

Article

The South Korean Twin Registry

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Abstract

The South Korean Twin Registry (SKTR) is an ongoing nationwide volunteer registry of South Korean twins and their families. Since its inception, from preschooler to young adult, twins have been registered with the SKTR and have demonstrated that relative influences of genetic and environmental factors explaining individual differences in various psychological, mental health and physical traits in South Koreans are similar to those found in many Western twin studies. Currently, studies at the SKTR focus on identification of the process of gene-by-environment interactions as well as developmental differences in genetic and environmental influences on psychological and mental health traits in South Koreans. This report provides a brief overview, recruitment strategies, current samples, zygosity assessment, measures and future directions of the SKTR.

Keywords: South Korea Twin Registry; development; psychological traits; mental health

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The South Korean Twin Registry (SKTR) is an ongoing nationwide volunteer registry of South Korean twins and their families. The general goal of the SKTR is to understand the interplay of genetic and environmental influences on psychological and mental health traits in South Koreans. Since its inception, multiple cross-sectional twin studies that span preschool age to early adulthood have been conducted (Hur, 2002; Hur et al., 2006, 2013). Relative influences of genetic and shared environmental factors in many psychological, mental health and physical traits found in these studies were similar to those reported in Western twin samples, although absolute phenotypic, genetic and environmental variances were found to be different to those discovered in Western samples (Hur et al., 2008), suggesting that further analyses are necessary to determine genetic and environmental etiologies of variations across human populations. Current major research issues of the SKTR include detection of environmental variables that interact with genetic factors as well as identification of the process of gene-by-environment interaction in psychological and mental health in children and adolescents. Recently, we have also begun exploring genetic influences on mental health unique to South Koreans, such as hwabyung (anger syndrome), which most Korean mental health professionals and the layperson have assumed to be environmental in origin (Hur, Choi et al., 2018; Hur, Jin, Lee, et al., 2019). The SKTR has been a partner contributing to the international consortiums such as the Cohort Description of Collaborative Project of Development of Anthropometrical Measures in Twins (CODATwins; Silventoinen et al., 2019) and is ready to serve as other international collaborations to identify genetic and environmental origins of human psychological and health traits.

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Recruitment Strategies

We identify twins mainly from schools, large maternity hospitals and the websites of the twins' mothers' clubs throughout South Korea. We ask city and provincial education offices to send our invitation letters to each school to obtain contact information (typically, telephone number) of twins interested in participation in our research. In addition, we obtain contact information about mothers of twins from large maternity hospitals. Once we receive contact information, our trained research staff telephone twins or mothers of twins, explain our research in detail and then give telephone interviews. We also advertise our research on the websites of twins' mothers' clubs. Typically, we attach online questionnaires to the websites and ask mothers of twins to complete the questionnaire online.

Sample and Zygosity Assessment

Table 1 presents the number of individual twins who have been participated in studies of the SKTR by age group and zygosity. Because residents in large cities in South Korea move around quite often, we have lost the contact information of twins during the past years. To supplement the registry membership, however, we have recruited new volunteer twins whenever fund is available.

While opposite-sex twins in the SKTR are automatically assigned to dizygotic (DZ) twins, same-sex twins complete a three-item zygosity questionnaire to determine their zygosity. For twins under age 13, we ask mothers of twins to complete the zygosity questionnaire, whereas for twins aged 13 years or older, we ask twins to complete the zygosity questionnaire. For preschool-aged twins ascertained from maternity hospitals, information on chorionicity of twins is additionally used to determine zygosity. As indicated in Table 1, while monozygotic (MZ) twins outnumbered DZ twins in both

Table 1. Number^a of twins participated in studies of the South Korean Twin Registry by age group and zygosity

Age group	Age	MZ	DZ ^b	Total
Preschoolers	<7 years	257	625	882
School-aged children	7–18 years	995	686	1681
Young adults	>19 years	949	546	1495
Total		2201	1857	4058

Note: MZ = monozygotic twins; DZ = dizygotic twins.

^aNumber of twin individuals.

^bOpposite-sex DZ are included.

the school-aged and young adult groups, the number of DZ twins is much greater than MZ twins in the preschooler group, which reflects recent changes of DZ twin birth rates in South Korea (Hur & Kwon, 2005; Hur & Song, 2009).

Measures

The instruments used for studies of the SKTR have been selected for their high psychometric properties and compatibilities with other twin studies in the world. Assessment categories of the SKTR include childhood temperament, personality, cognitive abilities, problem behaviors and mental health, family physical and psychological environment, and physical traits. To measure childhood temperament, the Emotionality, Activity, and Sociability scale (Buss & Plomin, 1984) has been used for mothers of preschooler twins (Hur, 2009a; Veselka et al., 2012). The Eysenck Personality Scale (Eysenck & Eysenck, 1991), grit (Duckworth & Quinn, 2009) and economic behavior have been used with adolescent and young adult twins for personality assessment (Hur, 2007a; Hur et al., 2011; Rushton et al., 2008, 2009). The Standard Progressive Matrices-Plus version (Raven, 2008) has been used for assessment of cognitive abilities for school-aged twins. To measure problem behaviors and mental health traits, the Strengths and Difficulties Questionnaire (Goodman, 1997), hostility (Koskenvuo et al., 1988), Launey–Slade Hallucination Scale – Revised (Launay & Slade, 1981), clinical symptoms of Personality Assessment Inventory (Morey, 1991), Center for Epidemiological Studies–Depression scale (Radloff, 1977), and Maudsley Obsessive-Compulsive Inventory (Hodgson & Rachman, 1977), and hwabyung (anger syndrome), have been administered to adolescent and young adult twins (Hur, 2006, 2007b, 2008, 2009b, 2014, 2015; Hur et al., 2015; Hur, Cherny et al., 2012; Hur, Choi et al., 2018; Hur & Jeong, 2008; Hur, Jin, Lee et al., 2019; Hur & Rushton, 2007). To assess physical and psychological family environment, the Family Asset Questionnaire and the Family Adaptability and Cohesion Scale (Olson et al., 1985) have been administered to twins or parents of twins. For physical traits, height, weight, birth weight and Sasang constitution types have been obtained either through parental report or self-report for most twins. In addition, pubertal timing (Hur, 2007c; Hur, Jin, & Lee, 2019; Hur, Lee, & Jin, 2018; Hur & Shin, 2008; Hur et al., 2005, 2008) and cold hands symptoms (Hur, Chae et al., 2012; Hur, Jin et al., 2018; Hur, Yu et al., 2018) have been collected from adolescent and young adult twins.

Future Directions

To date, the vast majority of twin studies have been conducted in Australia, Europe and the USA, although more recently, they have been extended to non-Western countries. As one of only several

twin registries in Asia, the SKTR has published over 50 research papers in international scientific journals, enhancing our understanding of human population differences and similarities in genetic architectures of complex traits.

Traditionally, twins were uncommon in South Korea (Hur & Kwon, 2005). However, recently, the DZ twin birth rates have increased very sharply in South Korea due to the widespread use of artificial reproductive technology (Hur & Song, 2009). We thus have the potential to add a substantial number of new twins each year to the registry. In the future, we plan to investigate how genetics exert their influences on treatment outcomes and effects of intervention in problem behaviors and mental health traits in South Koreans. Additionally, efforts will be made to identify polymorphisms associated with the psychological and mental health traits in South Koreans.

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