

# The Japanese Study of Adult Twins Reared Apart and Growing Old Separately

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More than 100 pairs of adult twins, reared apart and growing old separately, have participated in the Japanese Study of Adult Twins Reared Apart and Growing Old Separately since it began in 1974. The subjects are 161 pairs of adult twins born between 1910 and 1945 in Japan. The main focus of this study is to investigate the influences of environmental factors and life history on life satisfaction and psychological well-being in later adulthood. A mail survey has been conducted on these twins each year since 1974. To date, the Wechsler Adult Intelligent Scale, Maudsley Personality Inventory, Newgarten Life Satisfaction Index, comprehensive medical examinations and personal interviews have been conducted for 12 twin pairs residing in various areas of Japan.

It was not uncommon for Japanese twins to be separated in very early infancy and reared apart in the era before World War II; this practice is not common any more. Twins reared apart and who have grown old separately provide a powerful method of disentangling the influences of environmental and genetic factors on human characteristics. The Minnesota Study of Twins Reared Apart showed clearly the importance of the study of twins reared apart (Bouchard et al., 1990). The Swedish study of twins reared apart also showed the unique value of twins reared apart to the field of behavior science (Kato & Pedersen, 2005). Adult twins reared apart and who had grown up separately were approached from 1974. One hundred and sixty-one pairs of adult twins reared apart and who grew up separately across Japan participated in this study. The main focus of this study is to investigate the influences of environmental factors and life history on physiological, cognitive and psychological functions (Hayakawa et al., 2002).

## Recruitment of Twins

The twin pairs in this registry were recruited by newspaper advertisements, posters in hospitals, referrals

from nurse midwives, retired twin researchers and Buddhist monks (Hayakawa & Shimizu, 1987). One hundred and sixty-one pairs (148 monozygotic [MZ] pairs, 13 dizygotic [DZ] pairs) were included in this registry. All of the twin pairs included in this registry were separated under the age of 12 months. Age at separation was determined by the research records of collaborating retired researchers and the self-reports of the twins. One hundred and sixty-one pairs of adult twins reared apart have been followed each year via mailed questionnaires including questions on health conditions, social activities, family and community interactions, and so on. Zygosity was determined using methods previously reported (Hayakawa, 1987). To date, 12 of the 161 twin pairs have completed the Wechsler Adult Intelligent Scale, Maudsley Personality Inventory, Newgarten Life Satisfaction Index, and undergone comprehensive medical examinations. For those who underwent comprehensive medical examination, zygosity was determined by blood type (ABO, Rh, MN, Lewis, P, Duffy, Kidd, Kell, and Diego).

## Discussion

The primary interest of this study is to investigate the influence of environmental factors on personality, life satisfaction, cognitive ability, behavior patterns, and spiritual health. To date, the full set of comprehensive assessments have been completed for only 12 twin pairs. This study is ongoing, and as a result, it is difficult to draw a reliable conclusion given the small number of twins at this point. Assessments continue, the number of participating twin pairs will increase. The results of this study will be published once comprehensive assessments have been completed for all twin pairs reared apart in this registry.

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**Table 1**

Japanese Study of Adult Twins Reared Apart and Growing Old Separately

Name of register	The Japanese Study of Adult Twins Reared Apart and Growing Old Separately
Country	Japan
Kind of ascertainment	Volunteers (recruitment by newspaper advertisements, posters in hospitals, referrals from nurse midwives, retired twin researchers, Buddhist monks)
Number of pairs	161 pairs (148 MZ, 13 DZ)
Sex	77 male pairs and 81 female same-sex pairs, 3 opposite-sex pairs
Age	Born between 1910 and 1945
Age at separation	Under the age of 12 months
Primary interest	Personality, life satisfaction, cognitive ability, behavior patterns, spiritual health
Contact	Prof. Kazuo Hayakawa
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Major source of funding	Government of Japan

Note: MZ = monozygotic, DZ = dizygotic.

Several articles have been published on lifestyle and behavior patterns, such as smoking and alcohol drinking (Hayakawa, 1987), food preference and sports activity (Hayakawa & Shimizu, 1987), and occupation (Hayakawa, 1990), using the results from the mailed survey. The influences of lifestyle factors on high blood pressure complaints for twins reared apart are discussed in a previous article (Hayakawa & Shimizu, 1987). Each of these results showed a relatively low correlation in MZ twins reared apart and indicated the strong influence of environmental factors.

Results of the Wechsler Adult Intelligence Scale (digit span, digit symbol, and block design; Hayakawa et al., 1992), and Maudsley Personality Inventory (Hayakawa & Oshiro, 1991) are described previously. Intraclass correlation coefficients for digit span, digit symbol and block design were low both in male and female MZ twins reared apart.

We have collaborated internationally with several universities in Helsinki, New York, Turku and Virginia on the body mass index survey results for MZ twins reared apart, in order to accurately estimate the influences of environmental and genetic factors (Allison et al., 1996).

Collaborations are welcomed. All requests for collaboration should be directed to the first author, and will be assessed by the steering committee.

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