



## Research paper

# Neuroticism and extraversion mediate the relationship between having a sibling with developmental disabilities and anxiety and depression symptoms

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## ABSTRACT

**Background** Children growing up with a sibling with disabilities report higher levels of depression and anxiety symptoms as adults. Here, we examined whether personality characteristics also play a part in mediating this relationship.

**Method** We tested for differences in personality traits between 132 individuals who have a sibling with developmental disabilities and 132 closely matched comparisons.

**Results** Differences in Big Five factors of personality were demonstrated across the disability groups and between the disability groups and the comparisons, especially in Extraversion, Neuroticism and Openness. Individuals growing up alongside a sibling with developmental disabilities have a higher tendency to experience anxiety and depression symptoms, and this research is the first demonstration that personality traits mediate this relationship. Specifically, Neuroticism is a strong mediator of anxiety while both Neuroticism and Extraversion contribute mediating effects toward the development of depression.

**Limitations** Our study made use of self-report methodology which, although having recognized limitations, is more reliable than parental reports. Given the cross-sectional nature of our design, we were not able to examine pre-existing developmental factors that may have influenced the participant's propensity to particular personality traits and affective disorders. However, we obtained a large sample and closely matched participants to examine differences between those with a sibling with disabilities and those without.

**Conclusions** As such, differences in personality traits have important implications for the understanding and treatment of siblings presenting with anxiety and depression symptoms. We recommend that intervention should target those high in Neuroticism among individuals who have a sibling with disabilities, and that more social support is put in place for siblings to mitigate their tendency towards introversion and buffer them against psychological maladjustment.

## 1. Introduction

Affective disorders likely develop due to a complex interaction between genetic, environmental and developmental factors (Hartley and Casey, 2013; Rutter and Silberg, 2002); consequently, any adverse circumstances can have more or less of an effect on an individual's life largely depending on the perception of the situation by the individual (McAdams and Pals, 2006; McCrae et al., 2000). In childhood, the family context is paramount and, although siblings of individuals with developmental disabilities usually have unproblematic education and employment prospects, they can later experience challenges in maintaining romantic relationships (Wolfe et al., 2014). We have shown that children growing up with a sibling with disabilities report higher levels

of depression and anxiety symptoms as adults (O'Neill and Murray, 2016a).

In this study, we examine whether personality characteristics also play a part in the experiences of siblings of individuals with developmental disabilities. Indicators of the Big Five dimensional traits of personality appear early in life and across different cultures, before social indicators such as language (Slobodskaya et al., 2012). Personality traits are arguably endogenously-based, showing high levels of stability and predictability over the lifespan (McCrae, 2002; McCrae et al., 2000), or they manifest mean level changes over time (Gow et al., 2005). Such lifetime plasticity of personality traits could be attributed to broader life experiences (Edmonds et al., 2008; Srivastava et al., 2003) such as family constellation and, to an extent, age and sex

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differences (Gow et al., 2005). Even to the extent that traits remain reasonably stable, their expression will be contextually dependent (Clark et al., 2003).

Different explanations for the associations between personality traits and affective disorders have been suggested (Watson et al., 2005): either that temperament affects affective disorders, or conversely that the development of the affective disorders affects the personality traits, or that personality and affective disorders share the same underlying developmental causes, so that neither is responsible for the onset of the other. Individuals can also be genetically predisposed to affective disorder symptomatology (McCrae et al., 2000).

Neuroticism is a significant predictor of affective disorders with high scorers predisposed towards negativity ranging from unhappiness and lowered life satisfaction to clinical anxiety and/or depression (Hutchinson and Williams, 2007; Jylhä and Isometsä, 2006; Kotov et al., 2010; Lönnqvist et al., 2009; Scott et al., 1995; Trull and McCrae, 2005; Widiger and Anderson, 2003). Lönnqvist et al. (2009) suggest that Neuroticism can predict affective disorders once the personality of an individual has stabilized, usually following young adulthood. Importantly, those high in Neuroticism are more likely to suffer from affective disorders when faced with stressful life events. Neuroticism may act as an underlying vulnerability factor in the development of depressive symptoms (Lang and Farmer, 2007) and can become particularly provoked when daily hassles operate as a mediating factor (Hutchinson and Williams, 2007), even if an increase in such hassles is a perception rather than a reality.

In contrast to Neuroticism, high levels of Extraversion are associated with positive emotionality and sociability (McCrae et al., 2000; Watson et al., 2005) and lower levels of anxiety and depression, together with a decreased use of psychiatric services (Jylhä and Isometsä, 2006). The American National Co-morbidity Survey (Kessler et al., 1996) found Extraversion had significant, modest, negative associations with anxiety and depression; Neuroticism was highly positively associated with anxiety and depression, while a third member of the Big Five – Openness – had no associations with affective disorders.

High levels of childhood adversity significantly increase the risk of correspondingly high levels of Neuroticism and negative affect (Rosenman and Rodgers, 2006) with girls more likely to score higher on Neuroticism and on anxiety and depression measures, in contrast to boys who score higher on Extraversion (Del Barrio et al., 1997). Siblings of individuals with developmental disabilities arguably experience additional stressors in their everyday family lives (Mascha and Boucher, 2006), and they are less likely to engage in extra-curricular activities (Barak-Levy et al., 2010), potentially leading to relationship and behavioral problems (e.g., Giallo and Gavidia-Payne, 2006; Hastings and Petalas, 2014). However, there are also positive consequences, including greater empathy (Cuskelly and Gunn, 2003), and positive relationships with their disabled sibling (Hodapp et al., 2010). Less sibling rivalry and conflict is also reported (Kaminsky and Dewey, 2002) among siblings of children with Autism Spectrum Disorder (ASD) and, indeed, these siblings can broaden their own experience by teaching their siblings new skills, learning calming techniques to use with their siblings, and raising awareness in others through their understanding and appreciation of their siblings (Angell et al., 2012).

In terms of Agreeableness and Conscientiousness, siblings of those with Down's Syndrome (DS) may score higher than a comparison group, perhaps due to socialization processes requiring them to act as caregivers to their disabled siblings at an early age and leading to greater feelings of family solidarity (Cuskelly and Gunn, 2003). In contrast, although not sibling studies, Austin (2005) found increased levels of Neuroticism and lower levels of Extraversion and Agreeableness in a study of individuals with the broader autism phenotype (BAP). Similarly, increased levels of Neuroticism and lowered levels of Extraversion and Conscientiousness have also been found in a BAP group (Wakabayashi et al., 2006). These findings are relevant to our study as the BAP relates to family members who may share some subclinical

characteristics of ASD even if not diagnosed. Other research, however, has found no differences in the personality characteristics of sibling and comparison groups (Lounds-Taylor et al., 2008).

## 2. Rationale of the present study

To our knowledge there has been no empirical research carried out to ascertain if mediation occurs between personality traits, having a sibling with disabilities, and anxiety and depression symptomatology. It is reasonable to suppose that high levels of stress – arising from the acute or chronic health and behavioral problems of their siblings, or increased responsibility in the home including caretaking of their disabled siblings when children (Dyke et al., 2009; Meyer, 1997; Moore et al., 2002; Powell and Gallagher, 1993; Randall and Parker, 1999) – could lead to increased levels of Neuroticism (Rosenman and Rodgers, 2006). Similarly, the siblings might have had fewer opportunities for social activities (Barak-Levy et al., 2010; Seltzer et al., 2009), perhaps resulting in lowered perceptions of social support, particularly for those with BAP (Jobe and Williams-White, 2007), potentially leading to lower levels of Extraversion. Alternatively, siblings who may be extraverted but in need of support may just be unable to find the time to engage in more social activities.

In addition, witnessing negative behaviors in their sibling with disabilities while understanding that the sibling has little control over their behavior, and also witnessing outsiders' reactions (Seltzer et al., 2009) might increase levels of Openness in the sibling as they learned to tolerate different perspectives and the conduct or reactions of others. They might also experience higher levels of Conscientiousness as they learned to respond to their sibling's medical or behavioral routines and consequently learned high levels of personal control (Angell et al., 2012).

We have previously demonstrated that siblings of individuals with developmental disabilities had significantly greater vulnerability towards higher anxiety and depression symptomatology and that this could vary depending upon the type of disability their sibling has (O'Neill and Murray, 2016a). We recognize that simply having a sibling with disabilities is not sufficient reason per se to experience anxiety or depression. Likewise, it would be an over-simplification to suppose that being a sibling of an individual with a disability is predictive of a particular pattern of personality characteristics. Therefore, we carried out tests that examined for main effects and mediation analyses in order to ascertain whether personality traits play a role in the vulnerabilities towards affective disorders of siblings of individuals with disabilities (henceforth referred to as the sibling group). Consequently, the above literature lead to the following research questions being investigated:

Firstly, we hypothesized that individual sibling groups (DS, ASD, Prader-Willi Syndrome (PWS), Disabled with Unknown Aetiology (DUA)) would differ from the comparison group on the five personality traits as follows: the individual sibling groups will report higher levels of Neuroticism (Moore et al., 2002; Powell and Gallagher, 1993; Rosenman and Rodgers, 2006) and Openness (Seltzer et al., 2009) and lower levels of Extraversion (Kessler et al., 1996) than the comparison group. This is predicted due to potentially higher levels of stress or hassles (Hutchinson and Williams, 2007) relating to the disability that the sibling group encountered when younger and carried forward into adulthood. We also predicted that the traits of Agreeableness and Conscientiousness would be higher in the individual sibling groups than the comparison group, due to the caregiving towards their sibling with disabilities that they possibly experienced in the early years (Cuskelly and Gunn, 2003; Shiner and Caspi, 2003).

Secondly, we hypothesized that Neuroticism would mediate the relationship between being in the sibling versus the comparison group and anxiety and/or depression symptomatology. Neuroticism is the trait most closely associated with anxiety and depression (Hutchinson and Williams, 2007; Trull and McCrae, 2005; Watson et al., 2005) and could help to explain the relationship between having a sibling with

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