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Exploring the Causal Relationship between Life Skills and Self-Esteem in University Freshmen: A Cross-Lagged Panel Analysis

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Abstract

This study aims to examine the state of self-esteem among university freshmen and explore strategies for enhancing self-esteem by analyzing the causal relationship between life skills and self-esteem. Specifically, it assesses whether the acquisition of life skills among university freshmen promotes self-esteem. The method involved a panel survey conducted at two time points targeting university freshmen, followed by a structural equation model analysis using a cross-lagged effect model. The analysis included 203 university freshmen (men = 157, women = 46, mean age = 18.8 ± 0.9 years) attending a private university in Kyoto Prefecture. The first survey (T1) was conducted at the beginning of the fall-winter semester in September 2022, and the second survey (T2) took place at the end of the same semester in January 2023. This study found that in the post-COVID-19 social environment, the higher the interpersonal skills of university freshmen, the lower their self-esteem.

Keywords

Life Skill, Self-Esteem, University Student, Cross-Lagged Effect Model

1. Introduction

Life Skill Issues among University Students

Among the various maladaptive behaviors surrounding university students, a common factor is the lack of life skills (LS) (Chen & Tsuchiya, 2016). In this study, LS refer to "the abilities for adaptive and positive behavior that enable individuals to deal effectively with the demands and challenges of everyday life" (WHO, 1997). Such abilities can be enhanced by accumulating experiences that involve practic-

ing various skills, such as decision-making and problem-solving (WHO, 1997; Shimamono & Ishii, 2006). Furthermore, Shimamoto & Ishii (2006) argue that LS are considered similar to "living skills," the cultivation of which is a 21st-century educational goal in Japan. They highlight that for university students who are in the final stage of preparation to become independent members of society, acquiring LS is a crucial developmental task. Enhancing LS is believed to have a high potential to contribute to the formation of the main educational goal in Japan, which is "living skills." The essence of LS lies in the following: abilities that can be acquired through learning or experience, general and fundamental skills with high applicability to various problems and situations, and psychosocial abilities. Specifically, maintaining self-esteem (The ability to recognize one's self-worth and maintain a positive self-image, even in challenging circumstances), goal setting (The ability to set achievable and measurable objectives to guide actions and decisions), decision-making (The process of evaluating information, identifying options, and choosing the best course of action based on rational judgment), stress management (The ability to recognize, address, and reduce stress using effective coping strategies), and social skills (The ability to interact effectively with others, including clear expression of thoughts, active listening, and understanding social cues) are the main LS.

Problems Associated with University Students' Self-Esteem

The World Health Organization (WHO) declared the end of "Public Health Emergency of International Concern" regarding the novel coronavirus disease (COVID-19) on May 5, 2023. After three days, Japan's Ministry of Health, Labour and Welfare announced that COVID-19 would be reclassified as a "Category 5 infectious disease" under Japan's Infectious Diseases Control Law (Ministry of Health, Labour and Welfare, 2023). In the post-COVID-19 society, it has become necessary to promote various skills among individuals to adapt to new lifestyles. For example, during the COVID-19 pandemic, online meetings and classes became the norm, rapidly spreading and permeating society. In the pre-COVID-19 society, people's lifestyles were established based on their needs. However, after experiencing COVID-19 and transitioning to a post-COVID-19 society, the demand for skills, such as cloud computing and communication through screens, has gradually become an integral part of a new lifestyle. In such social situations, there are differences in individuals' learning abilities and adaptability. Prior to the COVID-19 pandemic, previous studies confirmed a positive correlation between life skills (LS) and self-esteem (SE), with interpersonal skills playing a particularly important role in relationship-based SE (Diener et al., 1999). However, the social isolation brought about by the pandemic disrupted this foundation and caused structural changes in the traditional process of SE development (Prati & Mancini, 2021). In the post-COVID-19 era, digital skills necessary for adapting to remote learning environments have gained increasing attention as important factors for students' psychological adjustment and academic engagement.

This study focuses on adolescents in their developmental stages, particularly first-year university students. There are concerns regarding the acquisition of LS

by newly admitted university students in Japan, including international students (Chen, 2023; Chen et al., 2024). This is because the transition from high school to university brings many differences compared to their previous high school experiences. The acquisition of LS is essential for adapting and adjusting to new interpersonal relationships and lifestyles when placed in a different environment. In an under- or post-COVID-19 society, self-esteem (SE) is an important factor emphasized for maintaining the quality of university life and contributing to personal growth (Lee et al., 2021; Tsuzuki et al., 2022). Generally, SE is defined as a positive or negative attitude toward oneself (Rosenberg, 1965). Based on Endo's (1992) perspective, SE is described as a way of feeling about oneself and includes elements such as self-respect and self-acceptance. Shirai (2015) notes that SE is often translated as "self-respect," "self-evaluation," or "self-affirmation." In addition to psychology, this concept has been extensively studied in various fields and is described as "a feeling of valuing oneself, liking one's current self, self-esteem and confidence, and a sense of comfort in being oneself."

This study draws on Rosenberg's concept of SE, which he defines as "feeling good about oneself as one is now" rather than a sense of superiority over others. At developmental stages, adolescents with high SE are more likely to solve various problems that arise in daily life. In contrast, low SE has been linked to problematic behaviors during adolescence, such as smoking and drinking (Kawabata, 2009; Khajehdaluee et al., 2013). Moreover, it is often assumed that university students have more free time during their university life than in high school and that their proactive behavior is linked to their LS. Therefore, it is important to understand the current state of university students' LS in the post-COVID-19 society and how these LS are associated with students' SE in the context of new living habits. Understanding this is important when considering LS. Moreover, the LS (experience) acquired during the first year of university are considered extremely important in laying the foundation for an individual's future university life. By understanding the types of experiences (skills) that build self-confidence and foster good interpersonal relationships based on one's SE, it is suggested that such approaches may contribute to a healthier university life. However, most studies to date on the impact of life skills training and programs on self-esteem have been cross-sectional, providing limited insight into specific life skills (Babaei, 2023; Sorescu, 2022). Furthermore, longitudinal research is needed to examine how acquiring life skills influences the self-esteem of university freshmen who have experienced COVID-19 as they adapt to a new environment. Additionally, they may promote lifelong mental well-being for new university students. This study aimed to clarify the actual state of SE among first-year university students and examine the estimation of causal relationships between SE and LS in the context of new living habits in the post-COVID-19 period. Furthermore, this study sought to gain insights into methods for enhancing SE among first-year university students. In addition, we did not formulate any specific hypotheses in advance but instead focused on identifying potential trends within the data.

2. Methods

Research Period and Participants

A survey was conducted with 541 first-year university students at a private university in Kyoto Prefecture, Japan. The first survey (T1) was conducted at the beginning of the fall-winter semester in September 2022, and the second survey (T2) was conducted at the end of the same semester in January 2023.

Of the 541 students who completed the T1 survey, 203 respondents (157 men, 46 women; mean age = 18.8 ± 0.9 years) provided complete data at both T1 and T2 and were included in the final analysis. The reduction in sample size from 541 to 203 was due to the exclusion of cases with missing data at either time point.

Procedure

The participants were informed about the purpose, objectives, and method of completing the survey and the protection of personal information (ethical considerations) to ensure that they fully understood the intent of the study. They were also assured that participation in the study was voluntary and that there would be no disadvantage if they chose not to participate. This study was approved by the Research Ethics Review Committee of the university where the survey was conducted (Approval number: 22M02).

The survey was conducted online using Google Forms, a service developed by Google Inc., an American company. A QR code linked to the Google Forms was generated, and the survey was distributed through the university's learning support portal. Responses were collected online within a specified deadline. The survey took approximately 10 min to complete.

Survey Contents

This study used the 10-item Japanese version of the Rosenberg Self-Esteem Scale originally developed by Rosenberg (1965) and translated by Sakurai (2000). The Japanese version is widely used to assess self-esteem because of its established reliability and validity, and its relatively small number of items makes it easy to administer with minimal respondent burden. Participants responded to the 10 items: 1) I am satisfied with myself; 2) I feel that I am a failure (R); 3) I feel that I have a number of good qualities; 4) I am able to do things as well as most other people; 5) I feel that I do not have much to be proud of (R); 6) I feel useless at times (R); 7) I feel that I am a person of worth, at least on an equal plane with others; 8) I wish I could have more respect for myself (R); 9) All in all, I am inclined to feel that I am a failure (R); and 10) I take a positive attitude toward myself-using a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Five negatively worded items (Items 2, 5, 6, 8, and 9) were reverse coded prior to analysis, and a total score was calculated by summing all item responses, with higher scores indicating higher levels of self-esteem. Sakurai (2000) reported high internal consistency for the scale (Cronbach's $\alpha = .84$) and good test-retest reliability over a four-month interval ($r = .77$, $p < .01$, $n = 79$), supporting the satisfactory reliability of the Japanese version.

For LS measurement, the Daily Life Skills Scale (University Student Version) developed by Shimamoto & Ishii (2006) was used. This scale was designed to measure LS of university students and consists of 24 items across eight factors (subscales). Responses are measured on a four-point scale 1 (not at all) to 4 (very true). A higher score indicates a higher level of skill, and the eight factors are broadly categorized into skills performed in primary personal and interpersonal situations. Primary personal factors include planning, knowledge summarization, SE, and positive thinking, whereas interpersonal factors include intimacy, leadership, empathy, and interpersonal manners. However, because the three SE-related items within the LS (e.g., "I am confident in my words and actions," "I like myself," and "I am satisfied with my life") share similarities with the items in the Rosenberg Self-Esteem Scale, SE items were removed from LS to analyze the impact of LS on SE more accurately.

The above content pertains to the responses regarding the situation at the time of each investigation.

Analytical Model

In this study, SE and LS were treated as observed composite scores calculated from the mean of their respective scale items. The analysis was conducted using the Maximum Likelihood (ML) estimator in AMOS 24.0. Although the scales consisted of Likert-type items, they were treated as continuous variables in the model, following standard practices in structural equation modeling when using validated scales. A two-wave cross-lagged effects model was employed to examine the longitudinal relationships between variables.

Statistical Processing

In this study, a panel survey was conducted at two time points, followed by a structural equation model (SEM) analysis using a cross-lagged effect model (**Figure 1**). This model considers the relationships between two variables at the same point in a time series and simultaneously examines the two hypothesized causal relationships. For example, based on the analysis in **Figure 1**, if the effect of LS at the first time point on SE at the second time point is significant among university students, it would suggest that LS influences SE in university students. Conversely, if the effect of SE at the first time point on LS at the second time point is significant, it would suggest that SE influences LS. If neither of the cross-lagged effects is significant, then there is no causal relationship between the variables. Generally, in SEM, the solution tends to be more stable when the number of estimated paths is smaller (Omi et al., 2005; Schermelleh-Engel et al., 2003).

Additionally, the model's fit to the data was assessed using the goodness-of-fit index (GFI), adjusted GFI (AGFI), and comparative fit index (CFI). According to empirical standards, a GFI and CFI of 0.90 or higher and a smaller difference between the GFI and AGFI indicate a better fit. Data were analyzed using IBM SPSS Statistics for Windows software, version 26.0 (IBM Corp., Armonk, New York, USA). The cross-lagged effects model was constructed using AMOS (version 24.0; IBM Corp., Armonk, New York, USA). Statistical significance was set at $p < 0.05$.

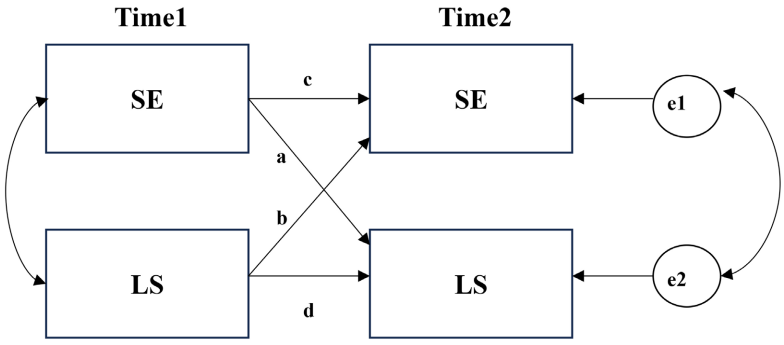


Figure 1. Cross-lagged effect model used in the analysis.

3. Results

Basic Statistics and Reliability of Each Variable

Table 1 and Table 2 present the basic statistics of each variable and the values of the coefficients representing reliability. Focusing on the average values of SE and LS in the post-COVID-19 period, all variables increased from the first to the second measurement points. Furthermore, in LS, interpersonal skills (intimacy, leadership, empathy, and interpersonal manners) had a higher average value than personal skills (planning, knowledge summarization, and positive thinking).

Table 1. Basic statistics of variables at each time point (n = 203).

		Time 1		Time 2	
		September 2022		January 2023	
		M	*SD*	*M*	*SD*
LS	Primary personal situations	23.74	3.50	25.25	3.31
	Interpersonal situations	31.52	4.70	33.51	4.78
SE	SE	24.92	3.85	24.94	4.27

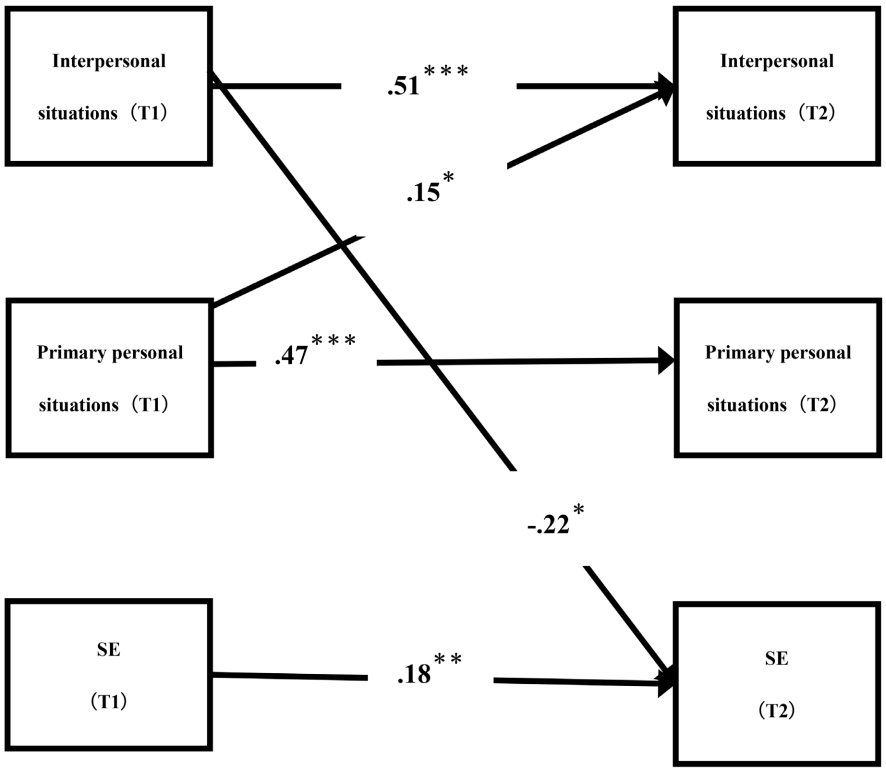
Table 2. Reliability of variables at each time point (n = 203).

		A coefficient		Test-retest reliability coefficient	
		Time 1	Time 2	Time 1	Time 2
LS	Primary personal situations	.56	.60		.57**
	Interpersonal situations	.67	.75		.70**
	Total	.78	.80		.68***
SE	SE	.58	.69		.45**

Note 1. Time 1: September 2022, Time 2: January 2023. Note 2. The values of the test-retest reliability coefficients are all $p < .01$.

In terms of reliability of each variable, although some subscales showed Cronbach's alpha coefficients below the standard value of 0.70 at the first and second time points, the overall internal consistency was generally acceptable. The

test-retest reliability coefficients between Time 1 and Time 2 exceeded 0.40 for SE and both aspects of LS, indicating moderate temporal stability (Figure 2).



Note 1. Covariances and error terms have been omitted. Note 2. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure 2. Results of the cross-lagged effect model.

Model Validation Results

Model Fit. The GFI and CFI values were 0.913 and 0.921, respectively, both exceeding 0.90. The AGFI value was 0.887, indicating that it did not decrease significantly compared to the GFI. Thus, the analytical model used in this study is generally valid and can be used to interpret the causal relationships between variables.

Causal Relationships between Variables. Based on the estimated cross-lagged effects (Table 3 and Figure 2), we examined the longitudinal relationships between SE and LS in the post-COVID-19 period. First, regarding the autoregressive (stability) effects shown in Figure 2, significant paths were observed from Time 1 to Time 2 for interpersonal situations ($\beta = 0.51$, $p < .001$), primary personal situations ($\beta = 0.47$, $p < .001$), and SE ($\beta = 0.18$, $p < .001$), indicating moderate stability of each construct across the semester. Regarding the cross-lagged effects from LS to SE, interpersonal situations at Time 1 significantly and negatively predicted SE at Time 2 ($\beta = -0.26$, SE = 0.088, $p < .01$). This indicates that higher levels of interpersonal skills at the beginning of the semester were associated with lower levels of SE at the end of the semester. In contrast, primary personal situations at

Time 1 did not significantly predict SE at Time 2 ($\beta = 0.21$, SE = 0.084, $p > .05$). With respect to the reverse cross-lagged paths from SE to LS, SE at Time 1 did not significantly predict primary personal situations at Time 2 ($\beta = -0.04$, SE = 0.067, $p > .05$) or interpersonal situations at Time 2 ($\beta = -0.02$, SE = 0.063, $p > .05$). Taken together, these findings indicate a unidirectional negative longitudinal effect from interpersonal life skills to SE, whereas no significant reverse effects from SE to life skills were observed. Therefore, in the post-COVID-19 social environment, higher interpersonal skills among university freshmen were associated with subsequent decreases in SE over time rather than increases.

Table 3. Estimated cross-lagged effects (standardized estimates, n = 203).

	a	b
	Time 1 → Time 2	**Time 1 → Time 2**
SE	**→Primary personal situations −.02**	**Primary personal situations → .16**
	→Interpersonal situations −.03	**Interpersonal situations → −.22***

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

4. Discussion

The primary objective of this study was to examine the bidirectional longitudinal relationship between SE and LS acquisition among university freshmen in the post-COVID-19 context. The cross-lagged panel analysis yielded two principal findings. First, the results indicated a unidirectional longitudinal effect from LS to SE, whereas SE did not significantly predict subsequent LS acquisition. This suggests that, during the transition to university life, the development and enactment of life skills may precede and shape students' self-evaluative processes, rather than pre-existing levels of SE facilitating later skill development. Second, contrary to expectations based on prior literature suggesting that life skills generally enhance self-esteem, the cross-lagged effect from interpersonal LS at Time 1 to SE at Time 2 was statistically significant and negative ($\beta = -0.26$, $p < .01$). In contrast, primary personal LS did not significantly predict subsequent SE, and SE did not significantly predict either domain of LS. These findings indicate that the observed longitudinal association was specific to interpersonal skills and was not reciprocal. This unexpected negative effect may reflect the unique social context faced by university freshmen in the post-pandemic period. Students with higher interpersonal engagement may have encountered greater social comparison, performance pressure, or relational stress while adapting to new peer networks. Such experiences could temporarily lower self-evaluations despite active interpersonal involvement. Thus, higher interpersonal LS may not automatically translate into enhanced SE when social demands are particularly high. Previous research has suggested that enhancing SE can contribute to improved health-related behaviors (Kawabata, 2006; Mann et al., 2004). In the present study, LS were conceptualized as abilities related to problem-solving, self-regulation, and interpersonal functioning. By ex-

amining their temporal relationship with SE, this study extends prior work by clarifying the directional dynamics between these constructs among first-year university students. From a practical perspective, the findings suggest that structured LS programs remain important for supporting student adjustment. However, interventions aimed at fostering interpersonal skills should also incorporate reflective components that help students process social experiences and maintain stable self-evaluations.

Regarding temporal stability, both SE and LS exhibited significant stability coefficients, indicating that each construct demonstrated continuity across time. These findings are consistent with previous research on Japanese university students, which suggests that although life skills and self-esteem demonstrate a certain degree of trait-like stability, they may also fluctuate during periods of environmental transition (e.g., Chen et al., 2024). Notably, the stability coefficients were moderate in magnitude (i.e., below 0.70), suggesting that these constructs were neither entirely fixed nor highly volatile during this developmental stage. Importantly, the presence of significant but moderate stability paths strengthens the interpretation of the cross-lagged effects. Because prior levels of SE and LS were statistically controlled in the model, the observed longitudinal effect from interpersonal skills at Time 1 to SE at Time 2 reflects change beyond trait-like continuity. Thus, the results indicate that while SE and LS possess relative temporal stability, they remain developmentally plastic, allowing interpersonal experiences to exert meaningful longitudinal influence.

Impact of COVID-19 on Acquiring LS from SE

In this study, which focuses on new university students, SE was found to have no effect on the acquisition of LS after the transition from high school to university. In high school, students typically develop LS and self-esteem (SE) within a relatively stable and familiar social structure, where adult guidance and peer relationships are consistent and predictable. Consequently, SE in this stage is often supported by external validation and routine-based success. However, in university, students must navigate new interpersonal networks, increased academic freedom, and self-management responsibilities—factors that demand more advanced and adaptive LS. In other words, SE does not lead to LS acquisition after a student enters university. University life requires independent and proactive actions. In each of these experiences, SE, which Rosenberg defines as "feeling satisfied with who you are now," is likely to be difficult to cultivate in the early stages of university life when practicing LS. This is because it remains challenging for students to assess or perceive things from a university perspective ("I feel ..."). At this stage, it may be a "dawn period" before acquiring full SE as a university student. Naturally, there is an opportunity to transform from "SE" as a high school student to "SE" as a university student. As observed in this study, the lack of causal effects of the acquisition of SE on LS might be associated with the change in social status from high school to university. SE in high school is likely to differ from SE in university. To adapt to a changing environment, the development of SE during high school

alone may be insufficient for future university life. Therefore, it is anticipated that a university student's SE is enhanced through life experiences during university (LS acquisition). Alternatively, it is plausible that the experiences (both successful and unsuccessful) encountered through interactions with others lead to the development of SE from LS acquisition (practice), rather than SE promoting LS acquisition. Therefore, for new university students, there is an impact on the acquisition of LS in new patterns of life experiences, which are influenced by a third mediating factor.

Impact of LS Acquisition on SE in the Post-COVID Era

This study revealed that LS, including interpersonal skills, influences SE. In the new social environment after the COVID-19 pandemic, and for freshmen who have just entered university, updating their existing skills is essential for adapting to their new surroundings. In everyday life, there is no guarantee that life events will proceed smoothly. Both successful experiences of effectively interacting with others and failures faced during these interactions are closely associated with LS acquisition, which contributes to achieving future goals and solving problems. Furthermore, confidence derived from these experiences influences SE formation. Therefore, university freshmen with higher levels of interpersonal skills, including factors such as intimacy, leadership, empathy, and interpersonal manners, had lower SE.

One possible cause of the low SE is changes in the surrounding environment. According to a national survey on high school students' lives (NHK Broadcasting Culture Research Institute, 2003), 90% of high school students responded that "school is very enjoyable or somewhat enjoyable." As students advance to university, they simultaneously experience life events, such as changes in their living environment and shifts in close friendships. Owing to these changes, many new university students are likely to feel unfamiliar with their new environment (university and daily life) and may hesitate to interact with new individuals for the first time (Chen, 2023). Furthermore, according to a survey by the NHK Broadcasting Culture Research Institute (2003), the current primary concern is "friendship" (62%), and the most essential activity in daily life is "talking with friends and acquaintances" (78%). Based on these observations, it can be inferred that, for high school students, maintaining a balance in relationships with those familiar to them, such as friends and acquaintances, is important before transitioning to university. For freshmen, the first year represents a period of building relationships from "zero." While there is excitement about meeting new friends, many new university students may feel anxious about effectively managing their relationships. Additionally, while high school students are accustomed to a lifestyle characterized by "fixed schedules" and "set group activities," university life offers more personal free time and requires students to independently approach and engage with new people. If students do not know how to interact effectively (skills), their SE may decrease, potentially leading to a lower SE. Conversely, if students experience pressure to "build good relationships" and become overly concerned or engage in

excessively polite behavior, it can also negatively affect their SE. In summary, behaviors such as "polite rudeness" tend to focus more on how one appears to others or the external aspect of the self, and this is reflected in low SE.

Another reason interpersonal skills may have a negative impact on SE is that the way people interact has changed. In the post-COVID era, opportunities for communication over the Internet have increased. It has been reported that in "screen-based" remote environments, visual cues are harder to perceive, making it more difficult to accurately discern others' intentions compared to face-to-face communication (Ishii, 2022). Therefore, it is expected that first-year university students will face increased hurdles in LS owing to remote interpersonal communication in addition to adapting to the new environment mentioned above. Furthermore, in remote communication scenarios in which participants do not show their faces, the lack of feedback, such as facial expressions and reactions, can lead to the formation of distrust and suspicion toward others, which may negatively affect SE.

To enhance SE of new university students in the future, it is necessary to promote "personal skill" acquisition while mitigating excessive interpersonal behaviors associated with "interpersonal skill" acquisition through appropriate interactions with others. Furthermore, as university freshmen continue to face uncertainty and challenges in adapting to social and academic environments altered by the pandemic, fostering LS may serve as a proactive means to enhance psychological well-being and resilience. Future research should examine which specific LS are most influential in boosting SE and whether such interventions have long-term impacts on students' mental health, academic success, and social integration.

5. Implications and Limitations

Implications

These findings provide practical implications for university student support. Educational programs should not only focus on the acquisition of interpersonal skills but also monitor the psychological cost associated with social adaptation. Support systems should be designed to help students balance social engagement with the maintenance of self-esteem, preventing "social fatigue" during the transition to university life.

Limitations

This study has some methodological limitations. First, while we used a two-wave cross-lagged panel model to examine causal directions, this model has limited leverage for separating stable, between-person traits from true within-person changes over time. Future research with three or more waves of data would be beneficial to employ models such as the Random Intercept Cross-Lagged Panel Model (RI-CLPM) to more accurately distinguish these effects.

Conflicts of Interest

The authors declare no conflicts of interest associated with this manuscript.

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