

# The University of British Columbia Twin Project: Still Figuring Out What Personality Is and Does

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The University of British Columbia (UBC) Twin Project is a registry of approximately 2,000 pairs of reared-together twins recruited across the major Canadian provinces. The focus of the project is an investigation of the behavioral genetics of personality and its disorders, and their relationship to other forms of mental illness. The goal is to find evidence for current diagnostic structures and classification systems, or certainly provide data for their reform. The primary measures employed are full-form self-report questionnaires of major psychological and psychiatric instruments covering personality, mood, general health, schizotypy, and more recently the anxiety disorders from symptoms resulting from exposure traumatic events, obsessive–compulsive behavior and beliefs, as well as coping strategies and health anxieties. No DNA has been collected. Data from the project have been used in several collaborative projects worldwide, and collaborative projects with other groups and interested researchers are welcomed.

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Allport's (1937) famous dictum that "personality is something and personality does something" remains an apt description of the primary goals and focus of the University of British Columbia (UBC) Twin Project's launch in 1991. Over the past decade, the hypotheses being studied have tended to focus on the "what personality does" end of the spectrum as opposed to the classic questions of "what personality is." The UBC Twin Project is a classic twin-reared-together study of approximately 2,000 pairs of twins aged 18 to 84 years, initially recruited from the Vancouver area, British Columbia, but over the past decade recruitment targeted all provinces across Canada. The primary recruitment method was broad advertising in the major daily newspapers, in addition to local weekly free newspapers that are delivered to most households in a given city, as well as being provided in free newspaper boxes on many major streets and roadways. This approach has ensured that a broad range of potential families from all socioeconomic means in a specific geographic region were reached.

As an additional incentive and to assist lower socioeconomic families who frequently do not typically participate in research projects, the UBC Twin Project provided an honorarium of \$25.00 to 50.00 per twin individual when the completed questionnaire battery was returned. Moreover, the offer of an honorarium has facilitated the recruitment of dizygotic (DZ) pairs such that the present sample is approximately evenly split between monozygotic and dizygotic pairs, and has increased study completion rates.

However, the female bias typical of volunteer twin studies remains. Zygosity was diagnosed through questionnaire, with demonstrated accuracy of over 95% (see Kasriel & Eaves, 1976) and examination of recent color photographs. Over the 21 years of the UBC Twin Project's history, the battery of questionnaires and interviews has shifted several times to follow up on leads and ideas garnered from the previous data. As such, the actual numbers of pairs that have completed any particular questionnaire ranges from at least a few hundred to almost all of the participants. The questionnaires used by the UBC Twin Project have been selected for their broad acceptance as the primary questionnaires in a field, but more importantly, the study strived to administer the full form of an instrument – as opposed to short forms or screening versions. Besides the obvious richness and better psychometric properties of full forms, these practices have enabled a great deal of data to be in common with other twin studies worldwide and has allowed several cross-national studies to be undertaken in collaboration (e.g., with projects in Germany and Japan); and we welcome more collaborative data-sharing projects in future,

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or will provide access to data for interested researchers upon application. No DNA samples have been obtained.

As noted earlier, prior to 2006, questions of “what personality is” occupied the attention of the UBC Twin Project (see Jang et al., 2006). The general approach taken was to apply standard multivariate behavioral genetic analytic methods to determine if the observed relationship between traits and between normal and abnormal personality was a reflection of underlying pleiotropic effects. The primary finding of this earlier research showed that over a wide range, measures of normal and abnormal personality estimated heritabilities all fell within the range of 0.40 to 0.50, with the remainder of the observed variability being attributable to non-shared environmental influences. Moreover, the often-observed five-factor structure (e.g., neuroticism or N, extraversion or E, openness to experience or O, agreeableness or A, and conscientiousness or C – popularly known as the “Big Five”) were shown to be reflective of a similar underlying multivariate genetic structure. For example, one approach was to factor the genetic and environmental correlations estimated between several personality measures which extracted a five-factor structure that represented N, E, O, A, and C (Jang et al., 2002). When the same type of analyses were applied to measures of personality dysfunction (e.g., Jang & Livesley, 1999), four factors described as “emotional dysregulation,” “introversion,” “compulsivity,” and “impulsivity” were extracted, and subsequent joint analyses showed that the genetic influences underlying N, E, A, and C were shared with emotional dysregulation, introversion, compulsivity, and impulsivity respectively. No personality disorder dimension akin to “openness to experience” was found, and this corresponds to what has been observed in clinical samples of patients with personality disorder (see Livesley et al., 1998). Moreover, these types of analyses demonstrated that a dimensional model of personality disorder, where personality and its disorders lie on a continuum, was supported by the research. These findings stand in stark contrast (Livesley & Jang, 2008) to the categorical model in which diagnoses are conceptualized as separate categories in which various diagnoses have little relationship to one another – as per current diagnostic system practices embodied by the American Psychiatric Association’s (APA) diagnostic system (see American Psychiatric Association, 2000).

The findings that personality traits shared a common aetiological basis led to another research track examining if the higher order factors of personality exist. Eysenck (1994) had famously suggested that the so-called “Big Five” were simply facets of his “Gigantic Three” (psychoticism or P – the negative end of O and A, extraversion, and neuroticism). Similarly, Digman (1997) proposed that the Big Five are subsumed under two higher order factors labeled  $\alpha$  (or “socialization,” defined by low N, high A, and C) and  $\beta$  (or “personal growth,” defined by E and O). However, the idea of higher order factors is controversial as they could be

entirely due to measurement artifacts such as item overlap across scales and measures. A collaborative project (McCrae et al., 2008) using data from Germany and Japan fitted multivariate genetic models that included parameters to take into account measurement error to determine if the higher order factors were a true reflection of an underlying genetic structure or measurement error. The results showed that measurement artefacts could indeed account for the apparent higher order structure, but that there was evidence of genetic influences for two factors that better resembled “love” and “work” after Freud’s famous dictum (see Erickson, 1963). In sum, the evidence supported the existence of higher order structure (see also Veselka et al., 2012), but for the practical use and research of personality, the lower order factors and facets are more useful.

### What is the Role of Personality?

It has always seemed odd to us that in the APA’s diagnostic manual system (DSM; e.g., American Psychiatric Association, 2000) personality and its disorders occupy a separate diagnostic axis (the so-called “Axis II disorders”) from depression, anxiety, and virtually all other forms of psychopathology (the so-called “Axis I disorders”). A goal of the project is to examine the veracity of this separation by testing the degree to which personality and its disorders share a common aetiology. The search for a common aetiology began with anxiety disorders simply because anxiety is a defining feature of measures of N, but also of anxiety disorders. However, for this work to go forward, first some basic questions about the anxiety disorders required investigation. For example: Are the anxiety disorders heritable? Do different anxiety disorders share a common aetiological basis? In short, the same questions asked about the heritability and structure of the personality needed to be applied to the major forms of anxiety disorders.

For example, Taylor et al. (2010) estimated that genetic influences accounted for 40% to 60% of the variation measured in obsessive–compulsive symptoms (i.e., obsession, neutralizing, checking, washing, ordering, and hoarding) and that multivariate analyses also showed that all six symptoms were influenced by a common genetic factor. This latter finding is of particular significance because hoarding has not been considered part of the obsessive–compulsive spectrum, but the finding of a common genetic basis suggests it should be. The paper also attempted to tease out the individual role of genetics and the environment on the obsessive–compulsive symptom severity. Individually, genetics and environment’s main effects were estimated to play a modest positive role, but their interaction (in the analysis of variance sense) played a much larger role, of around 1.5 to two times the role of either individually.

However, a consistent finding of our research is that with the anxiety disorders, there is a great deal of variability

in the heritability between disorders, but also within disorders, and in contrast to what was found with personality, non-genetic factors play a much larger role in their expression. For example, Jang et al. (2007a, 2007b) examined post-traumatic stress symptoms (PTSS) and showed that genetic factors (indexed by  $h^2$ ) become less important beyond some threshold (e.g., someone who has experienced three or four types of serious trauma) suggesting that genetic factors play a role in the modification of these symptoms within a range of human experiences – beyond which environmental effects supervene. For example, the heritability of PTSS re-experiencing the event, emotional numbing, and hypervigilance dropped from 0.30 to near zero as the number of traumatic events experienced exceeded three in contrast to PTSS avoidance of similar situations in which the heritability stayed under 0.10 no matter how many traumatic events were reported. One interpretation of these findings is that genetic factors confer some resilience (in contrast to the usual assumption that genetic factors confer liability) to traumatic events and resilient people are unlikely to report experience of traumatic events because they have suffered from fewer and less intense PTSS. However, this resilience may not make a difference for those who experienced too many traumatic events. Similarly, when Taylor et al. (2008) examined “anxiety sensitivity” (fear of arousal-related symptoms arising from beliefs that the sensations are harmful), they found evidence that anxiety sensitivity is differentially heritable by gender, as is the severity of the condition. Specifically, anxiety sensitivity in women was found to be heritable and this heritability increases with severity, whereas among men, variation in anxiety sensitivity was accounted for entirely by environmental factors.

As this brief review attempts to illustrate, the UBC Twin Project uses behavioral genetic methods to investigate the structure and relationship between and on personality function and other forms of mental illness. The goal is to find evidence for current diagnostic structures and classification systems like the DSM, or certainly provide data for its reform.

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