzed using repeated measures (MANOVA, ANOVA). *Results:* The intervention group was very satisfied with the training content and the training condition. At postintervention, the intervention group yielded significant improvements in cognitive strategies (acceptance, reappraisal), mental health (anxiety, depression), self-efficacy, and well-being compared to the control group. Moderate to large effect sizes were observed for these outcomes. However, there was no improvement in acculturative stress. *Limitations*: Most of the sample were female international students, the sample size was small, and no follow-up data were collected. *Conclusion:* Cognitive strategies in stress management trainings appear effective in enhancing coping skills and improving health outcomes among international students. Universities should therefore recognize the high prevalence of stress and mental health challenges in this population and offer accessible, low-threshold stress management interventions.

Keywords: international students, stress management, RCT, mental health, coping

Germany is a popular destination for international students (UNESCO's Institute for Statistics., 2024). The present study defines international students as students who obtained their university entrance qualification abroad and are enrolled in a full degree program at a university in Germany, excluding short-term exchange students (e.g., Erasmus). In the academic year 2023/24, their number increased to 379,939, accounting for 13% of all students in Germany (DAAD & DZHW, 2025). Most of these students came from India, China, and Turkey, followed by international students from Austria and Iran (DAAD & DZHW, 2025). However, international students face many challenges and barriers in academic study and social life. Several studies found that these students are confronted with language barriers, homesickness, financial problems, and adjustments to the academic system and the new culture (e.g., Gold, 2016; Ma, 2020; Wilton & Constantine, 2003). These challenges can lead to experiences of acculturative stress, which refers to the effects of several psychological and behavioral stressors that international students experience when living in another culture (Berry, 2006). In a study by Musheer et al. (2019), 78.5% of the new international students in Malaysia experienced a moderate level of acculturative stress, whereas 12.1% reported high acculturative stress. Various studies have shown that high levels of acculturative stress is related to greater anxious and depressive symptoms (e.g., Gebregergis, 2018; Li et al., 2019; Nguyen et al., 2019). High rates of anxiety and depression have been found among international students in different countries (e.g., Forbes-Mewett & Sawyer, 2016; Idemudia & Karing, 2026; Koppenborg et al., 2024; Razgulin et al., 2023). In a study with international students in the Netherlands, Koppenborg et al. (2024) found that 32.6% of these students showed a moderate-to-severe level of anxiety and 33.7% showed a moderate-to-severe level of depression. A study with international students in Germany found that 46.5% of the international students reported a clinically relevant depression and 46.8% showed a clinically relevant anxiety (Karing & Idemudia, 2026). Higher rates of depression were reported among international students in Lithuania (59%; Razgulin et al., 2023). In contrast, studies with domestic students in Germany reported lower rates of depression and anxiety (Kohls et al., 2023: 35.5% depression; Schaller & Karing, 2024: 32% depression, 29% anxiety). Importantly,

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these mental health issues can lead to lower academic achievement and study satisfaction, and may heighten the risk of drop-out (e.g., Litmanen et al., 2014; Stallman, 2010).

Cognitive Strategies, Acculturative Stress, and Mental Health Issues

Drawing on the transactional theory of stress and coping (Lazarus & Folkman, 1984) and the acculturative stress theory (Berry, 2006), cognitive strategies are central to stress-related outcomes, such as acculturative stress and mental health problems. According to Lazarus and Folkman's transactional stress model (1984), emotional responses to stress (e.g., depression, anxiety) depend on individuals' cognitive appraisal of a situation and their available coping resources. Various cognitive strategies have been identified to cope with stressful situations, including reappraisal (reframing one's thoughts), acceptance (acknowledging a situation and its associated feelings), positive self-instruction (deliberate positive self-talk to manage stress), avoidance (attempting to ignore or withdraw from a stressor) and emotional suppression (e.g., attempting to reduce unwanted emotional experience or conceal emotions for others; e.g., Hermann et al., 2014; Izadpanah et al., 2019). Empirical evidence supports the relevance of these strategies. Meta-analytic evidence indicated that reappraisal was associated with fewer mental health problems (e.g., anxiety, depression, stress) and greater well-being (e.g., life satisfaction), whereas expressive suppression was linked to poorer mental health (Hu et al., 2014; Riepenhausen et al., 2022). Moreover, reappraisal moderated the relationship between stressor exposure and negative health outcomes, showing particularly protective effects under high levels of stress (Riepenhausen et al., 2022). Interventional studies further reported that increases in reappraisal mediated reductions in negative health outcomes (e.g., depression, stress; Doré et al., 2017; Garland et al., 2011). Among international students, rumination was positively associated with acculturative stress and negatively with well-being, whereas acceptance and reappraisal showed the opposite pattern (Awasthi et al., 2022). Similarly, avoidance was linked to greater mental health problems in student samples, whereas positive self-instruction was associated with greater well-being (e.g., Gustems-Carnicer & Calderón, 2013; Homann & Ehmke, 2025; Le Vigouroux et al., 2021). In the present study, cognitive strategies were distinguished as adaptive (reappraisal, acceptance, positive self-instruction) and maladaptive (avoidance, expressive suppression, and experience suppression).

Beyond specific cognitive strategies, self-efficacy, defined as the belief in one's ability to successfully handle stressful situations (Bandura, 1992; Jerusalem & Schwarzer, 1992), plays a key role in this appraisal process. By enhancing a sense of control over a potential stressful situation (e.g., studying abroad), self-efficacy functions as a stress-coping strategy (Bandura, 1977; Meyer et al., 2022).

Extending the transactional framework to acculturative stress, Berry's model (2006) proposes that acculturative stress arises when international students perceive intercultural challenges as threatening and doubt their ability to manage them. Prolonged exposure to such stress increases the risk of mental health problems (e.g., depression, anxiety), lowers life satisfaction, and may hinder sociocultural adaptation (Berry, 2006; Soufi Amlashi et al., 2024).

Preventive Interventions for International Students

Although international students face many challenges and show high rates of acculturative stress and mental health issues, only a small number of these students seek professional help (e.g., de Moissac et al., 2020; Stokes et al., 2021; Swanbrow Becker et al., 2018). Reasons for not seeking help were language difficulties, cost concerns, transportation concerns, limited knowledge of available services, lack of time, the belief that treatment was unnecessary because their symptoms were minor, and limited knowledge of symptoms of mental health issues (Lu et al., 2014). Thus, prevention strategies on university campuses are necessary because these strategies can have lower barriers to access (e.g., short distances if they are on campus, not requiring insurance coverage). A growing body of research has demonstrated that stress management programs are effective in reducing stress and improving mental health of students (depression, anxiety; Amanvermez et al., 2023; Regehr et al., 2013). The meta-analysis by Amanvermez et al. (2023) reported moderate effects for stress (g = 0.58) and anxiety (g = 0.52), and a small effect size for depression (g = 0.36). However, there is limited research on the efficacy of such interventions for international students. A study with international students in Turkey (N = 18, Elemo & Türküm, 2019), using a randomized design with a passive control group and three measurement points including a six-month follow-up, examined the effects of an 8-week stress management intervention that focused primarily on stressors, different adaptive and maladaptive coping strategies, and dysfunctional self-talks. Results showed that the intervention improved coping self-efficacy; however, no significant effects were found for psychological adaptation and distress (Elemo & Türküm, 2019). In another study, a 5-week acceptance and commitment therapy (ACT) workshop

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with no control group (N = 53) using a pre- and posttest design resulted in reduced symptoms of stress, depression, and anxiety, and improved psychological flexibility and mindfulness skills of international students in Finland (Brandolin et al., 2023). Furthermore, a 6-week online stress management program with a randomized pre- and posttest design (N = 60, Bani Ahmad & Meriç, 2021) and a passive control group, which focused on physiological adaptation, self-concept, role function, and interdependence adaptation, improved the stress level and the coping capacity of international students in Cyprus. However, a randomized online stress management intervention study (N = 60, Kanekar et al., 2009) with a pre- and posttest design and a passive control group, which included sessions on social support, hardiness, and acculturation, found no significant intervention effects on mental health, social support, hardiness, and acculturation among Indian international students in the United States.

Current Study

Although international students face many challenges and show high rates of acculturative stress and mental health issues (e.g., Forbes-Mewett & Sawyer, 2016; Koppenborg et al., 2024), research on the efficacy of stress management interventions for international students is limited, and some studies have methodological shortcomings, such as lacking a control group (Brandolin et al., 2023). Therefore, the aim of this study was to examine whether a cognitive stress management intervention for international students had effects on cognitive strategies, and on self-efficacy, mental health issues, acculturative stress, and life satisfaction. Cognitive strategies were specified as primary outcomes, whereas mental health outcomes, acculturative stress, self-efficacy, and life satisfaction were treated as secondary outcomes in the present study. This classification was based on the intervention content, which explicitly targeted cognitive appraisal processes and coping skills (e.g., reappraisal, acceptance, positive self-instruction, avoidance). These processes are assumed to influence stress-related outcomes in line with the transactional theory of stress and coping (Lazarus & Folkman, 1984). A 4-week stress management intervention was compared with a waitlist control group. The following hypotheses are proposed:

Hypothesis 1 (H1): Based on the transactional theory of stress and coping (Lazarus & Folkman, 1984), and on the intervention content targeting cognitive restructuring, acceptance, and coping skills, participation in the stress management intervention is expected to increase adaptive cognitive strategies (reappraisal, acceptance, positive self-instruction) and decrease maladaptive strategies (avoidance, expressive suppression, experience suppression), compared to the control group.

Hypothesis 2 (H2): Based on the transactional theory of stress and coping (Lazarus & Folkman, 1984) and the acculturative stress theory (Berry, 2006), which posit that cognitive appraisal processes and coping resources shape emotional and behavioral stress responses, it was hypothesized that, compared to the control group, the intervention group would show greater reductions in depression, anxiety, and acculturative stress, as well as greater increases in self-efficacy and life satisfaction from pre- to postintervention.

Method

Participants

Thirty-four international students took part in the intervention study. The inclusion criteria were: being an international student at a university in Germany, seeking to obtain a degree in Germany, being aged ≥18 years, having the ability to understand English, and being willing to participate in the intervention study and provide informed consent. Power analysis using G*Power 3.1 Software (University of Düsseldorf, Germany) indicated that 34 participants were adequate to detect a moderate effect (effect size f = .25) with a power of .95 in a repeated-measures analysis of variance (ANOVA; α = .05, two measurements: T1 and T2). The international students were randomized into the intervention group and the wait list control group. However, problems with the randomization process occurred (e.g., some instances of non-adherence to the assigned intervention, primarily attributed to time constraints) [1]. In total, the intervention group included 17 international students, and the waitlist control group also included 17 international students.

In total, 79.4% of the participants were female and 17.6% were male students. The mean age of the sample

[1] Minor deviations from the original randomization plan occurred prior to the pretest, primarily attributed to time constraints, with some participants reassigned to the control group. Pretest comparisons on key outcome and demographic variables revealed no significant group differences, suggesting that the reassignment did not bias the comparability of the groups at baseline.

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was 25.38 years (*SD* = 4.24). The sample consisted of 19 undergraduate students (55.9%), nine graduate students (26.5%), and six postgraduate students (17.6%). Participants were studying at different public universities in Thuringia (a federal state in Germany). The average length of stay in Germany was 40.53 months (*SD* = 35.02). Sixty-eight percent of the students came from Asia (e.g., India, China, Turkey, Syria) and 29.4% came from different countries from Europe. Table 1 shows participants' demographic characteristics by group.

The mean depression score of our total sample at baseline was 9.24 (*SD* = 5.49), indicating slightly elevated depressive symptoms in the upper mild range. The mean anxiety score was 9.68 (*SD* = 5.66), indicating also slightly elevated anxiety symptoms in the upper mild range. Group-specific results are shown in Table 1. However, 41.2% of the students of the present total sample showed moderate-to-severe symptoms of depression, and 47.1% showed moderate-to-serve symptoms of anxiety. Similar results were found in a previous study based on a larger sample of international students in Germany (*N* = 326), where 46.5% reported clinically relevant depressive symptoms and 46.8% reported clinically relevant anxiety symptoms (masked for review, 2026). Furthermore, the intervention and control group did not differ significantly on gender [χ^2 (1) = 1.04, p = .60], age, length of stay, number of semester, and outcome variables at baseline [Wilks λ = .54; F(14,18) = 1.09, p = .42].

Study Procedure

The study received approval from the Institutional Ethics Commission of the University of Jena and written informed consent was obtained from all participants. Participants were recruited in 2024 via university mailing lists, social media platforms, and flyers were distributed at university. Participants completed an online survey immediately before (preintervention, T1) and after the intervention (post-intervention, T2). The time interval between T1 and T2 was 5 weeks. The control condition was a waitlist control group. After the assessment was completed, students of the waitlist control group took part in a stress management training. The control group had the same pre–post data collection schedule as the intervention group.

Program Description

The new developed 4-week stress management training for international students included the modules education and cognitive strategies. The program was based on the transactional theory of stress and coping (Lazarus & Folkman, 1984) and the acculturative stress theory (Berry, 2006). Both modules were adapted from a stress management program for students developed by Karing and Beelmann (2016), which has previously been positively evaluated in a study with university students (Karing & Beelmann, 2016). These modules were further developed and pilot-tested for use with international students. Each session took approximately 80 min to complete. The intervention was available in English. Each session consisted of theoretical input, exercises, and homework assignments. The homework assignments were discussed at the beginning of the following session. The intervention was manualized. The trainer manual included a written description of session-by-session content, and a guideline on how to teach the session. The stress management training was a group-based face-to-face intervention. The students met their trainer once a week.

The education module included psychoeducation on stress and stress reactions, an individual stress analysis and early warning signs. These exercises were intended to improve participants' awareness of stress processes and early warning signs, thereby promoting more adaptive coping strategies. The cognitive strategies module comprised three sessions. This module included psychoeducation and exercises on downers and uppers (e.g., positive self-instruction), cognitive restructuring (e.g., reappraisal), and strengthen your self-worth. Furthermore, it focused on solvable and unsolvable problems, the functions of positive and negative emotions, and the topic "acceptance and tolerance of difficult emotions." More specifically, these intervention components were systematically aligned with the study outcomes: exercises on cognitive restructuring were designed to increase reappraisal, while the exercises on acceptance and tolerance of emotions and

Table 1. Baseline demographics by group

Variable	Intervention group (*n* = 17)	Control group (*n* = 17)
Age, mean (*SD*)	25.35 (5.23)	25.41 (3.10)
Gender, *n* (%, female)	13 (76.5)	14 (82.4)
Continent of origin, *n* (%, Asia)	12 (70.5)	11 (64.7)
Semester, mean (*SD*)	4.94 (3.36)	5.65 (2.26)
Length of stay in Germany, mean (*SD*)	35.59 (36.93)	45.47 (33.37)

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on the functions of positive and negative emotions targeted greater acceptance and reductions in emotional suppression. Training in positive self-instruction aimed to enhance adaptive self-talk. In addition, distinguishing between solvable and unsolvable problems and addressing avoidance aimed to reduce maladaptive coping strategies (e.g., avoidance). These changes in cognitive strategies were expected to improve secondary outcomes, including increases in self-efficacy and life satisfaction as well as reductions in depression, anxiety, and acculturative stress, in line with the transactional model of stress and coping (Lazarus & Folkman, 1984).

Measures

Feasibility Measures

Feasibility measures included students' program satisfaction, course attendance, home practice of exercises, and participants' cooperation. Students' satisfaction with the stress management program was assessed with their satisfaction with the training content (3 Items, "I found the taught training content interesting."; α = .86, Karing & Beelmann, 2016) and their satisfaction with the training condition (3 Items, "All in all, I was satisfied with the working atmosphere in our group."; α = .91, Karing & Beelmann, 2016). Items were rated on a six-point Likert scale (1 = *strongly disagree*; 6 = *strongly agree*). The number of sessions attended was used to assess students' course attendance. Students' compliance with homework assignments was assessed with the frequency of home practice of the stress management exercises. The trainers rated participants' cooperation during the sessions on a three-point Likert scale (0 = *not at all*; 3 = *very much*).

Primary Outcome Measures

The cognitive strategies, acceptance, reappraisal, avoidance, expressive suppression, and experience suppression were assessed with subscales from the Heidelberg Form for Emotion Regulation Strategies (HFERST; Izadpanah et al. 2019). Furthermore, positive self-instruction was measured with a subscale from the Stress coping inventory (Janke et al., 1997). Each item of the subscales was rated on a 5-point Likert scale (acceptance and reappraisal: 1 = *never*; 5 = *always*; positive self-instruction: 1 = *definitely not*; 5 = *very probably*). Higher scores indicated a more frequent use of these strategies. Examples of the subscales are: acceptance (3 items, "When I cannot change something, I accept the situation as it is."; α_{T1} = .77, α_{T2} = .78), reappraisal (4 items, "When I want to feel better, I concentrate on the good aspects of a situation."; α_{T1} = .91, α_{T2} = .81), avoidance (4 items, "I prefer to avoid situations, which could cause negative emotions in me."; α_{T1} = .85, α_{T2} = .78), expressive suppression (4 items, "When something makes me angry or sad, I try to hide my feelings from others."; α_{T1} = .82, α_{T2} = .82), and experience suppression (4 items, "Whenever possible, I avoid realizing my feelings."; α_{T1} = 79, α_{T2} = .83), and positive self-instruction (4 items, "I tell myself that I will get through this."; α_{T1} = .79, α_{T2} = .68).

Secondary Outcome Measures

Depression was assessed using the Patient Health Questionnaire-9 (PHQ-9, Kroenke et al., 2001). The scale consists of nine items and responses were scored on a 4-point Likert scale (0 = *not at all*; 3 = *nearly every day*). The total score ranges from 0 to 27. The severity of depression was categorized as follows: no/minimal (0–4), mild (5–9), moderate (10–14), serious (15–19), and very serious depression (20–27, Kroenke et al., 2001). An example item is: "feeling down, depressed, or hopeless." Cronbach's alpha was α_{T1} = .83 and α_{T2} = .84.

Anxiety was assessed with the 7-item Generalized Anxiety Disorder scale (GAD-7, Löwe et al., 2008; Spitzer et al., 2006). Participants responded to items such as "Worrying too much about different things" on a 4-point Likert scale (0 = *not at all*; 3 = *nearly every day*). The total score ranges between 0 and 21. The severity of anxiety was categorized as follows: no/ minimal (0–4), mild (5–9), moderate (10–14), and severe anxiety (15–21, Spitzer et al., 2006). Cronbach's alpha was α_{T1} = .89 and α_{T2} = .87.

Acculturative Stress was assessed using the 36-item Acculturative Stress Scale for International Students (Sandhu & Asrabadi, 1994). Items were rated on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*, e.g., "Homesickness bothers me."). Higher scores indicated higher acculturative stress. Cronbach's alpha was α_{T1} = .94 and α_{T2} = .96.

Self-efficacy was measured using the 10-item general self-efficacy scale (Schwarzer & Jerusalem, 1999). Participants rated items such as "I can always manage to solve difficult problems if I try hard enough." on a 4-point Likert scale (1 = *not at all true*; 4 = *exactly true*). Higher scores indicated higher levels of self-efficacy. Cronbach's alpha was α_{T1} = .83 and α_{T2} = .83.

Life satisfaction was assessed using the 5-item satisfaction with life scale (SWLS, Diener et al., 1985). Items were rated on a 7-point Likert scale (1 = *strongly disagree*; 7 = *strongly agree*, e.g., "I am satisfied with my life."). Higher scores indicated higher life satisfaction. Cronbach's alpha was α_{T1} = .83 and α_{T2} = .84.

Data Analyses

Repeated measures multivariate (MANOVA) and univariate (ANOVA) analyses of variance were conducted in IBM SPSS

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Statistics (version 29) to investigate the effects of time, the effects of group, and the interaction between time and groups (intervention effect) on changes in outcomes from pre- to postintervention. Effect sizes are reported as partial eta squared (η_p^2) and Cohen's *d*. Descriptive statistics (*M* and *SD*s) are presented for all outcome variables. There was homogeneity of covariances, as assessed by Box's test ($p > .001$). Normality was assessed using the Shapiro–Wilk test and was satisfied for all variables except acceptance at T1, anxiety at T1, and acculturative stress at T2. Given evidence from simulation studies indicating that repeated-measures analyses of variance is robust to moderate violations of normality (Vasey & Thayer, 1987), all analyses were conducted as specified. A Bonferroni correction was applied to account for multiple testing. Level of significance was set at $p < .05$ (one-tailed).

Results

Feasibility

Seventy-one percent of the participants attended at least three sessions, of whom 35% attended four sessions. However, three participants (17.6%) attended only one session. The intervention group was very satisfied with the training content ($M = 5.72$, $SD = 0.45$) and the training condition ($M = 5.77$, $SD = 0.51$). The compliance to home practice was good. Between 67 and 85% of the participants completed their homework throughout the sessions. Furthermore, the trainer stated that the participants were, on average, very cooperative ($M = 2.91$, $SD = 0.22$) during the sessions.

Efficacy of the Stress Management Training

Primary Outcomes

Repeated-measures MANOVA from pre- to post-intervention showed a significant time × group interaction [$F(6, 26) = 4.26$, $p = .002$, $\eta^2 = .50$] and a significant time effect [$F(6, 26) = 3.01$, $p = .011$, $\eta^2 = .41$], but no significant group effect [$F(6, 26) = 1.39$, $p = .129$, $\eta^2 = .24$]. Subsequent repeated-measures ANOVAs showed significant intervention effects for acceptance and reappraisal. As predicted, there was a greater increase over time in acceptance and reappraisal in the intervention group compared to the control group. Moderate to large effect sizes (Cohens *d*) were observed for these outcomes. However, no significant interaction effects were found for the other primary outcomes (see Table 2). Thus, Hypothesis 1 was partially supported, as significant improvements were found for adaptive cognitive strategies acceptance and reappraisal, but not for maladaptive strategies or positive self-instruction.

Secondary Outcomes

Results from multivariate analysis of variance (MANOVA) with repeated measurement showed a significant interaction between time and group [$F(5, 28) = 4.71$, $p = .002$, $\eta^2 = .46$] and a significant time effect [$F(5, 28) = 4.47$, $p = .002$, $\eta^2 = .44$]. However, the group effect [$F(5, 28) = 1.31$, $p = .144$, $\eta^2 = .19$] was not significant. Results from repeated-measures ANOVAs showed significant intervention effects for depression, anxiety, self-efficacy, and life satisfaction. As predicted, there was a greater improvement over time in depression, anxiety, self-efficacy, and life satisfaction in the intervention group compared to the control group. Moderate to large effect sizes were found for anxiety and self-efficacy. There was no significant intervention effect for acculturative stress. Thus, Hypothesis 2 was partially supported, as significant effects were found for depression, anxiety, self-efficacy, and life satisfaction, but not for acculturative stress.

Discussion

The aim of this study was to investigate the feasibility and efficacy of a new developed cognitive stress management intervention for international students on cognitive strategies, mental health issues, acculturative stress, self-efficacy, and life satisfaction. International students often face a multitude of challenges that can hinder their academic and social life, and their mental health (e.g., Berry, 2006; Gold, 2016; Ma, 2020). We found that 41.2% of the students of the present sample showed moderate-to-severe symptoms of depression, and 47.1% showed moderate-to-severe symptoms of anxiety. Similar findings were reported by Prado et al. (2024) and Karing and Idemudia (2026) for international students in Germany. However, these rates of depression and anxiety were higher than those found in our previous intervention studies with national students in Germany (Karing, 2022; Schaller & Karing, 2024).

The study's findings showed that the intervention significantly improved adaptive cognitive strategies (reappraisal and acceptance), self-efficacy, life satisfaction, and reduced symptoms of anxiety and depression. Moderate-to-large effect sizes were observed for these outcomes. Overall, these findings provide partial support for Hypotheses 1 and 2, as only some of the predicted cognitive strategies and secondary mental health outcomes showed significant intervention effects. Our results

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Table 2. Repeated-measures ANOVAs results for the outcome variables

	Intervention group		Control group		Main effect of group				Main effect of time				Time × group interaction			
	Pre	Post	Pre	Post												
Outcome	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*	*p*	η_p^2	Cohen's *d*	*F*	*p*	η_p^2	Cohen's *d*	*F*	*p*	η_p^2	Cohen's *d*
Primary outcomes																
Acceptance	3.27 (0.84)	3.92 (0.71)	3.42 (0.82)	3.42 (0.86)	0.54	.234	0.02	0.13	5.70	.011	0.16	0.42	5.70	**.023**	0.16	0.42
Reappraisal	2.79 (1.00)	3.54 (0.67)	3.66 (0.90)	3.36 (0.78)	1.68	.103	0.05	0.23	2.78	.053	0.08	0.29	14.82	**<.001**	0.32	0.68
Avoidance	2.99 (0.88)	2.71 (1.00)	2.94 (0.88)	3.08 (0.94)	0.25	.310	0.01	0.09	0.19	.335	0.01	0.08	1.71	.201	0.05	0.23
Expressive suppression	3.28 (0.96)	3.03 (0.82)	3.05 (0.78)	3.06 (0.85)	0.14	.358	0.00	0.06	0.87	.179	0.03	0.16	1.12	.298	0.04	0.19
Experience suppression	2.79 (0.88)	2.51 (1.05)	2.59 (0.74)	2.64 (0.92)	0.02	.449	0.00	0.03	0.85	.182	0.03	0.16	1.67	.205	0.05	0.23
Positive self-instruction	3.37 (0.76)	3.91 (0.59)	3.81 (0.68)	4.05 (0.60)	2.10	.079	0.06	0.26	11.61	**.001**	0.27	0.60	1.84	.185	0.06	0.24
Secondary outcomes																
Acculturative stress	2.58 (0.78)	2.43 (0.85)	2.64 (0.67)	2.69 (0.48)	0.38	.272	0.01	0.11	0.58	.227	0.02	0.13	2.34	.068	0.07	0.29
Self-efficacy	2.72 (0.45)	3.14 (0.37)	2.97 (0.48)	2.95 (0.48)	0.04	.420	0.00	0.03	13.35	<.001	0.29	0.64	16.67	**<.001**	0.34	0.76
Anxiety	11.88 (5.81)	7.76 (4.13)	7.47 (4.68)	8.12 (5.00)	1.98	.085	0.06	0.24	3.79	.030	0.11	0.34	7.15	**.006**	0.18	0.50
Depression	10.41 (5.40)	7.94 (5.52)	8.06 (5.48)	9.35 (5.89)	0.08	.390	0.00	0.04	0.39	.269	0.01	0.11	3.98	**.028**	0.11	0.37
Life satisfaction	3.69 (1.20)	4.38 (1.31)	4.42 (1.18)	4.38 (1.31)	1.30	.131	0.04	0.20	7.57	.005	0.19	0.48	4.05	**.027**	0.11	0.37

Note. Bold values represent the statistically significant results.

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support the findings of Elemo and Türkum (2019), and Brandolin et al. (2023), who reported improvements of international students' self-efficacy and mental health with their stress management intervention. Furthermore, in a previous longitudinal study with students (Karing & Oeltjen, 2024) , we showed that students with higher levels of self-efficacy or acceptance had lower anxiety, depression, and stress levels. Similarly, Asselmann et al. (2024) showed that cognitive improvements (e.g., self-efficacy) and positive behavioral changes (e.g., less dysfunctional coping) resulting from interventions can lead to symptom improvements (e.g., anxiety). These findings are also in line with the assumptions of the transactional theory of stress and coping, which posits that cognitive strategies are critical to the outcomes (e.g., mental health issues; Lazarus & Folkman, 1984).

Contrary to our hypotheses, no significant intervention effects were found for maladaptive cognitive strategies (expressive suppression, experience suppression, avoidance), positive self-instruction, or for acculturative stress as a secondary outcome. There is limited research on the efficacy of stress management interventions for international students on these constructs. Elemo and Türküm (2019) reported no significant effects of their stress management intervention on psychological adaptation (e.g., homesickness, dietary problems, language difficulties), whereas Bani Ahmad and Meriç (2021) demonstrated significant effects of an online stress management intervention on the perceived stress levels and coping capacities of international students. Several factors may explain the lack of effects of our intervention on these constructs. First, our findings indicated a significant improvement in the cognitive strategies (acceptance, reappraisal) that had been specifically targeted during the training. The intervention included, in particular, sessions on acceptance and perspective taking. Accordingly, future programs should place an even greater emphasis on other cognitive strategies (e.g., positive self-instruction, expression of emotions). Furthermore, to effectively reduce acculturative stress, intervention programs may also incorporate other modules such as social support, active coping strategies (e.g., problem-solving), and communication skills. However, acculturative stress may be less responsive to short-term interventions, and the efficacy of these components still needs to be evaluated in future research with international students. Second, the data were not statistically significant, possibly because of the small sample size used in this study. For example, there was a descriptive improvement in these variables in the intervention group, while these variables showed little change or even worsened in the control group from pre- to posttest. Future studies with a greater sample size are needed to investigate these effects.

Limitations and Future Research Directions

There are some limitations of the study. First, most of the sample were female international students. Previous meta-analyses (Amanvermez et al., 2023; Regehr et al., 2013) have reported an overrepresentation of female students in stress management interventions. However, a meta-analysis by de Vibe et al. (2017) showed no relationship between the magnitude of the effect size for mental health and the proportion of females in the sample. Future research should attempt to recruit more male participants. Additional strategies are needed to recruit more males, such as modifications to group structure (e.g., all-male group option, Kelly et al., 2019) or recruitment strategies. Second, given the relatively small sample size and the number of outcomes tested, statistical power may have been limited and the risk of Type I error increased. Therefore, findings should be interpreted with caution. Third, as the control group was a waitlist control group and did not receive a comparable intervention involving social interaction, meeting opportunities with other (international or national) students or trainer contact, nonspecific effects (e.g., attention, group support, meeting other students) cannot be ruled out. Future research should therefore consider the use of an active control condition (e.g., regular meeting opportunities with other students) to better investigate intervention-specific effects. Fourth, our intervention study was limited by the absence of follow-up data. Thus, the long-term effectiveness of the intervention remains unclear. Future studies with follow-up assessments and greater sample size are needed to confirm the findings. Fifth, only self-rated outcome measures were used in the study, which increases the risk of response bias. Future studies should include objective measures and physiological measures, such as cortisol measures. Sixth, the participants came from 22 different countries (68% Asia, 29.4% Europe). This highlights the cultural diversity of our sample. Consequently, future stress management programs should be designed with greater attention to cultural sensitivity and should be more personalized to meet the unique needs of international students. Thus, future stress management programs could incorporate cultural sensitivity by using culturally relevant examples that reflect different cultural backgrounds and experiences of international students, language-adapted materials, and discussions of cultural differences in stress perception and coping strategies. Furthermore, personalization could be achieved through individual goal setting, modular content selection (e.g., optional modules), peer coaching, and self-monitoring tools (e.g., diaries, apps) within the group format.

Finally, nearly 50% of our sample showed clinically relevant anxiety and depression. Our findings suggest that international students with mental health issues were also interested in this low-threshold intervention. Thus, these

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programs may be perceived as less stigmatizing and more acceptable than psychotherapeutic interventions (Amanvermez et al., 2023). A previous study found that only 10.9% of international students with clinically relevant anxiety and depression received professional help (e.g., psychotherapy) for their mental health issues (Karing & Idemudia, 2026). However, stress management trainings are preventative, low-threshold approaches and should only complement and not replace psychotherapy for individuals with mental health issues.

Conclusions

Our findings indicate that cognitive stress management trainings can be effectively implemented among international student populations to enhance adaptive cognitive coping strategies, mental health, life satisfaction, and self-efficacy. These findings align with previous intervention studies that reported improvements in international students' self-efficacy and mental health (e.g., Brandolin et al., 2023; Elemo & Türküm, 2019). For practice, universities should recognize the high prevalence of stress and mental health challenges among international students and consider implementing stress management trainings as low-threshold, accessible interventions. Future research should explore ways to enhance intervention effects on acculturative stress, examine long-term outcomes, and investigate which program components are most effective in supporting international student mental health and well-being.

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Publication Ethics
All procedures performed in our study were approved by the institutional review board at the University of Jena and in accordance with the ethical standards of the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Informed consent was obtained from all participants included in the study.

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