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Abstract

Inquisitiveness (curiosity & acceptance to something and someone different) is a main engine for one person to initiate some relation, and the literature has established that maintaining nice relationships with friends, family and general others contributes to generativity and happiness. However, little is known about how generativity and happiness are characterized by inquisitiveness. We hypothesize that inquisitiveness is a fundamental determinant for generativity and happiness, empirically examining the relationships along with cognitive, noncognitive and sociodemographic factors. We conduct questionnaire surveys with 400 Japanese subjects, applying quantile regression and structural equation modeling to the data. First, the analysis identifies the importance of inquisitiveness in characterizing generativity in that people with high inquisitiveness tend to be generative. Second, people are identified to be happy as they have high generativity and inquisitiveness, demonstrating two influential roles of inquisitiveness as direct and indirect determinants through a mediator of generativity. Overall, the results suggest that inquisitiveness shall be a key element of people's happiness through intergenerational and intragenerational communications or relations.

Keywords: inquisitiveness; generativity; happiness

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Contents

Nomenclature

JPY Japanese yen

LGS Loyola generative scale

SEM Structural equation modeling

SVO Social value orientation

SWB Subjective wellbeing

SWLS Satisfaction with life scale

1 Introduction

Curiosity and acceptance are important elements for one person to gain creativity, fulfillment and views (Kashdan et al., 2009, Silvia and Kashdan, 2009, Kashdan et al., 2011, Hagtvedt et al., 2019). A child's tendency to ask a question given his or her curiosity and to accept something and/or someone new shall be an initial step of building human relations and learning various things. In the literature, such a tendency is conceptualized as "inquisitiveness" representing curiosity & acceptance to something and someone different (Lagattuta and Wellman, 2002, Fusaro and Smith, 2018). For instance, Frazier et al. (2009) examine adult-child conversational exchanges by focusing on young children's questions and adult's answers, claiming that such communications provide important bases for children's future life, especially regarding how they are able to grow through human interactions. Moreover, it has been established that having and keeping nice relationships with family, friends and general others contribute to generativity and happiness (McAdams and Aubin, 1992, Huta and Zuroff, 2007, Hofer et al., 2008, Schoklitsch and Baumann, 2012, Villar, 2012). Given this state of affairs, individual tendencies to be curious about and/or accept something and someone different (or new) may be a main engine for one person to be not only interactive with people in different generations but also happy. Therefore, this research addresses the role of inquisitiveness for generativity and happiness.

Erikson (1963) introduces the concept of generativity and defines it as a concern regarding the establishing and guiding of future generations in the life-span theory of personality development. Generativity is expressed in bearing and raising children but is by no means limited to the domain of parenthood (McAdams and Aubin, 1992). Various activities and behaviors in relation to future generations spanning guiding, helping and teaching something useful and interesting to young generations, are also considered expressions of generativity (McAdams and Logan, 2004, Timilsina et al., 2019). Some scales of generativity have been developed to quantify such people's activities, behaviors and concerns, e.g., the Loyola generativity scale (LGS) and the generative behavior checklist (GBC) (McAdams and Aubin, 1992, McAdams et al., 1993, McAdams, 2001, Hofer et al., 2008). Utilizing these scales, previous studies have characterized generativity in relation

to psychological and sociodemographic factors, such as aging, education, gender, health, income, marital status, political view, type of societies and value orientation (Peterson and Duncan, 1999, Pratt et al., 2001, Lawford et al., 2005, Rittenour and Colaner, 2012, Jones and McAdams, 2013, Schoklitsch and Baumann, 2012, Timilsina et al., 2019). Overall, it is established that age, marital status and type of societies are main determinants of generativity.

In modern society, happiness or wellbeing is taken to be a term that represents an outcome of a "good life," where people are assumed to act and behave to seek happiness (Mentzakis and Moro, 2009, Jorgensen et al., 2010, Luhmann et al., 2011, Gilbert et al., 2016).[1] Maslow (1954) is the first to propose a wellbeing theory based on psychological needs and gratification processes, suggesting that people are happy as they become wealthy, i.e., Maslow's hypothesis. To examine this hypothesis, several researchers have developed and refined happiness measurements, such as the subjective happiness scale (SHS) and satisfaction with life scale (SWLS) (see, e.g., Diener et al., 1985, 2003, Lyubomirsky and Lepper, 1999). Veenhoven (1991) and Diener and Diener (1995) empirically examine the hypothesis with cross-country-level data utilizing happiness scales and conclude that wealth can account for variation in happiness across countries to a certain extent; however, there should be some other important predictors. Following these works, the literature has mainly focused on how happiness is associated with various cultural, sociodemographic and personal factors, other than wealth or income, including education, gender, marital status, self-esteem, human relations, optimism and extraversion (Diener et al., 1998, 1999, Kahneman et al., 1999, Lee et al., 2000, Jan and Masood, 2008, Oishi and Diener, 2009, Diener and Ryan, 2009, Chitchai et al., 2018). Overall, it is established that aging, income, human relationships, personality traits and value orientations matter for characterizing happiness (Welsch, 2006, Zidansek, 2007, Leung et al., 2011, Bibi et al., 2015, Meisenberg and Woodley, 2015, Magnani and Zhu, 2018, Au et al., 2020).

Some previous studies have empirically examined the relationship between generativity and happiness, often along with social preferences, attracting much attention in the last few decades

[1] In this paper, we interchangeably use the term "wellbeing" to refer to "happiness."

due to the emergence of many environmental and sustainability problems (Dunn et al., 2008, Hofer et al., 2008, Aknin et al., 2012, Layous et al., 2012, Dunn et al., 2014, Rudd et al., 2014, Aknin et al., 2015, Morselli and Passini, 2015, Timilsina et al., 2019, Shahen et al., 2019). Aknin et al. (2012) conduct survey experiments with 51 students of the University of British Columbia, claiming that social preferences are positively associated with happiness and there exists a positive feedback loop between the two. Timilsina et al. (2019) compare prosociality and generativity between rural and urban people by conducting survey experiments in Nepal. They find that rural people are more prosocial and generative than urban ones, and claim that prosocial orientation shall contribute to generativity. Building upon Timilsina et al. (2019), Shahen et al. (2019) conduct similar types of survey experiments in rural and urban areas of Bangladesh, collecting data on happiness and generativity along with prosociality and other variables. They establish that generativity is a robust and consistent predictor of happiness, controlling for prosociality and some other key sociodemographic factors in the analyses. Overall, these studies suggest that generativity and prosociality can influence happiness (Aubin and McAdams, 1995, Huta and Zuroff, 2007, Hofer et al., 2008, Cox et al., 2010, Tabuchi et al., 2015).

Inquisitiveness is a concept to represent curiosity & acceptance of something and someone different and/or new, and those with such inquisitiveness tend to start communications with others by asking questions (Hirayama and Kusumi, 2004, Black, 2005, Bardone and Secchi, 2017, Watson, 2018, 2019). After some development of the scales for inquisitiveness as a subscale of critical thinking disposition by Facione et al. (1992), Hirayama and Kusumi (2004) and Hogan and Hogan (2007), some studies have been conducted to address how an inquisitive person behaves in terms of learning from and engaging with people regardless of their backgrounds, positions and roles as well as how such behaviors may lead to creative problem solving for nursing and schooling (Yeh, 2002, Kawashima and Petrini, 2004, Hogan and Hogan, 2007, Bardone and Secchi, 2017, Secchi and Adamsen, 2017). Hirayama and Kusumi (2004) conduct questionnaire surveys with 426 Japanese university students and analyze the effects of critical thinking attitudes on the process of drawing a conclusion. They find that inquisitiveness is an essential factor to reach a conclusion

that is not bounded by people's beliefs. Nakagawa (2016) also demonstrates that inquisitiveness is positively correlated with how people are well prepared for possible future disasters by conducting questionnaire surveys in Japan.[2] Overall, inquisitiveness is a powerful source of engines that increases the motivation and behaviors in some situations, triggering people's communications with others and their interactions with unfamiliar environments (Blank and Covington, 1965, Baldwin and Moses, 1996, Black, 2005, Cluver, 2010).

No previous works have addressed how generativity and happiness are characterized by inquisitiveness, while both of these concepts are known to be highly concerned with how people build and keep relationships with family, friends and general others. Inquisitiveness is considered an important factor to trigger communications, being conjectured to contribute to maintaining and keeping nice human relations. Therefore, it is hypothesized that inquisitiveness is an important determinant of happiness and generativity, empirically examining the relationships along with noncognitive, cognitive and sociodemographic factors in a single analytical framework. To this end, we conduct questionnaire surveys with 400 Japanese subjects to collect information on the aforementioned factors, social preference, inquisitiveness, generativity and happiness. With these data, our research addresses the following two open questions. (1) Does inquisitiveness play a role in generativity? (2) How does inquisitiveness, along with generativity, affect people's happiness?

2 Materials and methods

We conduct questionnaire surveys with 400 subjects sourced from the registered participant pool of a web-based survey research organization, Cross Marketing Inc., in Japan. Subjects' mean age is 47.79 years with a standard deviation $= 16.74$, ranging between 20 and 88 years. The survey area is divided into urban and nonurban ones according to a population density of 500 people km^{-2}. If the population density at the place where a subject lives is above the threshold, it is urban. Oth-

[2] Another group of studies analyze the role of inquisitiveness in leadership studies at schools and workplaces, generally confirming its importance in experiments and the fields (Harris, 2011, Blickle et al., 2014, Bardone and Secchi, 2017, Watson, 2019).

erwise, it is nonurban. This survey collects a sample of 200 subjects each in urban and nonurban areas (400 subjects in total) with information about (i) sociodemographic factors, such as age, gender, household income, marital status, educational background, family characteristics, (ii) generativity (a concern in guiding the next generation), (iii) subjective wellbeing (SWB) as happiness, (iv) inquisitiveness (curiosity & acceptance to something and someone different and/or new) and (v) social value orientation (as a proxy for social preferences). The variables we collect in this survey can be categorized into cognitive, noncognitive and sociodemographic factors in relation to SWB, as described in figure 1.

[Figure 1 about here.]

We employ the satisfaction with life scale (SWLS) to measure subjects' life satisfaction in our survey, wellbeing is a part of happiness (Bibi et al., 2015). The SWLS is an established measure of life satisfaction and is known as a concept that is central to the research area of subjective well-being (SWB) (see, e.g., Diener et al., 1985, Hayes and Joseph, 2003, Rittenour and Colaner, 2012, Grossman and Gruenewald, 2020). Validation is carried out across ages, countries and genders (Diener et al., 1985, Jan and Masood, 2008, Esnaola et al., 2017) and the components consist of several aspects (i.e., affective, intrinsic and extrinsic ones) (Diener et al., 1985, Lucas et al., 1996). The affective aspect of life satisfaction refers to emotional elements, whereby levels of positive and negative ones are used to indicate the status of SWB (Lucas et al., 1996). In this case, the level of SWB is measured by psychological instruments, such as Ryff's psychological wellbeing scale (Ryff, 1989). The extrinsic aspect of life satisfaction refers to a relativistic judgment, whereby comparing oneself with others is used to indicate the status of SWB. In this case, the level of people's SWB is measured by instruments, such as the subjective happiness scale (SHS), as compared to that of their peers by stating "Compared to my peers, I consider myself," and its anchor is "less happy" and/or "more happy" (Lyubomirsky and Lepper, 1999).

This research focuses on intrinsic happiness, not limited to positive and negative emotions, employing the SWLS, which is designed to measure self-recognition of SWB (Diener et al., 1985, Diener, 2009, Esnaola et al., 2017). The items of the SWLS include five short statements: (1) "In

most ways, my life is close to my ideal," (2) "The conditions of my life are excellent," (3) "I am satisfied with my life," (4) "So far, I have gotten the important things I want in life" and (5) "If I could live my life over, I would change almost nothing." Each item scores on a 7-point Likert scale, ranging from $1 =$ "Strongly disagree" to $7 =$ "Strongly agree," and the total scale scores are the sum of the five-item scores, ranging between 5 and 35. The higher the scores are, the greater life satisfaction is. The scores are categorized as extremely satisfied ($31 \sim 35$), satisfied ($26 \sim 30$), slightly satisfied ($21 \sim 25$), neutral (20), slightly dissatisfied ($15 \sim 19$), dissatisfied ($10 \sim 14$) and extremely dissatisfied ($5 \sim 9$).

For generativity, researchers have developed several measurements to assess individual differences in consideration of its various aspects (Schoklitsch and Baumann, 2012). The Loyola generativity scale (LGS), which shall be considered a cognitive factor, is employed to measure "generative concern," as it is the most commonly used one in the literature (see, e.g., McAdams and Aubin, 1992, Peterson and Duncan, 1999, McAdams et al., 2001, Lawford et al., 2005, Schoklitsch and Baumann, 2012, Jones and McAdams, 2013, Newton et al., 2014, de Espanés et al., 2015). The LGS scale contains a list of 20 questions, of which 6 questions are reverse questions. Another popular scale for generativity is the generative behavior checklist (GBC) that scores on "generative behaviors" in the past two months (McAdams et al., 1993, Schoklitsch and Baumann, 2012). Both the LGS and GBC are established to display positive associations, demonstrating consistency between generative concerns and behaviors (McAdams et al., 1993). We decide to use the LGS rather than the GBC because we realize that some questions in the GBC shall be difficult for many Japanese people to answer because of the absence of such opportunities and experiences (e.g.,"Babysat for somebody else's children," "Taught Sunday school or provided similar religious instruction").

The items of the LGS include statements, such as (1) "I try to pass along the knowledge I have gained through my experiences," (2) "I have important skills that I try to teach others," (3) "I feel as though I have made a difference to many people," (4) "I have made and created things that have had an impact on other people," (5) "I have made many commitments to many different

kinds of people, groups and activities in my life" and (6) "I do not volunteer to work for a charity." Here, question (6) is considered the reverse one. Subjects need to choose one of four options for each statement. "Zero," "one," "two" or "three" scores indicate how often the statement applies to subjects (Mark "zero" if a statement never applies, mark "three" if the statement applies very often or nearly always). In the case of reverse questions, we calculate the reverse score (i.e., zero becomes three, one becomes two, two becomes three and three becomes zero). The generativity score for each subject is computed as the sum of the scores for all 20 items. The theoretical range is between 0 and 60, being calculated as the sum of the scores from the LGS questions, and Cronbach's alpha for this measure is 0.90 in our sample.

We employ the inquisitiveness scale in our survey, which is a subscale of the critical thinking disposition scale developed by Hirayama and Kusumi (2004). This instrument is used to measure one's disposition for curiosity & acceptance of something and someone different and/or new (Hirayama and Kusumi, 2004, Nakagawa, 2016, Futami et al., 2020). This subscale consists of ten items, including (1) "I want to interact with people with various ways of thinking and learn a lot from them," (2) "I want to keep learning new things throughout my life," (3) "I like to challenge new things," (4) "I want to learn about various cultures," (5) "Learning how foreigners think is meaningful to me," (6) "I am interested in people who have a different way of thinking," (7) "I want to know more about any topic," (8) "I want to learn as much as possible, even if I do not know if it is useful," (9) "It is interesting to discuss with people who have different ideas than me" and (10) "I want to ask someone if I do not know." The items are rated from $1 =$ "Strongly disagree" to $5 =$ "Strongly agree." The theoretical range is between 10 and 50. This subscale is established as a reliable measure for influencing people's behaviors and attitudes in many important contexts, such as disaster management (Nakagawa, 2016).

We use the SVO game with the "slider method" to identify subjects' social preferences as prosocial or proself (Murphy et al., 2011). Figure 2 shows the six items of the slider measure that gives numbers to represent outcomes for oneself and the other in a pair of people where the other is unknown to the subject. Subjects are asked to choose among the nine options for each item.

Each subject chooses her allocation by marking a line that defines her most preferred distribution between herself and the other person. The mean allocation for herself $\overline{A}_s$ and that for the other person $\overline{A}_o$ are calculated from all six items (see figure 2). Then, 50 is subtracted from $\overline{A}_s$, and $\overline{A}_o$ to shift the base of the resulting angle to the center of the circle $(50, 50)$. The index of a subject's SVO is given by SVO $= \arctan \frac{(\overline{A}_o)-50}{(\overline{A}_s)-50}$. Depending on the values generated from the test, social preferences are categorized as follows: 1. altruist: SVO $> 57.15°$, 2. prosocial: $22.45° <$ SVO $< 57.15°$, 3. individualist: $-12.04° <$ SVO $< 22.45°$ and 4. competitive: SVO $< -12.04°$.

[Figure 2 about here.]

The SVO framework assumes that people have different motivations and goals for evaluating resource allocations between themselves and others. Also, the SVOs are established to be stable for a long time (see, e.g., Van Lange et al., 2007, Brosig-Koch et al., 2011). Subjects that are yielded from six primary items give complete categories of social preferences. As has been done in the research of psychology, we further simplify the four categories of social preferences into two categories of prosocial and proself types; "altruist" and "prosocial" types are categorized as prosocial subjects, while "individualist" and "competitive" types are categorized as "proself" subjects (see Murphy et al., 2011). Subjects are informed that the units in this game are points, meaning that the more points they get, the more real money they will earn.[3] Our survey experiments are conducted with real monetary payments in the SVO game. This game is designed to motivate subjects to seriously perform in the survey experiment, considering their opportunity costs of time and their true revelation of social preferences. One session takes 5 to 8 minutes. An exchange rate is applied to the points in the games to determine the monetary reward, and subjects receive a maximum of 150 JPY ($\approx$ 1.37 USD) and an average of 104 JPY ($\approx$ 0.95 USD) in the game. The decisions in this game are conducted in complete privacy. To compute the payoffs of subjects, we randomly match one subject with another to form a pair. The payoff for each subject in the game is the summation of the points from 6 selections by an individual, as "You," and 6 selections by

[3]For details, see the instructions in figure 2.

the partner, as "Other." We explain the methods of random matching and payoff calculation with information on the exchange rate 1 point is converted to 1 JPY) for the real monetary incentive for subjects before starting the game. Subjects who finish the questionnaire receive payments from the game and are paid 96.33 JPY on average.

With the data of the aforementioned variables, we use mean-based and median regressions to address the two open questions posed in this paper. Question 1: "Does inquisitiveness play a role in generativity?" Question 2: "How does inquisitiveness, along with generativity, affect people's happiness?" To answer questions (1) and (2), regression models are applied to characterize generativity and happiness as dependent variables, respectively, in relation to other key independent variables as described in figure 1, enabling to identify important determinants. For empirically characterizing the generativity of subject i, the model is specified as

$$\text{generativity}_i = \alpha_0 + \alpha_1 \cdot \text{inquisitiveness}_i + \alpha_2 \cdot \text{SVO}_i + \boldsymbol{\alpha}_3 \cdot \mathbf{x}_i' + \epsilon_i, \tag{1}$$

where $\mathbf{x}_i$ is a vector of sociodemographic independent variables including household income, marital status, family type, education, gender, etc. The associated coefficients of $\alpha_0, \alpha_1, , \alpha_2, \boldsymbol{\alpha}_3$ are the parameters to be estimated, and ϵ_i is a disturbance term. In equation (1), parameter α_1 is of particular interest to statistically examine question (1). For the happiness of subject i, the model is

$$\text{SWB}_i = \beta_0 + \beta_1 \cdot \text{inquisitiveness}_i + \beta_2 \cdot \text{generativity}_i + \beta_3 \cdot \text{SVO}_i + \boldsymbol{\beta}_4 \cdot \mathbf{x}_i' + \varepsilon_i \tag{2}$$

where SWB_i stands for subject i's happiness. The coefficients, $\beta_0, \beta_1, \beta_2, \beta_3, \boldsymbol{\beta}_4$, are parameters to be estimated and ε_i is a disturbance term. In equation (2), parameters β_1 and β_2 are of particular interest to statistically test question (2).

The median regression is used to statistically analyze the determinants of generativity and happiness in place of parametric mean-based regressions, when observations of generativity and happiness in the sample are considered to be non-normally distributed and/or skewed. The literature claims that median or quantile regressions are more appropriate than parametric mean-

based ones, such as ordinary least squares (OLS) regression, yielding robust estimations against the boundary values and/or outliers, especially when the dependent variable is bounded on a certain support range, non-normally distributed and skewed (Hao and Naiman, 2007, Wooldridge, 2016). In fact, we have run Shapiro-Wilk tests for the two dependent variables of generativity and happiness to check their normality with a null hypothesis that the variable is normally distributed. The results do not reject the null hypothesis ($z = 0.630, P = 0.264$) for generativity but reject it ($z = 3.621, P < 0.01$) for happiness. Therefore, we use the mean-based OLS and median regressions for generativity and happiness with the specifications of equations (1) and (2), respectively.

[Figure 3 about here.]

3 Results

Tables 1 and 2 present the definitions of all variables used in the analysis and the summary statistics for urban, nonurban and overall areas. The percentage of female subjects and the mean age are similar between urban and nonurban areas (45 % and 49 % as well as 50.29 years and 49.30 years). Concerning marital status, the percentage of married subjects in urban areas (nonurban areas) is 70 % (64 %). The percentage of subjects with extended families in urban areas (nonurban areas) is 11 % (20 %). Subjects in urban and nonurban areas possess a college degree and a high school diploma as the median education level, respectively. The median household income in urban areas is the same as that in nonurban areas. Contrary to our expectations, nonurban areas have a slightly higher percentage of unmarried individuals than do urban areas in our survey. This suggests that currently, in Japan, urban and nonurban people's lives are similar except regarding family type. Table 2 shows the summary statistics of subjects' generativity in urban, nonurban and overall areas. We have computed Cronbach's alpha for this scale to be 0.90, illustrating that the generativity scale possesses acceptable internal consistency in our sample. The median generativity score is 26 points in both urban and nonurban areas, while the average generativity scores are

25.87 and 24.63 points, respectively. This finding suggests that generativity between urban and nonurban subjects is similar; however, mean generativity in urban subjects is slightly higher than that in nonurban subjects.

Table 2 shows the summary statistics of subjective wellbeing (see the "SWB" row in table 2) in urban, nonurban and overall areas. We have computed Cronbach's alpha for this scale to be 0.93, illustrating that the satisfaction with life scale (SWLS) possesses acceptable internal consistency in our sample. The median scores of the SWLS are 19 and 18 points in urban and nonurban areas, while the average scores of the SWLS are 17.82 and 17.53 points, respectively. This finding suggests that SWB between urban and nonurban subjects is not distinct. Table 2 also shows the summary statistics of subjects' inquisitiveness in urban, nonurban and overall areas. We have computed Cronbach's alpha for this scale to be 0.94, illustrating that the inquisitiveness scale possesses acceptable internal consistency in our sample. The median score of inquisitiveness is 32 points in both urban and nonurban areas, while the average scores of inquisitiveness are 32.20 and 32.30 points, respectively. This finding suggests that inquisitiveness between urban and nonurban subjects is not different.

Next, we report the summary statistics of subjects' SVOs, focusing on the percentages of prosocial subjects in urban, nonurban and overall areas (see the last row of "SVO (prosocial)" in table 2). While 63 % of subjects in the overall are prosocial, 62 % (64 %) of urban (nonurban) subjects are prosocial. This result is in sharp contrast with similar studies in developing countries showing that the percentages of prosocial subjects between urban and rural areas are quite different, and the percentage of prosocial subjects in rural areas is higher than that in urban ones (Shahrier et al., 2016, 2017, Timilsina et al., 2019). This finding suggests that the degree of prosociality among people is similar between urban and nonurban areas in Japan, compared to other developing countries.

[Table 1 about here.]

[Table 2 about here.]

To empirically characterize open question (1), we perform ordinary least squares (OLS) re-

gression in which generativity is taken as a dependent variable, and inquisitiveness is taken as an independent one along with other factors, as described in equation (1). Table 3 reports the estimated coefficients $(\alpha_1, \alpha_2, \boldsymbol{\alpha}_3)$ and their respective standard errors of the independent variables on generativity, along with statistical significance. Model 1 in table 3 contains inquisitiveness and age as independent variables. Next, we gradually add marital status, the gender dummy and other factors as independent variables in models 2 to 4, building upon model 1. We first find that inquisitiveness is statistically significant with a positive sign at 1 % in a robust manner, irrespective of the models. The estimated coefficients of inquisitiveness on subjects' generativity range between 0.390 and 0.395 in models 1 to 4, implying that a subject is likely to have an increase in generativity by the range, when one unit in her inquisitiveness rises.

Second, age has a positive effect on the subject's generativity at 1 % significance in models 1 to 4. The estimated coefficients of age in models 1 to 4 indicate that a subject is likely to increase generativity by $0.086 \sim 0.110$ when she ages by one year. Marital status also exhibits 1 % and 5 % statistical significance with a positive sign in models 2 to 4, implying that a married subject tends to enhance her generativity by $2.259 \sim 2.471$, as compared with a nonmarried subject. The other independent variables, such as gender, prosociality, education, household income and area, are identified as statistically insignificant, as shown in models 2 to 4 in table 3. We confirm that the main results qualitatively remain the same, irrespective of the various specifications of models other than models 1 to 4, such as the inclusion of age squared and/or interaction terms among the variables. Overall, inquisitiveness, age and marital status are established to be the main determinants of subjects' generativity.

[Table 3 about here.]

To empirically characterize open question (2), we perform the median regression in which SWB is taken as a dependent variable, and generativity and inquisitiveness are taken as an independent one along with other factors, as described in equation (2). Table 4 reports the estimated coefficients $(\beta_1, \beta_2, \beta_3, \boldsymbol{\beta}_4)$ and their respective standard errors of the independent variables on

SWB, along with statistical significance. Model 1 of table 4 contains generativity and inquisitiveness as independent variables, and next, we gradually add marital status, age, household income and other factors as independent variables in models 2 to 4, building upon model 1. We first find that the generativity is statistically significant with a positive sign at 1 % in a robust manner, irrespective of the models. The estimated coefficients of generativity on subjects' SWB range between 0.265 and 0.293 in models 1 to 4, implying that a subject is likely to increase her SWB by the range when one unit in her generativity rises.

Second, inquisitiveness has a positive effect on people's SWB at 5 % and 10 % significance in models 1 and 4. The estimated coefficients of inquisitiveness in models 1 to 4 suggest that a subject is likely to increase her SWB range between 0.083 and 0.108 when one unit in her inquisitiveness rises. Marital status also exhibits 1 % and 5 % statistical significance with a positive sign in models 2 to 4, implying that a married subject tends to enhance her SWB by $1.773 \sim 2.311$, as compared with a nonmarried subject. Similarly, in models 2 to 4, a subject is likely to enhance her SWB range by $0.045 \sim 0.052$ at 5 % significance when she ages by one year. The other independent variables, such as household income, gender, prosociality, education, family type and area, are identified to be statistically insignificant, as shown in models 3 to 4 in table 4. We confirm that the main results qualitatively remain the same, irrespective of the various specifications of models other than models 1 to 4, such as age squared or interaction terms among the variables. Overall, generativity, inquisitiveness, marital status and age are established as the main determinants statistically and practically significant on the likelihood of a subject increasing her SWB.

[Table 4 about here.]

Based on the abovementioned results, there seems to be a considerable relationship, so-called "paths" exist: (1) inquisitiveness $\rightarrow$ generativity, (2) inquisitiveness $\rightarrow$ SWB and (3) generativity $\rightarrow$ SWB. Examining the existence of these three paths is carried out to test whether generativity is a mediator in the relationship between inquisitiveness and SWB, as graphically conceptualized in figure 4.[4] To statistically address whether or not generativity is a mediator, structural equation

[4]Mediation is established as a concept to describe a causal chain in which a first variable, X (inquisitiveness),

modeling (SEM) is employed by testing the paths among the three variables together with the direct and indirect effects of inquisitiveness, following the procedures in Gunzler et al. (2013, 2014) and Venturini and Mehmetoglu (2019). The SEM analysis computes a beta weight as a standard coefficient, (β), along with the associated statistical significance for each path. The analysis enables us to establish that inquisitiveness and generativity are crucial determinants for people's happiness through not only their direct but also indirect effects, which acts as another robustness check for the regression results. We adopt standardized coefficients for this analysis. The magnitude of standardized coefficients can be directly compared to estimating the relative strength of relationships. Standardization is necessary to compare indirect effects among different sets of paths in the same model, for example, comparing direct vs. indirect pathways in a mediation model (Fox, 1997, Cheung, 2009, Kwan and Chan, 2011).

We first analyze the two direct effects from inquisitiveness to SWB (path A in figure 4) and from generativity to SWB (path C in figure 4) by SEM standardized analysis. The results successfully show the existence of path A with ($\beta = 0.068, p = 0.148$) and that of path C ($\beta = 0.421, p < 0.000$), meaning that both inquisitiveness and generativity have direct effects on SWB. Next, we analyze the direct effect from inquisitiveness to generativity (path B in figure 4) and an indirect effect from inquisitiveness to SWB through generativity (path $\hat{C}$ in figure 4). The SEM analysis demonstrates the significance of path B ($\beta = 0.321, p < 0.000$) as well as path $\hat{C}$ ($\beta = 0.135, p < 0.000$). Comparing direct vs. indirect paths from inquisitiveness to SWB in a mediation model, the magnitude of path $\bar{C}$ ($\beta = 0.135, p < 0.000$) is found to be stronger than that of path A with ($\beta = 0.068, p = 0.148$). Based on these results, we confirm that the indirect path $\hat{C}$ from inquisitiveness to SWB plays a crucial role through a mediator of generativity. Overall, the SEM analysis establishes that inquisitiveness and generativity directly and indirectly affect SWB, where generativity is a mediator between inquisitiveness and SWB.

[Figure 4 about here.]

affects a second variable, M (generativity) which then affects a third variable of the outcome, Y (SWB), where the second variable is called a "mediator" (Baron and Kenny, 1986, Jason, 2018).

We are now ready to summarize the answers to the two open questions posed at the end of the introduction section. As described in our conceptual framework of figure 1, it is well known that happiness is mainly characterized by the three factors, such as cognitive factors, noncognitive factors and sociodemographic factors. The first question is, "Does inquisitiveness influence generativity?" Our answer to this question is that inquisitiveness, (α_1), is the crucial determinants regarding whether people possess high generativity in figure 1. Inquisitiveness is of utmost importance due to regression and SEM analyses' magnitude and statistical significance. The second question is, "How does inquisitiveness along with generativity affect people's happiness?" Our answer to this question is that generativity, (β_2), and inquisitiveness, (β_1), directly and indirectly, affect subjective happiness, demonstrating the importance of possessing inquisitiveness and generativity for SWB in figure 1.

Some studies have pointed out that inquisitiveness is stable as a part of critical thinking disposition, even in the long run, and considered innate because even very young children actively ask adults many questions and pursue explanatory information due to their curiosity (Callanan and Oakes, 1992, Baldwin and Moses, 1996, Gopnik, 1998, Chouinard et al., 2007, Cluver et al., 2013, Blickle et al., 2014). Conversely, other studies have pointed out that inquisitiveness can be acquired and further enhanced by learning (Callanan and Oakes, 1992, Stanovich and West, 1997, Toplak and Stanovich, 2002, Hirayama and Kusumi, 2004, Frazier et al., 2009, Yamaguchi and Sannomiya, 2012, Fusaro and Smith, 2018). For instance, Sannomiya and Yamaguchi (2016) conduct an experiment with 100 Japanese junior high school students, establishing that inquisitiveness and critical thinking ability are fostered with training and meta-cognitive belief. In addition, some leadership training programs have been developed to enhance inquisitiveness in business because an inquisitive person is considered able to improve productivity, creativity and management in practice (Yeh, 2002, Black, 2005, Harris, 2011, Blickle et al., 2014, Bardone and Secchi, 2017).

Based on the above discussions, inquisitiveness can plausibly be considered to increase through education, experiences and training, i.e., as a part of culture, in the course of people's lifetimes. If this is true, then the analyses in this paper suggest that both generativity and happiness are

expected to increase, as people become inquisitive through such cultural activities, i.e., education, experience and training. It is argued that subjective wellbeing has a positive correlation with a achievement of sustainable development goals (SDGs) (Kroll, 2015, De Neve and Sachs, 2020, Kim et al., 2021). At the same time, generativity is known to contribute to SDGs, because it facilitates intergenerational cultural and resource transfers between current and future generations (Shahrier et al., 2017, Shahen et al., 2019, Timilsina et al., 2019). With these findings in mind, an important contribution of this study that it provides statistical evidence that inquisitiveness is a fundamental human attribute to enhance not only generativity but also people's happiness, possibly leading to the materialization of sustainable societies.

4 Conclusions

This paper addresses how generativity and happiness are characterized by inquisitiveness. We hypothesize that inquisitiveness is an essential determinant for generativity and happiness, empirically examining the relationships along with sociodemographic, cognitive and noncognitive factors. To this end, we conduct questionnaire surveys with 400 Japanese subjects to collect sociodemographic, cognitive and noncognitive factors, applying the analysis of OLS regression, median regression and structural equation modeling. First, the analyses identify the importance of inquisitiveness in characterizing generativity in that inquisitive people tend to be generative. Second, people are identified to be happy as they have high inquisitiveness and generativity, demonstrating two influential roles of inquisitiveness as a direct and indirect determinant through a mediator of generativity. Overall, the results suggest that inquisitiveness (curiosity & acceptance of something and someone different and/or new) is a main engine for one person to enhance generativity and happiness through intergenerational and intragenerational communication or relations.

We note some limitations of our research and directions for future research. This study does not include very young people and children in our sample. Future research should conduct further data collections and analyses to confirm the robustness of our results by spanning people of

various ages possibly with very young people. In addition, this study does not address specific education, experiences and training that can improve people's inquisitiveness. To this end, future studies should conduct experimental research and projects to clarify some causality among inquisitiveness, generativity and happiness. These caveats notwithstanding, it is our belief that this research is an important first step toward understanding the importance of inquisitiveness along with generativity and happiness, hoping that further studies will ensure to identify how to enhance people's happiness and the sustainability of societies.

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List of Figures

Figure 1: A conceptual framework describing the relationships concerning SWB among cognitive, noncognitive and sociodemographic factors

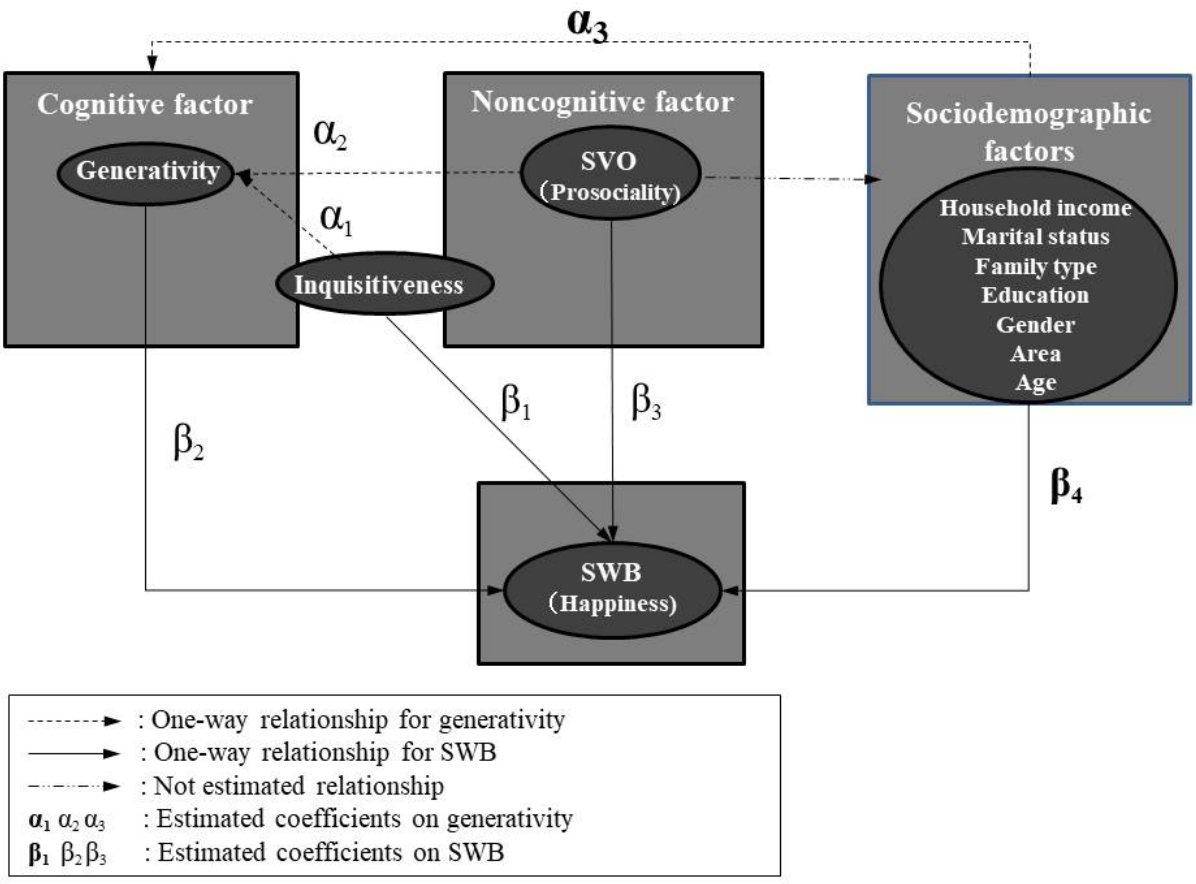


Figure 2: Instructions of the “slider method” for measuring the social value orientation (Murphy et al., 2011)

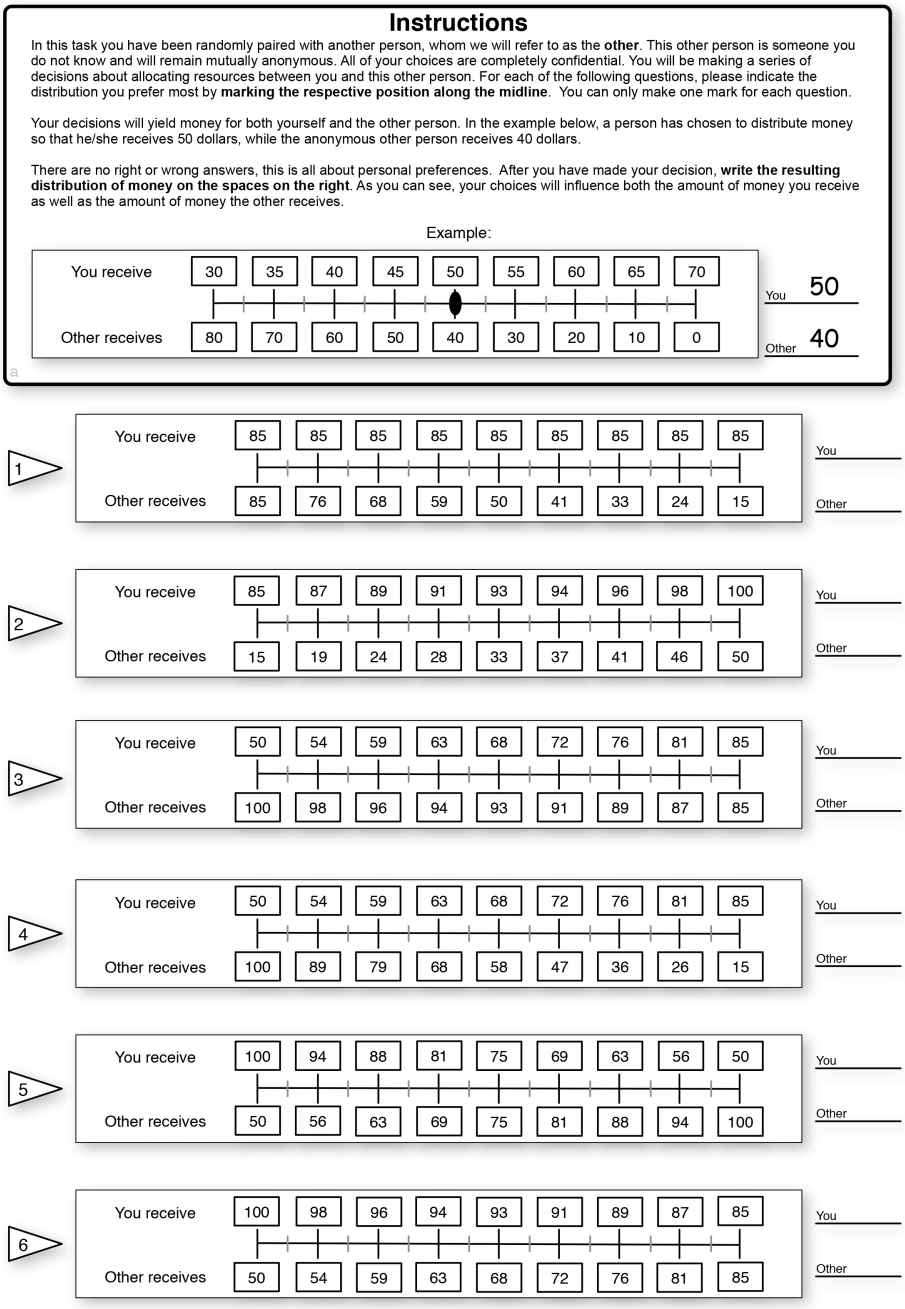
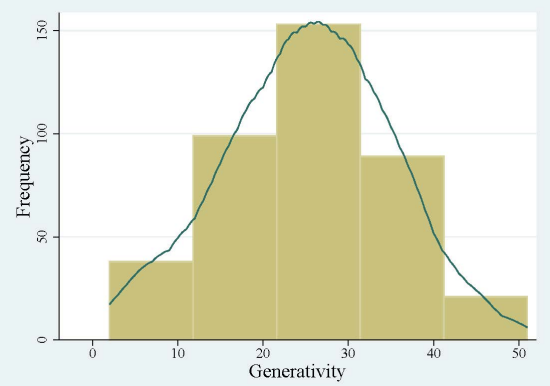


Figure 3: Histgrams and kernel density for the dependent variables of generativity and SWB

(a) Generativity



(b) SWB

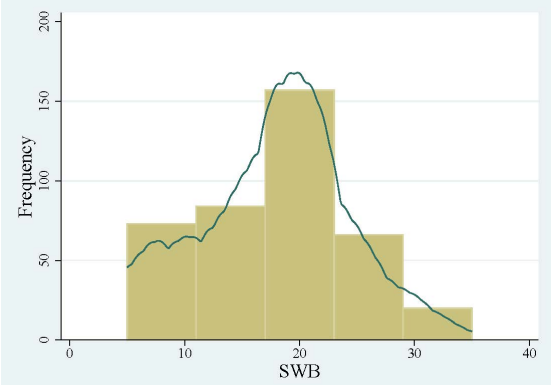
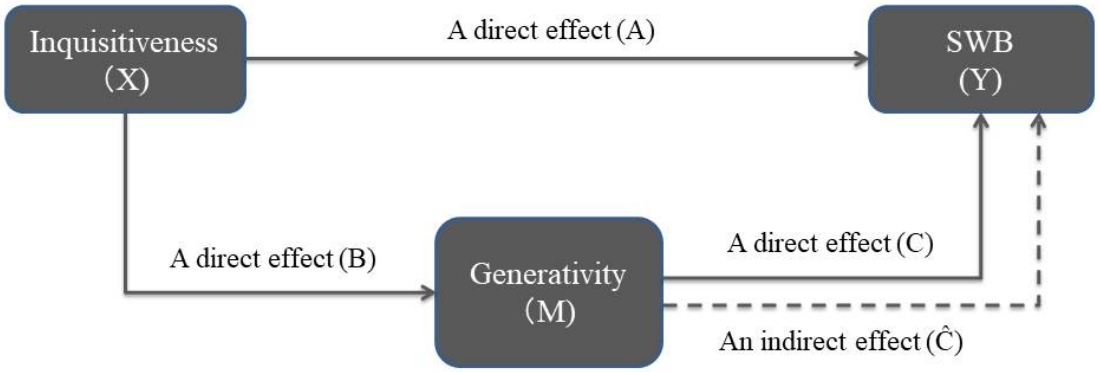


Figure 4: The mediating effects among inquisitiveness, generativity and SWB



List of Tables

Table 1: Variable definitions

Variables	Descriptions
Gender	Gender is a dummy variable that takes 1 when the subject is female, otherwise 0.
Age	Age is defined as years of age.
Marital status	Marital status is a dummy valuable that categorical variable of 0 and 1 where nonmarried (i.e.,single, divorce or bereavement) and narried are coded as 0 and 1, respectively.
Family type	Family type is that categorical variable of 0 and 1 where family type, nuclear family, extended family are coded as 0 and 1 respectively.
Education	Education is categorical variables of $1, 2, 3, 4$ and 5 where educational background, No scholastic, Junior high school, high school, undergraduate and graduate are coded as $1, 2, 3, 4$ and 5, respectively.
Household income	Household is categorical variables of $1, 2, 3, 4, 5$ and 6 where household income per year in JPY, $0 <$ 1M, $1 <$ 2.5M, $2.5 <$ 4M, $4 <$ 7M, $7 <$ 10M and more than 10M, respecively.
Generatitity	Generativity is defined as the measurement of the Loyola generative scale (Range is between 0 and 60)
SWB	Subjective wellbeing (SWB) is defined as the measurment of the satisfaction with life scale (SWLS) (Range is between 5 and 35)
Inquisitiveness	Inquisitiveness is defined as the measurement by a subscale of the critical thinking disposition scale (Range is between 10 and 50)
SVO	The "SVO" represents a dummy valuable taking 1 when the subject is prosocial. and otherwise 0, based on SVO games.

Table 2: Summary statistics of subject's sociodemographic information and major variables

	Urban areas					Nonurban areas					Overall				
	Mean	Median	SD[1]	Min	Max	Mean	Median	SD	Min	Max	Mean	Median	SD	Min	Max
Gender (female)	0.45	0	0.50	0	1	0.49	0	0.50	0	1	0.47	0	0.50	0	1
Age	50.29	51	17.40	20	88	49.30	49	16.10	20	88	49.79	50	16.74	20	88
Marital status (experienced)	0.70	1	0.46	0	1	0.64	1	0.48	0	1	0.67	1	0.47	0	1
Family type (extended)	0.11	0	0.31	0	1	0.20	0	0.40	0	1	0.15	0	0.36	0	1
Education	3.73	4	0.58	1	5	3.46	3	0.64	1	5	3.61	4	0.62	1	5
Household income	3.86	4	1.40	1	6	3.59	4	1.33	1	6	3.72	4	1.37	1	6
Generativity	25.87	26	10.33	3	51	24.63	26	9.38	2	47	25.25	26	9.87	2	51
SWB	17.82	19	6.84	5	35	17.53	18	6.46	5	33	17.67	19	6.65	5	35
Inquisitiveness	32.20	32	7.39	10	50	32.30	32	7.23	10	50	32.25	32	7.30	10	50
SVO (Prosocial)	0.62	1	0.49	0	1	0.64	1	0.48	0	1	0.63	1	0.48	0	1
Subjects	n = 200					n = 200					n = 400				

[1] SD stands for standard deviation.

Table 3: Estimation results of OLS regression on people's generativity

Variable	Generativity			
	Model 1	Model 2	Model 3	Model 4
Inquisitiveness	0.395***	0.390***	0.391***	0.391***
	(0.064)	(0.063)	(0.064)	(0.064)
Age	0.110***	0.086***	0.088***	0.090***
	(0.028)	(0.029)	(0.029)	(0.030)
Marital status (base group = non married)		2.458***	2.471***	2.259**
		(0.978)	(0.984)	(1.047)
Gender (base group = male)			−0.632	−0.570
			(0.923)	(0.936)
Prosociality (base group = proself)			−0.479	−0.463
			(0.952)	(0.954)
Education				−0.029
				(0.744)
Household income				0.147
				(0.360)
Area (base group = nonurban)				0.950
				(0.939)

***significant at 1 %, **significant at 5 percent,*significant at 10 percent

Table 4: Estimation results of median regression on subjective wellbeing

Variable	Marginal effects on subjective wellbeing			
	Model 1	Model 2	Model 3	Model 4
Generativity	0.293***	0.267***	0.269***	0.265***
	(0.042)	(0.039)	(0.039)	(0.040)
Inquisitiveness	0.108**	0.083*	0.083*	0.098*
	(0.057)	(0.052)	(0.051)	(0.053)
Marital status (base group = male)		2.311***	1.773**	1.784**
		(0.771)	(0.801)	(0.842)
Age		0.045**	0.047**	0.052**
		(0.023)	(0.023)	(0.024)
Household income			0.285	0.325
			(0.272)	(0.289)
Gender (base group = male)			0.284	0.297
			(0.710)	(0.621)
Prosociality (base group = proself)			−0.311	−0.252
			(0.730)	(0.765)
Education				0.297
				(0.621)
Family type (base group = nuclear family)				−0.741
				(1.036)
Area (base group = nonurban)				−0.385
				(0.756

[1] ***significant at 1 percent, **significant at 5 percent, *significant at 10 percent

[2] We have run median regression including independent variables of age squared and household income squared. The result shows less influence from independent variables of them on subjective wellbeing. Based on the outcome, we judge that these variables could be removed from the models to simplify showing regression results.