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Abstract

This study examined the effect of nostalgia proneness on the level of achievement of developmental tasks during the later stages of adulthood (generativity and ego integrity) and the indirect effect of nostalgia on ego integrity. The level of nostalgia proneness changes with age and contributes to subjective well-being in old age. We assumed that nostalgia proneness affects generativity and ego integrity. To confirm the causal relationship between nostalgia proneness and achievement of developmental tasks, a longitudinal study was conducted. We conducted an Internet survey twice with 600 Japanese adults (aged 20–87). The first and second surveys (T1 and T2) were conducted in March 2021 and March 2022, respectively. The questionnaire comprised the inventory of psychosocial balance scale, positive/negative nostalgia proneness scale, and state functions of the nostalgia scale. An autoregressive path model indicated that high and low levels of positive and negative proneness, respectively, predicted ego integrity. The results of the mediation analysis suggested that social connections have an indirect effect on ego integrity and that people who tend to feel positive emotions are less likely to feel negative emotions when they remember nostalgic memories, which leads to a sense of social connection and the acquisition of ego integrity. The findings provide an understanding of the processes through which developmental tasks are facilitated in later adulthood and elucidate the efficacy of psychosocial interventions in older adults.

Keywords: Nostalgia, Nostalgia Proneness, Ego Integrity, Generativity,
Longitudinal Study

Relationship between Nostalgia Proneness, Generativity, and Ego Integrity

According to Erikson's (1963) theory of psychosocial development, the human life cycle evolves through eight sequential developmental stages from infancy to late adulthood. Studies have reported that generativity and ego integrity, which are developmental tasks that occur after adulthood, are positively correlated with well-being in old age (Ardelt, 2003; Ardel & Edwards, 2016; Ren et al., 2022), and achievement of developmental tasks is a psycho-social factor related to subjective well-being among older adults. Personality traits and Erikson's stages at younger ages are related to ego integrity among older adults (Ardelt et al., 2018; Westerhof et al., 2017). Furthermore, studies have shown that generativity and ego integrity are not directly enhanced with chronological age (Hannah et al., 1996; Webster, 2003; Westerhof et al., 2017), although Erikson distinguished eight phases in the life cycle that corresponded with approximate age groups. Therefore, it is unclear whether there are factors that influence the achievement of developmental tasks in adulthood beyond relatively stable factors, such as specific personality traits and the attainment of previous developmental tasks.

Erikson's Psychosocial Stages in Older Adulthood

This study examined how individual differences in nostalgia affect the achievement of developmental tasks, specifically generativity and ego integrity. Generativity versus stagnation is a key developmental task in the seventh stage in Erikson's stages of development, targeting middle-aged people (Erikson, 1963).

Generativity is “the concern in establishing and guiding the next generation. The person commits to leaving a lasting legacy by cultivating the next generation” (Erikson, 1963, p. 267). The desires to be useful to and contribute to younger generations are often-cited motivations for social engagement in later life (Narushima, 2005; Okun, 1994).

Generativity is enhanced not only by intergenerational interactions but also by feeling respect from others (Gruenewald, Liao & Seeman, 2012; Scott et al., 2022). Cheng (2009) stated in a longitudinal study that perceived respect from younger generations enhances generativity in later life. Therefore, generativity is related to social connections with others, especially respectable relationships with others.

Ego integrity versus despair is a key developmental task in the final stage, targeting older adults (Dunkel & Harbke, 2017). In this stage, individuals reflect on their lives and may experience either a sense of satisfaction or regret (Erikson & Erikson, 1998). When individuals are able to accept their past with their present, they tend to deal with their past and find meaning in their lives to adapt to the crisis of this stage, thus leading to feelings of wisdom, while failure to do so results in regret, bitterness, and despair (Erikson & Erikson, 1998). A life review conducted by Butler (1995) has suggested the mechanism that positive functions of reminiscence are related to ego integrity. Integrative reminiscence, which refers to the psychological process of reflecting on past experiences and incorporating them into one’s identity and life’s meaning, helps the individual achieve ego integrity (Wong, 1995). Ego integrity is conceptualized as individuals valuing their life history as positive through interactive reminiscence. Individual differences in people’s tendencies to recall nostalgic memories, which involve reminiscence (Hepper et al., 2012), may influence ego integrity.

Nostalgia Proneness and Function of Nostalgia

Nostalgia refers to “a preference (general liking, positive attitude, or favorable affect) toward objects (people, places, or things) that were more common (popular, fashionable, or widely circulated) when one was younger (in early adulthood, in adolescence, in childhood, or even before birth)” (Holbrook & Schindler, 1991, p. 330). Nostalgia proneness refers to an individual’s tendency to experience nostalgia; it is a personality trait that varies across individuals, with some people being more prone to nostalgia than others. Kusumi (2021) reported that the level of nostalgia proneness increases with age and that older adults tend to recall nostalgic memories with more positive and fewer negative emotions. Moreover, nostalgia proneness is related to subjective well-being.

The psychological functions of nostalgia can be classified into three dimensions (Sedikides & Wildschut, 2018, 2019). The first is the enhancement of social connectedness: Nostalgia evokes memories of intimate others, recognizes connections with others, such as family members (e.g., parents and children), reduces loneliness, and promotes prosocial behavior (Hepper et al., 2012; Wildschut et al., 2006). The second function is self-regard: Nostalgia is an emotion that accompanies the recollection of autobiographical memories in which oneself is the protagonist, enhances the recognition of one’s temporal continuity, clarifies oneself, and enhances self-esteem (Sedikides et al., 2016; Wildschut et al., 2006). The third function is the existential function: Nostalgia recognizes the meaning of life (Hepper et al., 2012) and reduces the threat of death as it involves the recollection of events from various periods of one’s life (Juhl et al., 2010).

These functions of nostalgia are conceptually similar to generativity and ego

integrity. Generativity is related to social connections and respectable relationships with others. Nostalgia evokes memories of intimate others, and people who tend to feel nostalgia with positive emotions have the potential to achieve generativity. Reminiscing about the past is related to ego integrity (Santor & Zuroff, 1994; Taft & Nehrke, 1990); when individuals reminisce about their lives, they tend to share this with others, which is related to finding meaning in the past (Cappeliez & O'Rourke, 2002; Cully et al., 2001). Therefore, we hypothesized that individual differences in nostalgia proneness and function may predict the level of achievement of developmental tasks in later stages of adulthood.

Nostalgia proneness is assessed by three dimensions: positive proneness, negative proneness, and reminiscence proneness. The level of nostalgia proneness changes with age; older adults tend to report higher levels of positive nostalgia proneness and lower levels of negative nostalgia proneness. Both have been reported to contribute to subjective well-being in old age via the function of nostalgia (Kusumi, 2021). However, the effect of nostalgia proneness on developmental tasks is unclear. We assumed that older adults who perform developmental tasks in old age are influenced by nostalgia proneness, which is the individual differences of viewing past experiences positively. By examining whether nostalgia proneness enhances developmental tasks in middle and old age, the study provides an understanding of the influence of nostalgia proneness as a psychological characteristic that helps in the achievement of developmental tasks during the adulthood. It suggests that the achievement of developmental tasks, such as generativity and ego-integrity, may be influenced not only by aging but also by nostalgia proneness. It has a practical implication in that it helps explain the effects of psychological interventions, including remission therapy

(Yamagami et al., 2007), targeting older adults.

Purpose of This Study

This study examined the effect of nostalgia proneness on the level of achievement of developmental tasks during adulthood (generativity and ego integrity) and the psychological process via the functions of nostalgia, such as social connectedness and self-regard, which may be related to subjective well-being. Specifically, social connectedness and self-regard may be related to generativity and ego integrity because they are related to life satisfaction (Kusumi, 2021).

The hypotheses of this study are as follows: a) Individual differences in nostalgia proneness affect the degree of generativity; b) Individual differences in nostalgia proneness affect the degree of ego integrity. The working hypotheses of a) are as follows: a-1) Negative proneness to nostalgia interrupts the degree of generativity; a-2) Positive proneness to nostalgia enhances the degree of generativity. In this study, the primary outcomes were negative and positive proneness to nostalgia, and the secondary outcome was reminiscence proneness to nostalgia. The working hypotheses of b) are as follows: b-1) Negative proneness to nostalgia interrupts the degree of ego integrity; b-2) Positive proneness to nostalgia enhances the degree of ego integrity. After supporting these hypotheses and examining the causal relationships with the two variables, we analyzed the indirect effect of nostalgia function on the relationship between nostalgia proneness and developmental tasks.

Methods

Participants and Procedure

We conducted two Internet surveys with Japanese adults (aged 20–87 years) using Cross-Marketing Inc., an online research company in Japan. The first survey (T1)

was conducted in March 2021 and the second survey (T2) was conducted in March 2022. The participants were fully informed about the study's purpose, procedures, risks, and benefits on the website before the survey. Informed consent was obtained from all the participants. The sample comprised 600 adults (314 men and 286 women) who lived in Japan and participated in both surveys. Participants who were doubtful about answering the questionnaire (the answer time was too short or the answers were the same for every question) were excluded from the dataset to avoid the effect of bias (Krosnick, 1991). The participants were financially compensated by the web system for completing the survey. This survey was approved by xxx, Research Ethics Committee (xxx).

Table 1 presents the participants' general characteristics. We conducted surveys targeting both older adults and younger adults to cover individuals at various stages of adulthood, because generativity and ego integrity did not directly increase with age (Westerhof et al., 2017). Busch (2023) conducted a survey with German adults aged 40 years or older, acknowledging the debate surrounding the usefulness of a chronological definition of middle adulthood. Given the ambiguity of life stage definitions in Japanese culture, participants in this study included younger generations. The study comprised 49 individuals in their twenties (20-29 years old), 73 in their thirties (30-39 years old), 89 in their forties (40-49 years old), 96 in their fifties (50-59 years old), 105 in their sixties (60-69 years old), 139 in their seventies (70-79 years old), and 49 in their eighties (80-87 years old). According to Japan's legal system, individuals aged 65 years and above are considered older adults, while those under 65 are classified as non-older adults. First, we tested the hypotheses with the total sample and, if supported, examined whether there were differences among age groups using multi-group analysis.

[Insert Table 1]

Measures

Erikson's Psychosocial Stages

The Japanese version of the Inventory of Psychosocial Balance (IPB; Shimonaka et al., 2000) was used to assess generativity and ego integrity. The IPB was developed by Domino and Affonso based on Erikson's theory of ego development stages and has good test-retest reliability and internal consistency (Domino & Affonso, 1990). Shimonaka et al. (2000) developed a Japanese version, checked for cultural differences, and conducted a back-translation. The Japanese version comprises eight subscales that contain 10 items scored on a five-point Likert scale, ranging from strongly disagree (*1 point*) to strongly agree (*5 points*); higher scores indicate better adaptability to the crisis of the life stages. In this study, the seventh and eighth stages, "generativity versus stagnation" (e.g., It is very important to plan for the next generation) and "integrity versus despair" (e.g., I know how much it means to have a strong sense of self), respectively, represented the developmental tasks of after adulthood period and were recognized as the dependent variables. The Japanese version of this scale demonstrated high internal consistency and validity (Shimonaka et al., 2000). The internal consistency of the data in this study was satisfactory (Cronbach's alphas for the subscales ranged from .75 to .77).

Nostalgia Proneness

We used the Scale of Positive/Negative Nostalgia Proneness (NP) (Kusumi, 2021; Appendix 2), comprising 18 items based on Hepper et al.'s (2012) characteristics of nostalgia and three subscales: negative nostalgia proneness (NP-N), positive nostalgia proneness (NP-P), and reminiscence (NP-R). NP-N contains seven items that

assess whether a person tends to remember nostalgic memories with negative emotions (e.g., When I have my past in mind, I feel loneliness). NP-P contains seven items that assess whether a person tends to remember nostalgic memories with positive emotions (e.g., When I have my past in mind, I feel happy). NP-R contains four items that assess whether a person tends to remember a nostalgic memory (e.g., I often reminisce). Participants rated each item in terms of how often it was true on an eight-point scale (1=*strongly disagree*, 8=*strongly agree*). Kusumi (2021) reported that the scale correlated with the short version of the Holbrook Nostalgia Proneness (Holbrook, 1993) and the Southampton Nostalgia Scale (Barrett et al., 2010) and demonstrated high internal consistency and validity. The internal consistency of the data in this study was satisfactory (Cronbach's alphas for the subscales ranged from .90 to .91).

Functions of Nostalgia

We used the Japanese version of the State Functions of Nostalgia Scale (Hepper et al., 2012; Kusumi, 2021), which comprises 16 items across four subscales: social connectedness (e.g., Thinking about the most nostalgic event makes me feel loved), self-continuity (e.g., Thinking about the most nostalgic event makes me feel connected with my past), meaning in life (e.g., Thinking about the most nostalgic event makes me feel life is meaningful), and self-regard (e.g., Thinking about the most nostalgic event makes me feel good about myself). Each subscale comprises four items. Participants rated each item on a five-point scale (1=*strongly disagree*, 5=*strongly agree*). Kusumi (2021) translated the scale into Japanese and reported its internal consistency and validity. The internal consistency of the data in this study was satisfactory (Cronbach's alphas of the subscales ranged from .85 to .93).

Control Variables

A previous study reported that there were age and gender differences in nostalgia proneness (Kusumi, 2021); thus, we used age and gender (1=male, 2=female) as control variables.

Data Analysis

Analyses were performed using R 19.0 for Windows (Ihaka & Gentleman, 1996) and M plus7 (Muthén & Muthén, Los Angeles, CA, USA). To assess goodness of fit, we used the following criteria: comparative fit index (CFI) $>.9$ (Bentler & Bonnet, 1980) and root mean square error of approximation (RMSEA) $<.10$ (Browne & Cudeck, 1993).

Results

Descriptive Statistics and Correlations

Table 2 shows the descriptive statistics of variables and correlations at T1.

[Insert Table 2]

Causal Relationship between Nostalgia Proneness and Psychosocial Stages

We first tested whether nostalgia proneness predicts generativity and ego integrity using an autoregressive path model within a structural equation model (Finkel, 1995). This design involves examining whether the variables at T1 predict the later variables at T2. The analysis model assessed variables for correlations, and each variable was predicted by previous variables (Figure 1). The analysis model includes the implication of a bidirectional relationship between the variables. The paths from nostalgia proneness to generativity/ego integrity indicate that nostalgia proneness predicts the score on the other measure at a later time, and the paths from generativity/ego integrity indicate a relationship in the opposite direction. These relationships between variables indicate the prospective effect of one variable on the

other, after controlling for stability across time. We compared the paths of (a) nostalgia proneness and (b) generativity/integrity. Table 3 shows the path coefficients¹.

[Insert Figure 1]

[Insert Table 3]

In the generativity model, the path from NP-N at T1 to generativity at T2 was not significant ($\beta = -.032, p = .23$), while the path from generativity at T1 to NP-N at T2 was significant ($\beta = -.062, p < .05$). The path from NP-P at T1 to generativity at T2 was not significant ($\beta = -.029, p = .28$), while the path from generativity at T1 to NP-P at T2 was significant ($\beta = .122, p < .01$). These results show an effect from generativity on nostalgia proneness. The results of NP-R, which is the secondary outcome, showed that the causal paths between generativity and NP-R (a and b) were not significant.

In the model of ego integrity, both paths between NP-N and ego integrity were significant ($\beta = -.135 / -.078, ps < .05$). The path coefficients were not significantly different. The path from NP-P at T1 to ego integrity at T2 was significant ($\beta = .080, p < .01$); however, the path from ego integrity at T1 to NP-P at T2 was not significant ($\beta = -.062, p = .06$). These results show an effect of positive nostalgia proneness on ego integrity. The causal paths between ego integrity and NP-R (a and b) were not significant.

¹ Marital status and education level are also important factors affecting ego-integrity and well-being (Seehusen et al., 2013; Solcova et al., 2021). Therefore, the authors conducted an additional analysis that included education level and marital status as control variables. The significant paths remained unchanged from the original analysis, indicating that the effects of these two variables were weak in the analysis model in this study. The output files of the additional analysis are publicly available at <https://osf.io/r2sg3/>.

To examine age-group differences in the relationship between nostalgia proneness and ego integrity, we performed a multi-group analysis, dividing participants into two groups: older adults (over 65 years) and non-older adults (under 65 years).

We compared the path coefficients from the models that examined the effect of NP-N/NP-P on ego integrity for the two groups (see Appendix 1). In the results for NP-N, the path coefficient was significant in older adults ($\beta = -.098, p < .05$) but not in non-older adults ($\beta = -.056, p = .16$). The test of difference in path coefficients showed that the age group difference in the path from NP-N to ego integrity was marginally significant ($Z = 0.743, p = .12$).

In the results of NP-P, the path coefficient from NP-P was significant in non-older adults ($\beta = -.109, p < .05$) but not in older adults ($\beta = -.069, p = .20$). The test of difference in path coefficients showed that the age group difference in the path from NP-P to ego integrity was marginally significant ($Z = 1.680, p = .09$).

Indirect Effects of Nostalgia Functions

We examined the indirect effects of nostalgia functions on the relationship between nostalgia proneness and ego integrity using path analysis by adding four factors of nostalgia function. The exogenous variables were ego integrity, NP-P, and NP-N at T1, and the endogenous variables were four factors of functions of nostalgia (T1) and ego integrity at T2. The saturated model hypothesized that nostalgia proneness (NP-P and NP-N) predicted the level of ego integrity and functions of nostalgia, and functions of nostalgia predicted the level of ego integrity (Figure 2). The goodness-of-fit

statistics for the final model, which removed the non-significant paths from the saturated mode, met the criteria (Figure 2; $\chi^2(3)=4.240$, n.s., RMSEA=.026, CFI=.999, SRMR=.007). The path coefficients indicated that NP-P was related to all the factors of nostalgia function (social connectedness: $\beta=.232$, $p<.01$, 95%CI [0.157–0.308]; self-continuity: $\beta=.172$, $p<.01$, 95%CI [0.092–0.253]; meaning in life: $\beta=.141$, $p<.01$, 95%CI [0.063–0.214]; and self-regard: $\beta=.130$, $p<.01$, 95%CI [0.049–0.216]); NP-N was related to lower levels of social connectedness, which is a factor of nostalgia function ($\beta=-.126$, $p<.01$, 95%CI [-0.20 – -0.049]); and social connectedness predicted higher levels of ego integrity at T2 ($\beta=.108$, $p<.01$, 95%CI [0.046–0.170]).

[Insert Figure 2]

We performed mediation analysis using bootstrapping (2000) to examine the indirect effects of nostalgia proneness on ego integrity. The indirect effects of NP-N ($\beta=-.014$, $p<.05$, 95% CI [-0.026–0.004]) and NP-P ($\beta=.025$, $p<.01$, 95% CI [0.010–0.043]) were negatively and positively significant, respectively.

Discussion

Using longitudinal data, this study examined whether nostalgia proneness predicted generativity and ego integrity. The effects of nostalgia proneness were not found to be significant; hypotheses a-1) and a-2) were not supported. Contrary to the expected findings, a reverse causality was demonstrated, suggesting that high levels of generativity are associated with subsequent high levels of positive proneness and low

levels of negative proneness. The mixed effects of nostalgia proneness in multiple directions pose limitations in interpreting these results. Nonetheless, generativity and nostalgia proneness still have the potential to influence each other. Watching images that evoke nostalgia affects nostalgia proneness (Kusumi, 2021). It is conceivable that situations enhancing generativity serve as triggers for nostalgic memories, subsequently influencing the inclination to experience nostalgia. Generativity is enhanced by positive feedback from the younger generation through interactions with the next generation that make them feel respect from the younger generation (Cheng, 2009). Therefore, these experiences become memories that evoke nostalgia and are more likely to be accompanied by positive emotions. However, this study lacked some important variables that may have impacted generativity (e.g., parental relationships and grandparent-grandchild relationships). Future studies examining the effect of generativity on nostalgia proneness and ego integrity are required to elucidate this process.

Regarding ego integrity, nostalgia proneness was found to predict subsequent ego integrity. A trend similar to that of positivity proneness on ego integrity was confirmed, although the effect of negativity proneness on ego integrity remained unclear. Therefore, hypotheses b-1) and b-2) were supported. When events from the past are felt nostalgically, this leads to the acquisition of ego integrity by making it easier to feel positive emotions and less likely to feel negative emotions. Therefore, it can be hypothesized that evaluating one's life experiences positively and accepting even painful experiences with reduced negative affect may facilitate the achievement of developmental tasks in later life.

The multi-group analysis results did not show clear age-related differences in the relationship between nostalgia proneness and ego integrity. Although the effect was marginally significant, there was a potential age difference, with the older age group showing a weaker effect than the younger group. The correlation between age and NP-P was significant in the older adult group, and the significant correlations of age were not found in the non-older adult group models that added nostalgia proneness (Please see if this is Appendix 1, line 16). It was suggested that temporal changes might be difficult to observe because of the confounding effect of age on positive affectivity.

Regarding the supported hypotheses b-1) and b-2), a path analysis was performed to examine the psychological processes mediated by nostalgia. The results indicated that a person tends to feel nostalgia with higher levels of positive emotions and lower levels of negative emotions, which enhances social connection and promotes ego integrity. Social connections have been reported to be related to life satisfaction (Hepper et al., 2012). Kusumi (2021) reported that self-clarity, a factor of nostalgia function, is also related to life satisfaction. However, no effect of self-clarity on ego integrity was found in this study. The coefficients of the simple correlation between self-clarity and ego integrity showed a moderate level of correlation ($r=.61$), although we did not find a relationship in the path analysis model using the longitudinal dataset. Therefore, social connection is liable to variation, while other factors remain stable, implying that social connection impacts the variation of ego integrity.

In this study, reminiscence proneness was the secondary outcome, and there were no significant causal relationships between reminiscence proneness, generativity, and ego integrity. Reminiscence proneness means that the person tends to remember a nostalgic memory and whether recalling this memory with positive or negative

emotions is inconsequential. The results of the monotonic correlations between NP-R, NP-N, and NP-P showed that NP-R was associated with both negative and positive nostalgia proneness (NP-N: $r=0.57$; NP-P; $r=0.49$). Therefore, individual differences in reminiscence were not related to the achievement of developmental tasks in later life directory.

Indirect Effects of Nostalgia Functions

Positivity proneness was related to all the factors of nostalgia functions, while negativity proneness was only associated with social connectedness. The correlations between negativity proneness and these four factors of nostalgia function were significantly negative. Kusumi (2021) reported that negativity proneness was associated with other factors when examining life satisfaction as an outcome variable. However, in the present study, we did not confirm the effect of negativity proneness on nostalgia functions except for social connectedness. These results indicate that low negativity proneness is associated with experiencing fewer unpleasant emotions when reminiscing about past nostalgic events. This study, which focuses on ego integrity as the outcome variable, directly suggests that low negativity proneness contributes to the acquisition of ego integrity. The standardized value of path coefficients from NP-N to ego integrity is higher than that from NP-P to ego integrity (Figure 2). Within the concept of ego integrity, which encompasses accepting one's life experiences, it is believed that there is a strong direct effect on negativity proneness independent of the functions of nostalgia.

The association between nostalgia proneness and ego integrity was mediated by social connectedness. Engaging in nostalgic reflections on memories has been found to facilitate ego integrity through the reaffirmation of social bonds. Integrative reminiscence helps the individual achieve ego integrity (Wong, 1995). The results of

this study indicated that remembering memories with positive emotions was related to feeling social connectedness and it leads to conceptualize ego integrity by valuing their life through feeling social bonds with others.

Practical Implications

This study's findings contribute to understanding the processes through which developmental tasks are facilitated in later adulthood. Developmental tasks are established for each stage of life; however, aging cannot be said to directly influence ego integrity (Westerhof et al., 2017). In this study, when analyzing the inclusion of nostalgia proneness, the path from age to developmental tasks was found to be non-significant. The tendency of positive proneness to nostalgia to increase and negative proneness to decrease with age (Kusumi, 2021) suggest that age-related influences can be explained by nostalgia proneness.

Moreover, the association between nostalgia proneness and ego integrity was mediated by the perception of social connections. Engaging in nostalgic reflections on memories has been found to facilitate ego integrity through the reaffirmation of social bonds. This finding is expected to contribute to the understanding and elucidation of the efficacy of psychological interventions, including reminiscence therapy (Yamagami et al., 2007), targeting older adults. The results of this study indicate that the effects of nostalgia proneness are not limited to older adults, suggesting that these interventions may also be effective for patients in other age groups.

The strength of the study is the inclusion of a Japanese sample, and the results included Japanese or East Asian cultural backgrounds. In Japan, nostalgia is known as “Natsukashisa,” with “Natsu-ku” meaning friendliness and familiarity (Kusumi, 2021). Nostalgia in Western countries, where nostalgia often entails bittersweet feelings and

negativity, in Japan there is a tendency for nostalgia to be associated with positive emotions and connection with others. Given these cultural differences, there is the possibility of an association between ego integrity and nostalgia proneness among the participants of this study, including younger generations. Future studies are necessary to examine whether these results can be replicated in other cultures.

Limitations and Future Research

This study has several limitations. First, nostalgia proneness was found to be affected by SES in previous research (Newman et al., 2022); however, this study has not investigated the impact of SES factors, such as family income and residential area. Second, the participants included older adults and young individuals. The results of the multi-group analysis did not indicate age group differences. It is unclear whether the effects of nostalgia proneness are specific to older adults. This study's findings suggest that nostalgia proneness is related to ego integrity, which is a developmental task during the later stages of adulthood. Finally, surveys were conducted at two time points over the course of one year, a narrow period affected by the COVID-19 pandemic. It is necessary to explore developmental effects over a longer period of time. The period of pandemic-related restrictions and reduced social interactions may have led to enhanced reminiscence regarding past life events and significant interpersonal relationships (Zhou et al., 2022). Therefore, it is difficult to determine the extent to which historical events have influenced this study's findings.

Conclusions

This study confirmed the effect of nostalgia proneness on generativity and ego integrity. A longitudinal study indicated that individual differences in nostalgia proneness predicted ego integrity and social connection had an indirect effect. These

results suggest that people who tend to feel positive emotions are less likely to feel negative emotions when they remember nostalgic memories, which leads to a sense of social connection and the acquisition of ego integrity. This study's findings contribute to understanding the processes through which developmental tasks are facilitated in later adulthood and are expected to contribute to the understanding and elucidation of the efficacy of psychological interventions, including reminiscence therapy, targeting older adults.

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Conflict of interest

The authors declare that they have no conflict of interest.

Data Availability Statement

The data used in this study and pre-registration information for the analysis plan of this study are publicly available at <https://osf.io/r2sg3/>.

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Table 1*Demographic Characteristics of Participants*

		Total (<i>n</i> =600)	aged<65 (<i>n</i> =366)	aged>=65 (<i>n</i> =234)
Age	<i>M</i> (<i>SD</i>)	56.69 (16.93)	45.75 (11.95)	73.80 (5.58)
Gender	Male	314 (52.3%)	190 (51.9%)	124 (53.0%)
	Female	286 (47.7%)	176 (48.1%)	110 (47.0%)
Marital status	Married	379 (63.2%)	192 (52.5%)	187 (79.9%)
	Unmarried	162 (27.0%)	155 (42.3%)	7 (3.0%)
	Divorced/Widowed	59 (9.8%)	19 (5.2%)	40 (17.1%)
Educational background	Junior high school	14 (2.3%)	8 (2.2%)	6 (2.6%)
	High school	172 (28.7%)	89 (24.3%)	83 (35.5%)
	College School	45 (7.5%)	36 (9.8%)	9 (3.8%)
	Junior college/Technical college	69 (11.5%)	38 (10.4%)	31 (13.2%)
	University	277 (46.2%)	175 (47.8%)	102 (43.6%)
	Graduate school	21 (3.5%)	19 (5.2%)	2 (0.9%)
	Others/no answer	2 (0.3%)	1 (0.3%)	1 (0.4%)

Table 2*Descriptive Statistics of Variables and Correlations at T1*

Variables	<i>M</i>	(<i>SD</i>)	1	2	3	4	5	6	7	8	9
1. Generativity	3.58	(0.60)	—								
2. Ego integrity	3.54	(0.66)	.72 **	—							
3. NP-N	3.91	(1.50)	-.27 **	-.48 **	—						
4. NP-P	4.46	(1.38)	.33 **	.36 **	.03	—					
5. NP-R	4.72	(1.51)	.00	-.11 **	.57 **	.49 **	—				
6. Social connectedness	3.85	(1.04)	.49 **	.66 **	-.36 **	.42 **	-.01	—			
7. Self-continuity	4.14	(0.96)	.50 **	.52 **	-.21 **	.34 **	.13 **	.58 **	—		
8. Meaning in life	4.00	(1.07)	.56 **	.61 **	-.29 **	.36 **	.02	.63 **	.59 **	—	
9. Self-regard	3.78	(0.96)	.45 **	.52 **	-.19 **	.32 **	.09 *	.52 **	.56 **	.68 **	—
10.Age	56.69	(16.93)	.35 **	.34 **	-.21 **	.21 **	-.06	.29 **	.26 **	.37 **	.37 **

Notes: ** $p < .01$, * $p < .05$, $N = 600$, NP-N=negative nostalgia proneness, NP-P=positive nostalgia proneness, NP-R= reminiscence.

Table 3*Path Coefficients of the Analysis Models*

path	NP-N and Generativity		NP-P and Generativity		NP-R and Generativity	
	coefficient	95%CI	coefficient	95%CI	coefficient	95%CI
a	-.032	-.084 - .020	.029	-.024 - .081	-.031	-.080 - .019
b	-.062 *	-.119 - .004	.122 **	.058 - .187	-.040	-.107 - .027
c	.721 **	.681 - .761	.621 **	.571 - .672	.618 **	.568 - .668
d	.746 **	.706 - .786	.745 **	.704 - .786	.754 **	.716 - .792
e	-.270 **	-.343 - -.194	.332 **	.259 - .402	-.001	-.081 - .079
f	-.139 **	-.217 - -.060	.117 **	.038 - .196	.006	-.074 - -.086

path	NP-N and Ego integrity		NP-P and Ego integrity		NP-R and Ego integrity	
	coefficient	95%CI	coefficient	95%CI	coefficient	95%CI
a	-.135 **	-.189 - -.082	.080 **	.029 - .131	-.042	-.090 - .006
b	-.078 **	-.140 - -.016	.062	-.003 - .128	-.065	-.133 - .002
c	.701 **	.653 - .748	.635 **	.584 - .686	.611 **	.561 - .662
d	.725 **	.680 - .769	.762 **	.722 - .801	.783 **	.748 - .818
e	-.477 **	-.536 - -.413	.362 **	.290 - .429	-.110 **	-.188 - -.030
f	-.160 **	-.238 - -.082	.190 **	.113 - .267	.029	-.051 - .109

Notes: The values were standardized. The label of letters indicates the paths in Figure 1:

a=the effect from nostalgia proneness, b=the effect from generativity/ego integrity,

c=stability effect of nostalgia proneness, d=stability effect of generativity/ego integrity,

e=correlations at T1, f=correlations at T2. ** $p < .01$, * $p < .05$, $N=600$, NP-N=negative

nostalgia proneness, NP-P=positive nostalgia proneness, NP-R= reminiscence.

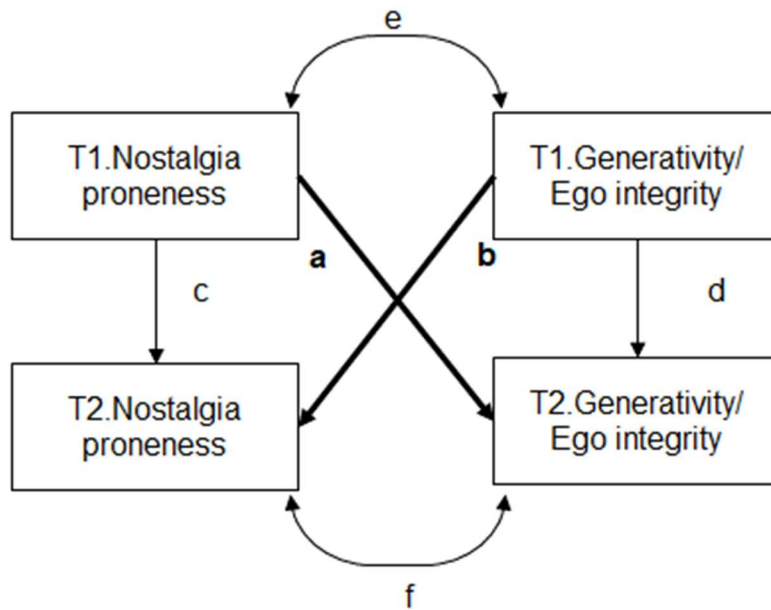
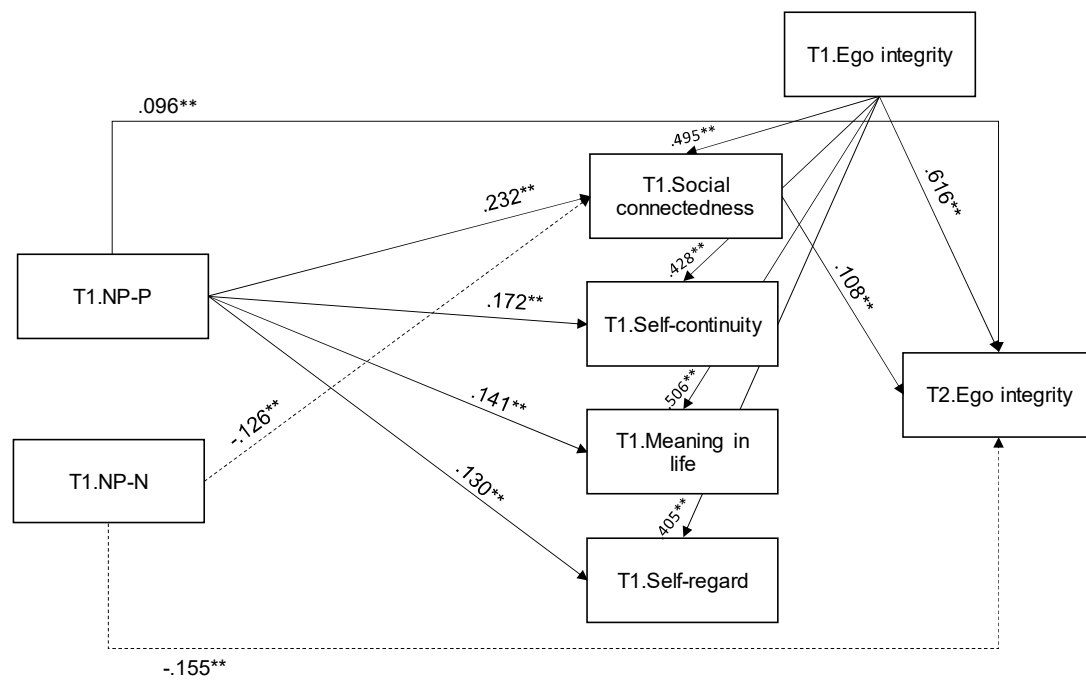


Figure 1

Analytical Model to Examine an Autoregressive Path Model.

Notes: In the analysis, four models were used to examine four hypotheses (a-1: negative proneness to nostalgia and generativity, a-2: positive proneness to nostalgia and generativity, b-1: negative proneness to nostalgia and ego integrity, and b-2: positive proneness to nostalgia and ego integrity).

**Figure 2**

Results of path analysis to examine the relationship between nostalgia proneness, functions of nostalgia, and ego integrity

Notes: ** $p < .01$, * $p < .05$, $N = 600$. The values were standardized. Dashed paths indicate negative values. The correlations between exogenous variables and errors are abbreviated.

Supplementary file*Appendix 1.**Path Coefficients in the Multi-group Analysis*

Time1	Time2	Non-older adults (n =366)	Older adults (n =234)
T1 NP-N	→ T2 Ego integrity	-.102 **	-.208 **
T1 Ego integrity	→ T2 NP-N	-.056	-.098 *
T1 NP-N	→ T2 NP-N	.725 **	.654 **
T1 Ego integrity	→ T2 Ego integrity	.752 **	.682 **
T1 Ego integrity	↔ T2 Ego integrity	-.141 **	-.196 **
Age	→ T2 Ego integrity	-.006	-.020
Age	→ T2 NP-N	-.005	.034
Gender	→ T2 Ego integrity	.009	.031
Gender	→ T2 NP-N	.013	.048
T1 NP-P	→ T2 Ego integrity	.109 *	.069
T1 Ego integrity	→ T2 NP-P	.056	.028
T1 NP-P	→ T2 NP-P	.765 **	.728 **
T1 Ego integrity	→ T2 Ego integrity	.667 **	.586 **
T1 Ego integrity	↔ T2 Ego integrity	.205 **	.155 *
Age	→ T2 Ego integrity	-.007	-.026
Age	→ T2 NP-P	.027	.144 **
Gender	→ T2 Ego integrity	-.001	.027
Gender	→ T2 NP-P	-.040	-.001

Notes: ** $p < .01$, * $p < .05$. The values were standardized.

*Appendix 2.**Translation of the Scale of Positive/Negative Nostalgia Proneness (NP) (Kusumi, 2021)*

Items
1 When I have my past in mind, I feel lethargic and lazy.
2 When I have my past in mind, I feel sad and depressed.
3 When I have my past in mind, I feel heart-wrenching and anxious (e.g., distress and nausea).
4 When I have my past in mind, I feel loneliness.
5 When I have my past in mind, I feel like an introvert.
6 When I have my past in mind, I feel regret about it.
7 When I have my past in mind, I feel sentimental.
8 When I have my past in mind, I feel calm and relaxed.
9 When I have my past in mind, I feel happy.
10 When I have my past in mind, I feel comfortable and warm.
11 I remember rose-tinted memories.
12 I often recall fond memories (good old days and funny moments).
13 When I have my past in mind, I feel a bond between relationships (family, friends, etc.).
14 I remember events of the past and recognize their value to me.
15 I often have my past in mind (reminisce, look back on the past).
16 I often reminisce.
17 I often recall old memories.
18 I often look back on the past.

Notes: NP-N=items 1–7, NP-P=items 8–14, NP-R=items 15–18.