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Changes in Psychological Well-being and Homesickness Following a Twelve Day Generative AI Assisted Activity Program among Pakistani International Students in China

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Changes in Psychological Well-being and Homesickness Following a Twelve Day Generative AI Assisted Activity Program among Pakistani International Students in China

Abstract:

International students' psychological adjustment is shaped by challenges involving everyday agency, social connection, and separation from familiar support networks. This study examined short-term changes in psychological wellbeing, social self-efficacy, and homesickness following a 12-day generative artificial intelligence (GenAI)-assisted daily activity programme among Pakistani international students in China. Guided by Self-Determination Theory, the programme combined activities intended to support autonomy, competence, and relatedness with GenAI-assisted planning, reflection, and conversational rehearsal. Twenty-eight participants completed self-report assessments immediately before and after the programme in a single-group pre-test–post-test design. Outcomes were assessed using Ryff's Psychological Well-Being Scale, a social self-efficacy measure, and the homesickness subscale of the Acculturative Stress Scale for International Students. Reported Wilcoxon signed-rank analyses indicated an increase in overall psychological wellbeing from 86.38 to 98.14 ($p = .004$) and a decrease in homesickness from 10.90 to 7.52 ($p = .002$). Social self-efficacy increased from 96.38 to 107.34, although this change was not statistically significant ($p = .092$). These findings provide preliminary evidence of favourable changes in selected psychosocial outcomes during participation in a structured GenAI-assisted activity programme. However, the absence of a comparison group, the small purposively recruited sample, and the lack of follow-up prevent attribution of these changes to GenAI or conclusions about their durability. The study offers an initial application of need-supportive programme design in a South–South educational mobility context and provides a basis for subsequent controlled evaluation.

Keywords: Generative artificial intelligence; Self-Determination Theory; psychological well-being; homesickness; Pakistani International Students in China.

1. Introduction

The rapid diffusion of generative artificial intelligence (GenAI) tools, such as ChatGPT and other large language model assistants, has reshaped how individuals seek information, make decisions, and structure their everyday behaviour. Recent meta-analytic evidence suggests that AI chatbots have a significant and predominantly positive impact on

motivation-related outcomes. One synthesis of 24 randomized studies reports enhancements in performance, motivation, self-efficacy, interest, and appreciation of learning, as well as reductions in anxiety (Wu & Yu, 2024). Reports referenced in this literature indicate that the use of GenAI is no longer limited to specialists; rather, it has become prevalent among school-age and university populations, with over a third of students reportedly utilizing these tools regularly(Wu & Yu, 2024). As GenAI transitions from a novelty to a regular companion for study, reflection, and personal development, both researchers and practitioners are increasingly inquiring about its potential integration into structured, routine behaviour-change practices, rather than limiting its use to an ad hoc academic resource. This question is particularly significant for international students, who must establish new routines to manage motivation and wellbeing while adapting to an unfamiliar academic and cultural context. Pakistani students constitute one of the largest South Asian groups studying in China. Empirical research on this demographic has consistently shown significant, albeit moderate, levels of acculturative stress due to homesickness, language barriers, unfamiliar food, and the transition to a new academic system (Shan et al., 2020).

Recent research on international students in China indicates that acculturative stress adversely affects academic, social, and emotional adjustment. However, perceived social support can mitigate much of this impact, especially in the emotional and social domains (Chen, 2025). Complementary research conducted in Pakistan indicates that psycho-social factors, including length of stay, financial support, and peer relationships, significantly influence both acculturative stress and mental health adjustment among international students (Riaz et al., 2025). This literature collectively identifies Pakistani students in China as a demographic that would benefit from low-cost, self-administered tools designed to enhance psychological well-being during their adjustment period. Simultaneously, a robust and empirically validated tradition in positive psychology has shown that brief, structured daily practices such as gratitude listing, acts of kindness, goal setting, and reflective journaling consistently enhance psychological functioning. The important research conducted by Emmons and McCullough (2003) demonstrated that maintaining a brief daily or weekly record of gratitude enhances subjective well-being compared to documenting hassles or neutral occurrences. This finding has been verified in healthy adults (Krejtz et al., 2016) and among more clinically vulnerable populations through randomized, multi-day diary methodologies (Hartanto et al., 2023; Sztachańska et al., 2019). Research on kindness and loving-kindness practices indicates that intentionally

observing or engaging in minor prosocial behaviours enhances positive affect and fosters lasting personal and social resources over time(Fredrickson et al., 2008). Additionally, broader investigations in positive psychology have confirmed that activities such as identifying a signature strength and composing a gratitude letter yield significant and enduring improvements in happiness (Seligman et al., 2005).

The current study integrates three components: GenAI-facilitated behaviour change, positive psychology diary methods, and the identified adjustment needs of Pakistani students in China into a unified design. The study applies SDT-informed design principles to a structured GenAI-assisted activity programme and examines preliminary changes in selected psychosocial outcomes. It does not directly test whether psychological need satisfaction mediates those changes. A 12-day diary was designed to align each day with a specific need-supportive activity, including setting an intention, reconnecting with someone, practicing mindfulness, performing an act of kindness, setting a goal, practicing a skill, expressing gratitude, celebrating a personal strength, teaching someone, holding an open conversation, cooperating on a shared task, and taking a self-care break. Each activity was complemented by a corresponding GenAI interaction that facilitated participant engagement through brainstorming, planning, reflection, or role-playing. The design aligns with the three fundamental psychological needs outlined in Self-Determination Theory (SDT): autonomy, competence, and relatedness (Ryan & Deci, 2000), with each day explicitly focused on one or more of these needs.

2. Literature Review and Theoretical Background

2.1. Self-Determination Theory as a Framework for Need-Supportive Activity

Self-Determination Theory posits that human motivation, well-being, and psychological development are contingent upon the continuous fulfilment of three inherent psychological needs: autonomy, which involves acting with volition and personal endorsement; competence, characterized by a sense of effectiveness and capability; and relatedness, defined by feelings of connection and care from others (Ryan & Deci, 2000). When environments or activities fulfil these needs, individuals exhibit increased intrinsic motivation, positive affect, and sustained engagement; conversely, when these needs are thwarted, motivation shifts towards a more controlled state, resulting in diminished wellbeing. Self-Determination Theory (SDT) has been utilized in various fields, including coaching, psychotherapy, health behaviour change, and education. Interventions that specifically address

one or more of the three fundamental needs have consistently demonstrated positive effects on engagement and well-being outcomes across these areas. The 12-day diary analysed in this study adheres to this tradition by designating a specific need focus for each day. For instance, Day 1 emphasizes autonomy through self-selected intention-setting, Day 2 emphasizes relatedness by encouraging outreach to another individual, and Day 3 emphasizes competence through a mindful, attention-oriented routine task. This structure enables the application of the same theoretical framework utilized in classroom and workplace Self-Determination Theory (SDT) research to be examined within a personal, daily behavioural context involving an international student sample.

2.2. Positive Psychology Diary and Behavioural Interventions

Comprehensive research supports brief daily diary interventions to increase wellbeing. The gratitude intervention was based on Emmons and McCullough's (2003) findings that short gratitude journals improved well-being more than hassles or neutral daily experiences. Research has shown that daily gratitude lists can improve self-esteem, optimism, and adaptive coping in vulnerable groups, such as breast cancer patients (Krejtz et al., 2016; Sztachańska et al., 2019). A recent within-person experimental diary study found that a brief daily gratitude-contemplation exercise reduced negative affect, perceived stress, anxiety, and depressive symptoms across personality types (Hartanto et al., 2023). Complementary research on kindness and loving-kindness practice shows that small prosocial acts increase positive emotional experience and build lasting personal and interpersonal resources (Fredrickson et al., 2008), while Seligman and colleagues' (2005) randomized evaluation of several positive-psychology exercises found increases in six-month happiness. This literature shows that short, self-administered daily activities over one to two weeks are a credible and inexpensive way to measure gains in wellbeing. Still, it relies almost entirely on unaided, self-generated diary content and doesn't examine what happens when a conversational AI actively facilitates each day's task.

2.3. Generative AI in Education and Well-being Contexts

GenAI's benefits for motivation, engagement, and well-being are being studied in an emerging body of literature. AI chatbots improved students' motivation, self-efficacy, curiosity, and anxiety in a 2024 meta-analysis of 24 randomized studies(Wu & Yu, 2024). A one-week open trial of an AI-powered mental-wellness chatbot among college students with severe

depression or anxiety found it to be feasible and acceptable (Reyes-Portillo et al., 2025), suggesting that conversational AI can support personal well-being and academic outcomes. This literature warns cautiously. An extensive study of GenAI use in vocational and higher education coined the phrase “metacognitive laziness” to characterize how strong dependence on AI-generated output can reduce learners' creative and evaluative work (Fan et al., 2025). Aldraiweesh and Almutairy (2026) found that perceived autonomy and relatedness significantly predicted whether university students experienced GenAI use as autonomy-supportive, which predicted autonomous motivation, motivation, and engagement. Perceived competence did not significantly predict autonomy-supportive perceptions, suggesting that the three SDT needs do not translate into AI-related motivation. Unifying the literature's contradiction between GenAI as a motivational tool and as a potential crutch is pertinent to a design like the current diary, which invites GenAI into a personally meaningful, need-supportive activity rather than an academic chore.

2.4. **Acculturation and Adjustment Among Pakistani Students in China**

The population context for this study draws on research on Pakistani students in China. A purposive method study using the Acculturative Stress Scale for International Students, administered to 203 Pakistani students from five Chinese provinces and 20 Wuhan students, found that Pakistani students reported serious concerns about perceived discrimination, homesickness, and hostility on the quantitative scale. Still, culture shock, homesickness, food, and language barriers were more prevalent in the qualitative interviews. A more recent survey of international students in China found that acculturative stress significantly impairs emotional, social, and academic adjustment. Still, perceived social support meaningfully buffers this impact, particularly in the emotional and social domains (Chen, 2025). Psychosocial determinants such as length of stay, financial support, and peer relationships affect acculturative stress and adjustment in Pakistan (Riaz et al., 2025). This literature shows that homesickness, language barriers, and cultural adjustment are real and recurring factors for Pakistani students in China, and that socially and emotionally oriented supports can significantly reduce this strain. However, it has not yet been tested whether a brief, self-administered, GenAI-facilitated activity diary targeting autonomy, competence, and relatedness could help.

2.5. Research Gap

Research on GenAI-assisted student support has begun to examine both conversational wellness applications and associations between AI use and sociocultural adaptation. Nevertheless, these approaches leave questions about how GenAI can be incorporated into a specified sequence of everyday activities intended to support psychological adjustment. In particular, further evidence is needed on programmes that combine participant choice, manageable opportunities for accomplishment, and interpersonal engagement with AI-assisted planning and reflection among Pakistani international students in China. This distinction matters because outcomes observed during programme participation may arise from the activities themselves, reflective journaling, human contact, or GenAI assistance. The present study addresses an initial empirical question by examining within-participant changes in psychological well-being, social self-efficacy, and homesickness following a 12-day SDT-informed activity programme. Its contribution lies in documenting the programme and its preliminary outcome pattern in a specific educational mobility context; identifying GenAI's incremental contribution and the proposed psychological mechanisms requires subsequent comparative research.

2.6. Research Questions:

RQ1. What are the changes in psychological wellbeing, social self-efficacy, and melancholy that are observed within participants between the time before and after their participation in the 12-day GenAI-assisted activity program?

RQ2. What modifications are observed in the dimensions of psychological wellbeing, which are regarded as experimental secondary outcomes?

3. Methodology

This study, the quantitative method is described very well. The study examined pre–post changes in psychological well-being, social self-efficacy, and homesickness, assessed as a specific component of acculturative stress. The program is inspired by the Self-Determination Theory (SDT) (Deci & Ryan, 2000, 2013). The program applies the principles of Generative Artificial Intelligence (GenAI) to scaffold participants' engagement in purposeful, everyday tasks to meet the basic psychological needs of autonomy, competence, and relatedness.

3.1. Research Design

This research uses an experimental design consisting of a pre-test and a post-test for a single group (Campbell & Stanley, 2015). All four dependent variables are evaluated on a single cohort of N = 28 participants at two different time points: immediately before (Time 1: pre-test) and immediately after (Time 2: post-test) the 12-day intervention program. The pre-test is administered immediately before the intervention program. The following is the design's more formal notation: The single-group pre-test–post-test design assessed within-participant change over the programme period. Without a comparison group, observed changes cannot be attributed uniquely to programme participation This is especially true in applied educational and counselling psychology settings, where the allocation of participants to a matched control group is constrained either ethically or logistically (Anderson-Cook, 2005). This is especially beneficial given the relatively small sample size (N = 28), as the within-subjects design maximizes statistical power by reducing error variance attributable to individual differences.

According to (Campbell, 1963), this design acknowledges threats to its internal validity. These threats include history, maturation, testing effects, and regression to the mean. Despite its parsimony, this design acknowledges these dangers. Multiplicity correction addresses false-positive risk across statistical comparisons, while effect-size reporting describes the magnitude of observed change. Neither procedure removes the internal-validity limitations of the uncontrolled design.

3.2. Population and Sampling

The group being targeted consists of international students currently enrolled in an undergraduate or postgraduate degree program who have relocated to a host country within the two years prior to the current period. Compared with domestic students, international students consistently exhibit higher levels of acculturative stress, greater perceived cultural distance, and lower levels of social self-efficacy (Berry et al., 2006; Ward, 2001; Yeh et al., 2008). Based on these findings, international students are a population that is both theoretically and empirically relevant for this investigation (Etikan et al., 2016; Patton, 2015). A purposive sampling approach is used to ensure that each participant meets the specific conceptual and experiential criteria pertinent to the study constructs. Instead of focusing solely on demographic features, intervention research typically uses purposive sampling to target individuals distinguished by specific lived experiences (for example, a recent overseas relocation).

Inclusion Criteria

- Students who are currently enrolled at the host university and who identify themselves as international (non-domestic)
- The candidate must have been a resident of the host nation for a period of no more than twenty-four months at the time of recruitment.
- Someone who is at least 18 years old
- Having a strong command of the English language, as demonstrated by academic enrolment records
- Being willing and able to interact with a GenAI tool (such as ChatGPT or a similar one) using a personal device for the entirety of the program at any given time. Providing one's free and informed agreement to participate in the entire program and finish both exam batteries

Exclusion Criteria

- Participating in another structured psychological intervention, counselling program, or acculturative support service at the present opportunity
- They have been diagnosed with a severe or acute psychiatric disease, such as psychosis or severe depression with current suicidal ideation, which has the potential to cause confusion in measurement or to pose a risk to their safety.
- Failing to show up for ten out of the twelve sessions of the daily program (an incomplete dose)
- The interaction with GenAI does not require the use of a gadget or internet connectivity.

3.3. Sample Size

The research included 28 overseas students from Pakistan. For the intended statistical analyses, such as within-subjects analysis of variance (*Wilcoxon signed-rank effect size*) and paired-sample t-tests, this sample size is sufficient. Although bigger samples might yield more reliable results, this study's sample size of 28 is adequate to detect medium-to-large effect sizes in within-subjects designs, which is in line with other intervention studies done with populations of international students (Brydges, 2019). In addition, the 12-day intervention program was quite rigorous, and full participation was required; thus, the sample size couldn't realistically be large. The study participants' demographic characteristics are displayed in Table 3.1.

Table 3.1 Participant's Demographics: (N=28)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	18	64.3
	Female	10	35.7
Age	21-25	3	10.7
	26-30	12	42.9
	31-35	8	28.6
	More than 35	5	17.9
Duration in China	1-2 years	10	35.7
	3-4 years	4	14.3
	4-6 years	9	32.1
	More than 6 years	5	17.9
Degree	Undergraduate (BA, BSc, BBA)	1	3.6
	Graduate (MA, MSc, MEd, MBA)	6	21.4
	Doctoral	17	60.7
	Post-doctorate	4	14.3
Major	Social Sciences & Humanities	4	14.3
	Natural Sciences	6	21.4
	Engineering & Technology	5	17.9
	Business & Economics	9	32.1
	Health Sciences & Physical Education	4	14.3
Having Scholarship	Yes	27	96.4

	No	1	3.6
Marital status	Single	18	64.3
	Married	10	35.7
Having Chinese	Yes	18	64.3
Friends	No	5	17.9
Satisfaction in China	Yes	7	25.0

The sample comprised 28 participants, including 18 males (64.3%) and 10 females (35.7%). The largest age group was 26–30 years (42.9%), followed by 31–35 years (28.6%). Residence duration varied, with 35.7% reporting 1–2 years in China and 32.1% reporting 4–6 years. Doctoral participants constituted the majority (60.7%), while business and economics was the most represented disciplinary category (32.1%). Most participants received scholarships (96.4%), and 64.3% were single. Eighteen participants (64.3%) reported having Chinese friends, while seven (25.0%) reported satisfaction with life in China. However, the friendship and satisfaction entries do not account for all participants, so these findings should be interpreted cautiously until the remaining responses are clarified.

Retaining Participants

Every one of the twenty-eight people who signed up for the study's intervention and took the pre- and post-tests saw it through to its conclusion. All 28 enrolled participants completed the pre-test and post-test assessments. The study did not establish which factors accounted for retention.

3.4.Variables and Measurement Instruments

Using approved instruments administered at both the pre-test and post-test time points, the study evaluates four crucial variables. The variables and measurement instruments are listed below.

3.4.1. Acculturation Stress Scale

According to Berry (1997) and Sandhu and Asrabadi (1994), acculturation stress refers to the difficulties people face when adjusting to a new culture. Perceived prejudice,

homesickness, anxiety, shame, and stress from cultural shift are some of the ways in which acculturative stress presents itself to overseas students (Berry, 1997; Sandhu & Asrabadi, 1994). Sandhu and Asrabadi (1994) created the Acculturative Stress Scale for International Students (ASSIS) to quantify acculturative stress. To measure the acculturative stress that overseas students face, researchers developed the ASSIS, a 36-item self-report instrument. The seven subscales that make up the scale are as follows: perceived prejudice, homesickness, hate, fear, stress from change/culture shock, guilt, and other things. Higher ratings indicate more acculturative stress, as respondents rank each statement on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Internal consistency reliability (Cronbach's alpha) for the ASSIS was recorded at 0.896, indicating strong psychometric qualities. Research with international student populations, such as Pakistani students in China, has extensively utilized the scale (Shan et al., 2020).

3.4.2. Psychological Well-being Scale

Positive psychological functioning, which includes aspects such as self-acceptance, positive relationships with others, autonomy, environmental mastery, personal progress, and purpose in life, is what we mean by psychological wellness (Ryff, 1989; Ryff & Keyes, 1995). The idea comes from eudemonic traditions of health, which prioritize reaching one's full potential and working toward worthwhile objectives. The participants' mental health was assessed using Ryff's Psychological Well-Being Scale (PWBS). The short form of the scale, which consists of 18 items, measures six aspects of psychological well-being: self-determination, mastery of one's surroundings, personal development, positive relationships with others, life purpose, and self-acceptance. Each topic is evaluated by respondents using a 7-point Likert scale, where 1 indicates strong disagreement, and 7 indicates strong agreement. The PWBS has been validated in cross-cultural settings and has demonstrated good psychometric properties across diverse groups, including international student samples. Better mental health is indicated by higher scores.

3.4.3. Social Self-Efficacy Scale

A person's confidence in their own abilities to act socially and handle social situations appropriately is known as social self-efficacy (Smith & Betz, 2000). The concept of social self-efficacy is based on the work of Albert Bandura (2018) and refers to an individual's belief in their ability to initiate and sustain discussions, speak up, when necessary, handle social pressures with grace, and overcome social obstacles(Bandura & Hall, 2018) . Building social

networks and managing the interpersonal demands of cross-cultural adaptation are two of the most important resources for international students. One of these resources is social self-efficacy. For this purpose, Smith and Betz (2000) created the Scale of Perceived Social Self-Efficacy (PSSE) to gauge social self-efficacy. The PSSE measures self-efficacy expectations for various social behaviours using a 25-item test. On a 7-point Likert scale, from 1 (strongly disagree) to 7 (strongly agree), respondents indicate their level of assurance in carrying out each activity. Good internal consistency and conceptual validity are just two of the outstanding psychometric features this scale has demonstrated. Higher scores indicate greater social self-efficacy. Research with varied groups has utilized the PSSE, which has been translated and validated in multiple cultural contexts.

3.5. The 12-Day GenAI-Assisted Intervention Program

The intervention program is built on combining two distinct theoretical background that work together. To begin, according to Self-Determination Theory (Deci & Ryan, 2000), a person's mental health and motivation to act are best served when their basic psychological needs for autonomy (free will and approval of one's own actions), competence (success in one's work), and relatedness (meaningful relationships with others) are met. Secondly, according to Bandura's (1997) social cognitive theory, there are four main ways to boost self-efficacy beliefs, including social self-efficacy: social persuasion, physiological arousal regulation, vicarious learning, and enactive mastery experiences(Bandura, 1997). Through a series of carefully planned daily activities, the 12-day program puts these theoretical mechanisms into action. These activities are tailored to meet the needs of SDTs and aim to influence one or more of the four study variables simultaneously. Participants can plan, enhance, debrief, and reflect on their daily activities in a linguistically accessible and culturally responsive way, with the help of a generative AI tool (e.g., ChatGPT-4 or equivalent) that serves as an interactive, personalized cognitive and social scaffold throughout the program. New findings on AI-assisted behavioural intervention are congruent with this scaffolding role and Vygotsky's (1978) zone of proximal development (Husa et al., 2023; Vygotsky & Cole, 1978).

3.6. The Structure and Delivery of the Program

Each of the twelve days (excluding holidays) of the program consists of a single scheduled activity. Participants are advised to spend at least fifteen to twenty minutes per day interacting with the GenAI tool and carrying out the assigned daily activity. Activities were completed individually within participants' everyday routines. Researcher contact and

reminders should be reported because they may have influenced adherence and participants' responses.

The four-stage micro-structure for each daily activity is as follows: (1) Intention Setting, where the participant reads the objective and interacts with GenAI to make it their own; (2) Action, where the participant actually does the activity in their everyday life; (3) Reflection, where the participant goes back to GenAI to discuss what happened, including how they felt, how competent they felt, and what it means for their relationships; and (4) Brief Journaling, where the participant writes down a three- to five-sentence summary in a diary that the researcher provides.

3.7. 12-Day GenAI-supported Intervention Schedule

Table 3.6 shows the full 12-day intervention plan that was used in the program. It includes the specific psychological goal, a description of the GenAI-supported activity for each day, and the main research variables addressed. The main researcher created this schedule after reviewing the supplied program document. It was then adjusted to make sure that each of the 12 sessions covered the variables in a systematic way.

3.8. Informed Consent

Participants received an information sheet on the study's goal, the 12-day GenAI-assisted activity program, and the pre- and post-test psychological well-being and homesickness measures before enrolling. Activities, time investment, difficulty with reflecting on personal experiences, and privacy considerations when using GenAI technologies were described. Participants were advised that GenAI assistance was exploratory research, advantages were not guaranteed, and it was not professional psychiatric care. Refusing or withdrawing from the program did not affect academic standing, scholarships, or university services. The technique and date for removing study data were explained to participants. The terms of any pay were disclosed before enrolment. Data collection was preceded by questioning and informed consent.

3.9. Confidentiality and Data Protection

Research-related questionnaire responses, activity diaries, and GenAI interaction records were confidential. Study codes and consent data were kept separate from research replies. Data were accessible only to authorized people, and scheduled for retention and secure destruction according to approved retention term and method. Results were aggregated and diary entries were anonymized. Participants were told not to submit names, student IDs, contact

info, or other personal information into GenAI tools. The researchers give guaranty of confidentiality and providers' data-handling policies, as stated in consent papers. Participants knew the scope, purpose, access, and storage of interaction records.

3.10. Institutional Approval

Ethical approval for this study was obtained from the ethics committee of the host institution prior to data collection (Approval No. S156). All participants were provided with an information sheet detailing the study's aims, the procedures involved, and that participation was voluntary. Participants were explicitly informed that their anonymity and confidentiality would be rigorously protected throughout the research process and that they retained the unconditional right to withdraw from the study at any stage without consequence. To safeguard participants' privacy, pseudonyms were adopted in all interview transcripts and subsequent publications, and no personally identifiable information was disclosed or utilized. In addition, all research data were securely stored on password-protected devices accessible only to authorized members of the research team.

4. Results

4.1. SDT-Driven and GenAI-supported Daily Activity Intervention Results

This study presents the empirical results of a single-group pre-test-post-test assessment of a 12-day Generative Artificial Intelligence (Gen-AI) initiative conducted with a cohort of 28 Pakistani overseas students during their tenure at a university in China. The chapter examines a specific empirical inquiry: does a concise, structured, technology-facilitated intervention yield statistically and practically significant short-term alterations across three theoretically distinct yet conceptually interconnected psychosocial domains: social self-efficacy, eudaimonia, psychological well-being, and acculturative stress, as operationalized through its homesickness component? This chapter addresses the subject by incorporating quantitative findings, an interpretive analysis grounded in established psychological theories and current research on generative AI in education, and a final synthesis highlighting the study's theoretical and practical consequences.

Two converging fields of study inspire this research. One is the long-standing literature on international students' acculturative stress, which, since Berry's (1997) foundational model, has identified homesickness, communication barriers, and loss of familiar social support as the main psychological strains. Pakistani students in China have been repeatedly identified as a particularly relevant population: empirical work identifies homesickness, culture shock, food,

and language barriers as the largest stressors this group reports (Shan et al., 2020), and language and communication competence as key determinants of their psychological adjustment abroad. Second, the rapidly emerging literature on generative AI as an informal support resource for international students has begun to document associations between GenAI use and sociocultural adaptation, academic performance, psychological well-being, and intercultural communication competence among Chinese students. This chapter provides one of the first quantitative pre–post evaluations of a brief, structured Gen-AI activity against standardized psychometric outcomes in an understudied group of international students.

This study presents findings from a within-subjects design, in which each of the 28 participants completed the same set of validated self-report instruments immediately before and after the 12-day activity, thereby serving as their own baseline control. Three instruments were utilized: the Scale of Perceived Social Self-Efficacy (Smith & Betz, 2000), which evaluates confidence in initiating and maintaining interpersonal relationships across four subdomains (absence of social difficulties, social confidence, sharing interests, and friendship initiatives); Ryff's Psychological Well-Being Scale (Ryff, 1989; Ryff & Keyes, 1995), which measures six theoretically distinct dimensions of eudemonic well-being (autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance); and the homesickness subscale of the Acculturative Stress Scale for International Students (Sandhu & Asrabadi, 1994)

4.2. The SDT-Driven and GenAI-supported Daily Activity Intervention

The quantitative outcome of this intervention of 12-day Gen-AI activity was associated with (a) a large, significant improvement in overall psychological well-being, driven primarily by autonomy, environmental mastery, and self-acceptance; (b) a large, significant reduction in homesickness-related acculturative stress; and (c) a consistent but statistically non-significant positive trend across all facets of social self-efficacy. Purpose in life was the only measured construct to decline, albeit non-significantly, over the study period.

4.3. Social Self-Efficacy with the Daily Diary Intervention

The Social Self-Efficacy Scale is a tool that assesses an individual's level of self-assurance in their ability to manage interpersonal relationships, initiate friendships, participate in social activities, and interact effectively with others. On the Social Self-Efficacy Scale, the total scores increased from a mean of 96.38 (standard deviation = 20.59) on the pre-test to a mean of 107.34 (standard deviation = 18.48) on the post-test. This marks an increase of almost

11 points, which is comparable to approximately half of the standard deviation at the baseline level. The mean social self-efficacy score increased by 10.96 points, but the Wilcoxon test did not provide sufficient evidence of a pre–post difference at the stated significance threshold (p = .092). This is even though the 12-day activity was relatively brief, and the statistical power afforded by N = 28 was limited.

At the subscale level, all four aspects of social self-efficacy moved in the predicted positive direction; however, none achieved statistical significance on their own. The absence of social difficulties increased from 44.41 (standard deviation = 11.84) to 49.55 (standard deviation = 8.31), p =.157, r =.26; social confidence increased from 25.97 (standard deviation = 8.11) to 28.69 (standard deviation = 6.61), p =.152, r =.27; sharing interests increased from 13.28 (SD = 4.76) to 14.79 (SD = 3.09), p =.345, r =.18 (the smallest observed effect); and friendship initiatives increased from 12.72 (SD = 4.52) to 14.31 (SD = 4.61; p =.208, r =.23. However, despite the absence of individual significance, the uniformly positive direction of change across all four subscales suggests a consistent pattern of improvement in participants' confidence to initiate and maintain social relationships following exposure to the Gen-AI activity. This pattern is not yet statistically robust, but it is consistent nonetheless.

Table 4.1 Change in Social Self-Efficacy Scale Scores

Variables	pre	post	*p*	r
Social Self-Efficacy Scale（Total）	96.38(20.59)	107.34(18.48)	0.092	0.31
Absence of social difficulties	44.41 (11.84)	49.55(8.31)	0.157	0.26
Social confidence	25.97(8.11)	28.69(6.61)	0.152	0.27
Sharing interests	13.28(4.76)	14.79(3.09)	0.345	0.18
Friendship initiatives	12.72(4.52)	14.31(4.61)	0.208	0.23

Table 4.1 indicate that post-test means were higher than pre-test means across all four dimensions of social self-efficacy. Absence of social difficulties increased from 44.41 to 49.55, social confidence increased from 25.97 to 28.69, sharing interests increased from 13.28 to 14.79, and friendship initiatives increased from 12.72 to 14.31.

Nevertheless, none of these changes was statistically significant. The effect sizes ranged from $r = .18$ for sharing interests to $r = .27$ for social confidence. These findings indicate

consistent positive directional changes across the dimensions, although the statistical evidence does not confirm reliable pre–post improvement.

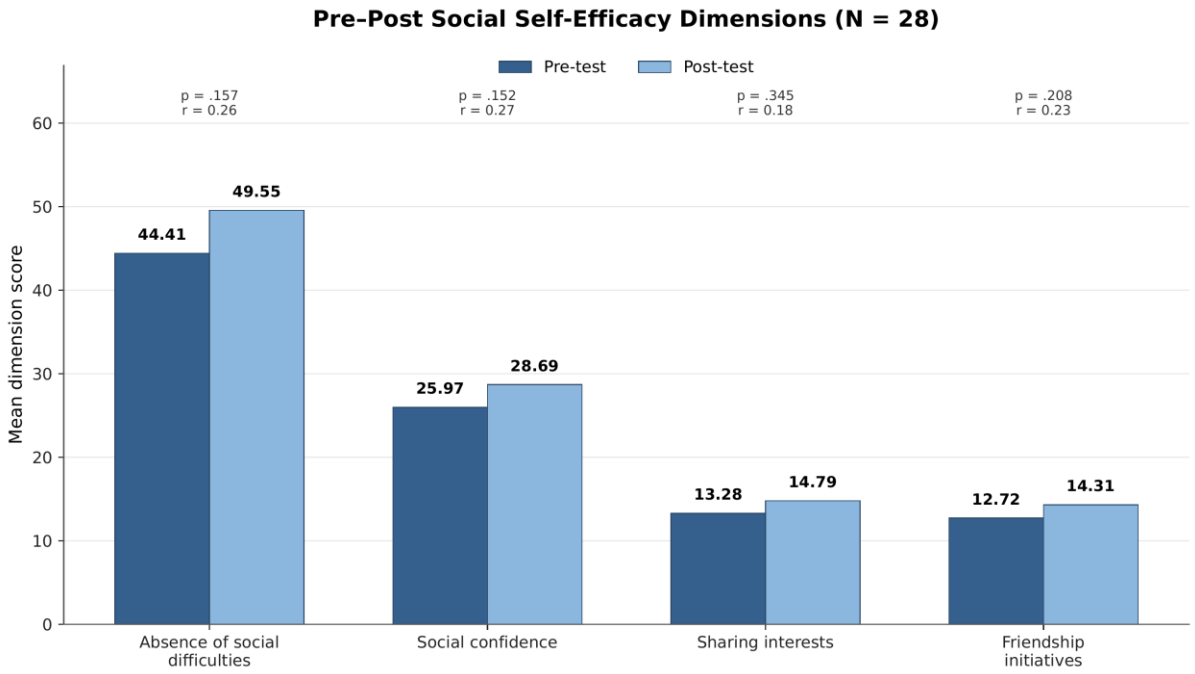


Figure 4.1 Pre-test and post-test mean scores for total social self-efficacy among intervention participants (N = 28)

4.3. Psychological Well-Being with the Daily Diary Intervention

Psychological well-being was assessed using Ryff's multidimensional model, which comprises six psychological dimensions. It was the Psychological Well-Being Scale that provided the most convincing evidence of transition. The total scores significantly increased from a mean of 86.38 (standard deviation = 13.86) on the pre-test to a mean of 98.14 (standard deviation = 9.89) on the post-test, with a Wilcoxon p =.004 and a large effect size (r =.54). This indicates that the participants reported a meaningfully greater overall psychological well-being after the 12-day Gen-AI activity than they did before it. Gains that were statistically significant were observed on three of the six subscales measuring well-being. From 13.62 (standard deviation = 3.76), to 17.66 (standard deviation = 2.65), with a p-value less than.001 and a correlation coefficient of.76 (a very substantial effect), that is, a gain of around four points and more than one baseline standard deviation, autonomy was the variable that induced the most significant and robust change observed anywhere in the sample. p =.006, r =.51 (big effect) indicates that environmental mastery improved from 14.31 (standard deviation = 3.25) to 17.38

(standard deviation = 3.35). 15.34 (standard deviation = 4.30) to 17.69 (standard deviation = 2.55), p =.030, r =.40 (medium-to-large effect) was the rise in self-acceptance. With the exception of the purpose-in-life subscale, the remaining three subscales showed positive trends but did not reach statistical significance. Personal growth grew from 16.45 (standard deviation = 3.86) to 18.21 (standard deviation = 2.68), p =.094, r =.31; favourable relations with others increased from 13.31 (standard deviation = 4.33) to 15.24 (standard deviation = 2.89), p =.073, r =.33; both of these increases arrived near the conventional.05 threshold, but did not achieve it. This decline was not statistically significant (p = .135, r = .28); however, it is noted here because it runs counter to the otherwise uniformly positive pattern observed across the well-being domain. The only variable in the entire battery to move in the undesirable direction was purpose in life, which decreased from 13.34 (standard deviation = 3.73) to 11.97 (standard deviation = 3.98).

Table 4.3 intervention Results of Psychological Well-Being Scale

Variables	pre	post	*p*	r
Psychological Wellbeing（Total）	86.38(13.86)	98.14(9.89)	0.004**	0.54
Autonomy	13.62(3.76)	17.66(2.65)	0.000***	0.76
Environmental mastery	14.31(3.25)	17.38(3.35)	0.006**	0.51
Personal growth	16.45(3.86)	18.21(2.68)	0.094	0.31
Positive relations	13.31(4.33)	15.24(2.89)	0.073	0.33
Purpose in life	13.34(3.73)	11.97(3.98)	0.135	0.28
Self-acceptance	15.34(4.30)	17.69(2.55)	0.030*	0.40

Figure 4.3 shows that significant improvements were found in autonomy, environmental mastery, and self-acceptance. Autonomy increased from 13.62 to 17.66 and produced the largest reported effect size ($p < .001$, $r = .76$). Environmental mastery increased from 14.31 to 17.38, with a relatively large effect size ($p = .006$, $r = .51$). Self-acceptance increased from 15.34 to 17.69, representing a statistically significant change with a moderate effect size ($p = .030$, $r = .40$).

Personal growth increased from 16.45 to 18.21, while positive relations increased from 13.31 to 15.24. However, neither change reached statistical significance. Purpose in life decreased

from 13.34 to 11.97, but this reduction was also non-significant (p = .135). Overall, the strongest pre–post changes were observed in autonomy and environmental mastery.

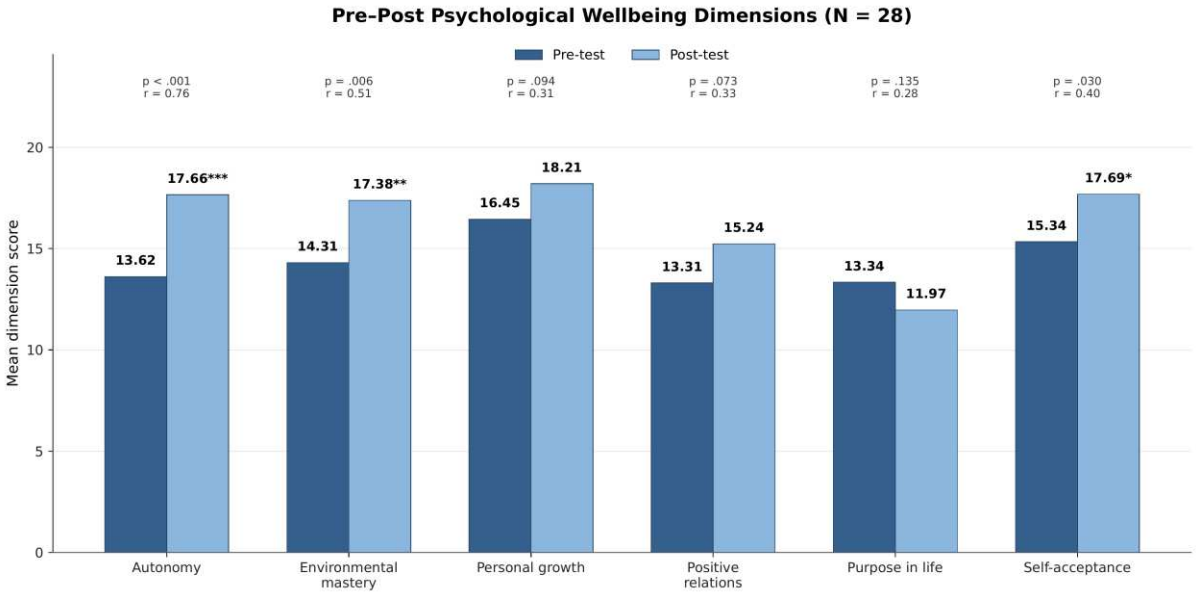


Figure 4.3 Pre-test and post-test mean scores across the dimensions of psychological wellbeing among intervention participants (N = 28)

4.4. Acculturative Stress with the Daily Diary Intervention

One aspect of acculturative stress is homesickness, which is the emotional suffering that comes with being away from one's home, family, and familiar cultural environment. With a substantial decrease (about 31% reduction; Wilcoxon p =.002, r =.58, large impact), the Acculturation Stress Scale-Homesickness subscale scores went from 10.90 (SD = 4.19) on the pre-test to 7.52 (SD = 2.44) on the post-test. Participants reported lower homesickness scores at post-test than at pre-test. This result shows that the 12-day Gen-AI activity reduced the homesickness component of acculturative stress experienced by these Pakistani students during their sojourn in China. This is because lower scores on this measure indicate less acculturative distress.

Table 4.4 intervention Results of Acculturative Stress

Variables	pre	post	p	r
Acculturation Stress Scale-Homesickness	10.90(4.19)	7.52(2.44)	0.002**	0.58

*Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. r = matched-pairs rank-biserial correlation (Wilcoxon signed-rank effect size); values of 0.10, 0.30, and 0.50 are conventionally interpreted as small, medium, and large effects, respectively (Cohen, 1988).*

Figure 4.4 indicates that the mean homesickness score decreased from 10.90 at pre-test to 7.52 at post-test, representing a reduction of 3.38 points or approximately 31%. This reduction was statistically significant (p = .002) and was accompanied by a relatively large effect size (r = .58). Because lower homesickness scores represent a more favourable outcome, the result indicates a meaningful reduction in participants' reported homesickness during the study period.

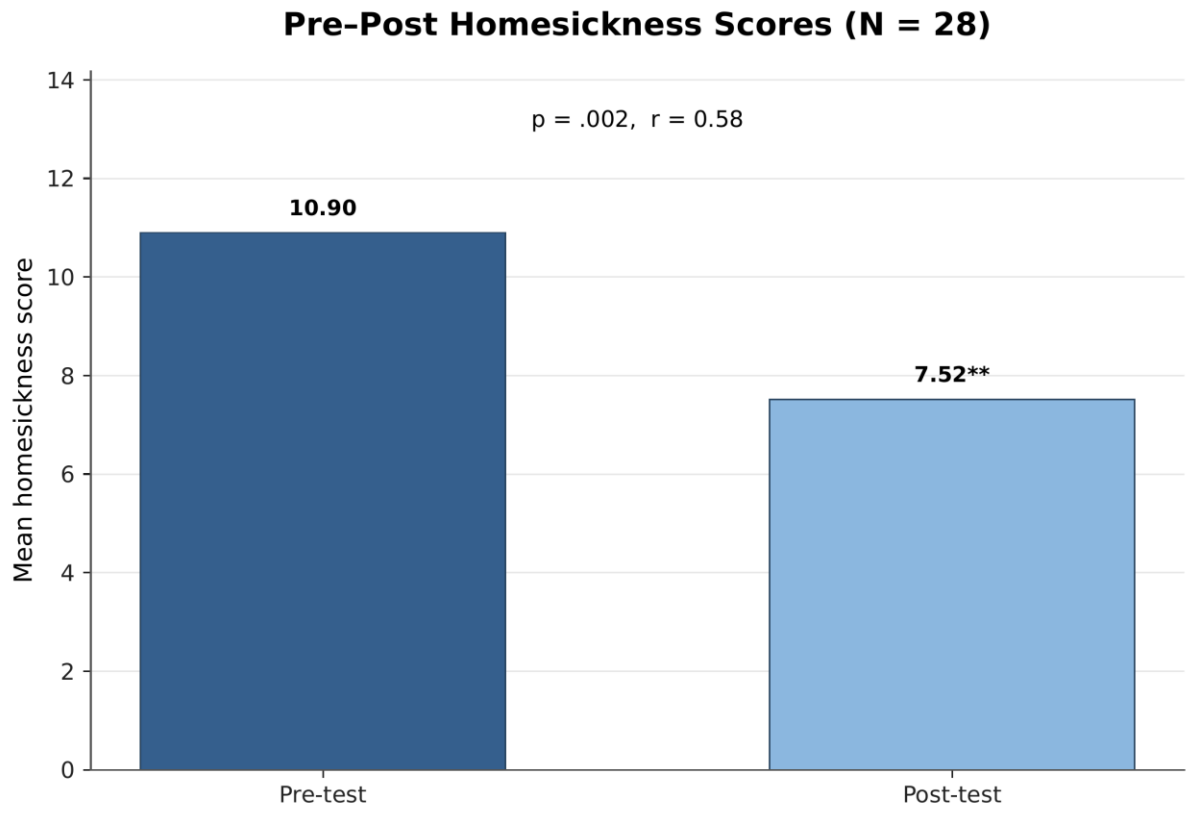


Figure 4.4 Pre-test and post-test mean homesickness scores among intervention participants (N = 28)

5. Discussion and Conclusion

The results indicate significant improvements in psychological well-being and a notable decrease in homesickness, accompanied by a slight, sub-threshold increase in social self-efficacy. This aligns with and expands upon the developing literature regarding generative

AI as a means of facilitating the sociocultural and psychological adjustment of international students in China.

The substantial advancements in autonomy, environmental mastery, and self-acceptance are conceptually relevant within Ryff's (1989; Ryff & Keyes, 1995) model of psychological well-being, which positions autonomy and environmental mastery as indicative of an individual's self-determination and adeptness in managing daily challenges within their environment, while self-acceptance signifies a favourable assessment of oneself and one's history (Ryff, 1989; Ryff & Keyes, 1995). AI-assisted planning and conversational rehearsal are plausible explanations for the observed changes. However, the study did not measure these processes or determine whether participants used GenAI for the specific tasks proposed here. This interpretation corresponds with recent evidence indicating that the utilization of generative AI is correlated with sociocultural adaptation among international students in China, facilitated by mechanisms of positive cognitive reappraisal and perceived empathy (Saracini et al., 2025). Additionally, it aligns with findings that generative AI tools are associated with enhanced academic performance and psychological well-being through collaborative, AI-supported learning in Chinese higher education (Shahzad et al., 2025). Survey evidence indicates that pleasurable and trustworthy AI-mediated interactions correlate with enhanced intercultural communication ability among overseas students in China (Wang & Gao, 2025).

Homesickness is one of several distinct components of the acculturative stress that international sojourners experience. This includes perceived discrimination, fear, guilt, and culture shock. The acculturative stress framework, originally proposed by Sandhu and Asrabadi (1994), provides an analogy for the substantial decrease in homesickness. Past studies focusing on Pakistani students in Chinese universities have consistently found that homesickness, culture shock, food, and language barriers are among the most significant causes of acculturative distress for this group, even more so than perceived prejudice or hatred (Shan et al., 2020). When it comes to the mental health of Pakistani students studying abroad, Bashir and Khalid (2022) provide more evidence that proficiency in spoken and written English is a critical factor. Given this context, it is reasonable to assume that homesickness exhibited one of the two biggest effect sizes in the current study. This could be explained by a Gen-AI activity that made it easier to communicate and understand one another through translation, information retrieval, and social contact (Bashir & Khalid, 2022).

The fact that social self-efficacy did not change statistically, even though it went up on all four measures, is also easy to understand. In line with Bandura's larger theory of self-efficacy, social self-efficacy is generally enhanced through cumulative social feedback and repeated mastery experiences rather than through a single brief activity. This belief is based on the work of Smith and Betz (2000), who created the Scale of Perceived Social Self-Efficacy, which was used in this research (Smith & Betz, 2000). Although there is a consistent positive trend across all subscales, suggesting that a longer or more intense version of the activity could potentially produce significant gains, a 12-day window may be too short to generate statistically detectable change in a construct that relies on repeated behavioural practice.

Given the limited sample size and lack of statistical significance, it is practical to proceed with caution when interpreting the only unexpected finding: a small but insignificant decrease in life purpose. A possible justification for this is that, in contrast to state-like dimensions like autonomy or environmental mastery, which are more susceptible to short-term situational interventions, purpose in life is more stable and trait-like, reflecting a longer-horizon sense of direction and meaning. Possible explanations include participants' transient disruption of their regular academic or personal routines as a result of the 12-day activity's emphasis on a new technology, or participants' temporary narrowing of their attention toward immediate social and technical tasks, both of which the purpose-in-life subscale captures. Rather than being interpreted as a strong intervention impact, this decline should be seen as an exploratory observation that requires follow-up with qualitative or longer-term quantitative data due to its lack of statistical significance.

A number of methodological restrictions qualifies these interpretations. To start with, there is no control or comparison group in the one-group pre-test-post-test design, so any gains could have been due to something else entirely: regression to the mean, practice effects, maturation, or even just random occurrences that happened over the course of the 12 days. Statistical power to identify small-to-medium effects is limited by the tiny sample size (N = 28). Several subscales revealed r values in the 25–35 range that failed to attain statistical significance (perhaps due to power constraints rather than a genuine lack of effect) and restrict extrapolation beyond this particular group of Pakistani students enrolled in a single Chinese university. Third, the pre-test and post-test were administered very close together, and all measurements were self-reported, which could have introduced social desirability or demand-characteristic bias. Fourth, compared to the multi-week or multi-month timeframes usually used in acculturation and self-efficacy research, the 12-day intervention window is quite short.

This could explain why constructs like social self-efficacy, which require cumulative behavioural practice, or long-horizon reflection, like purpose in life, showed weaker or no effects at all, in contrast to more immediately responsive constructs like autonomy, environmental mastery, and homesickness.

The short activities may be finished without formal appointments, and the targeted experiences can happen as part of students' regular routines, hence daily delivery was selected. The program's ecological significance is further strengthened by this design choice; nonetheless, the current study did not examine a dose-response connection or compare daily delivery with less frequent schedules. Rather than concluding that daily intervention is universally superior or a required condition for benefit, the results support the appropriateness and feasibility of the selected schedule within this study.

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Consent to Participate

All authors have participated in the process, read, and agreed to the published version of the manuscript.

Ethical statement

Ethical approval for this study was obtained from the ethics committee of the host institution(Huazhong University of Science and Technology) prior to data collection (Approval No. S156). This study has been conducted in full accordance with the ethical principles outlined in the *World Medical Association Declaration of Helsinki*. We affirm our commitment to respect and protect the rights, safety, and well-being of all research participants. Informed consent was obtained from each participant, and their autonomy, dignity, and confidentiality has been strictly maintained. The study design, risk-benefit analysis, and procedures were reviewed and approved by a recognized ethics committee prior to commencement. No participant was exposed to unnecessary risk, and their right to withdraw at any stage was ensured without any consequence.

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Data availability

Data will be available upon request.

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