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Sensory-Processing Sensitivity predicts treatment response to a school-based depression prevention program: Evidence of Vantage Sensitivity

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ABSTRACT

Objective: Treatment effects of preventative mental health interventions for adolescents tend to be relatively small. One reason for the small effects may be individual differences in the response to psychological treatment as a function of inherent characteristics, a notion proposed in the concept of *Vantage Sensitivity*. The current study investigated whether the personality trait Sensory-Processing Sensitivity moderated the efficacy of a new school-based intervention aimed at the prevention of depression.
Method: Using a two-cohort treatment/control design with one cohort serving as the control group ($N = 197$) and a subsequent cohort as the treatment group ($N = 166$) it was tested whether Sensory-Processing Sensitivity predicted depression trajectories from pre-treatment up to a 12 months follow-up assessment in 11-year-old girls from an at-risk population in England.
Results: Sensory-Processing Sensitivity emerged as a significant predictor of treatment response. The prevention program successfully reduced depression scores in girls scoring high on Sensory-Processing Sensitivity but was not effective at all in girls scoring low on the same measure.
Conclusions: This study provides first empirical evidence for *Vantage Sensitivity* as a function of the personality trait Sensory-Processing Sensitivity regarding treatment response to a school-based depression prevention intervention.

1. Introduction

Rising rates of depressive disorders during childhood and adolescence pose a major public health concern in most Western societies (e.g., Collishaw, Maughan, Goodman, & Pickles, 2004). Not only are depressive symptoms in adolescence often associated with social, academic, and physical health difficulties, but they also tend to predict subsequent major depression in adulthood (Aalto-Setala, Marttunen, Tuulio-Henriksson, Poikolainen, & Lonnqvist, 2002). Children growing up in economically deprived neighborhoods (Yoshikawa, Aber, & Beardslee, 2012) and girls (Hyde, Mezulis, & Abramson, 2008) are at a particularly high risk for the development of depressive disorders. According to a recent study in England the percentage of youth reporting frequent feelings of depression and anxiety doubled over the last two decades, with girls being almost three times more likely to suffer from depression/anxiety than boys (Collishaw, Maughan, Natarajan, & Pickles, 2010).

Given the detrimental effects of depression and the recent increase of depressive disorders in adolescent populations, substantial efforts have been directed towards the prevention of depression in childhood—usually through school-based promotion of adaptive coping skills and related competencies (Sutton, 2007). According to several meta-analyses such preventative interventions have generally been found effective regarding the reduction of depression symptoms (Brunwasser, Gillham, & Kim, 2009; Horowitz & Garber, 2006; Stice, Shaw, Bohon, Marti, & Rohde, 2009). However, the average treatment effects tend to be modest at best ($r = .11–.24$) and treatment efficacy appears to vary as a function of intervention delivery and sample demographics (Brunwasser et al., 2009; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Horowitz & Garber, 2006; Stice et al., 2009). What has been neglected in existing work, until very recently (Eley et al., 2012), is the notion that intervention effects may differ as a function of inherent child characteristics (e.g., personality

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traits, genetics). It is widely accepted that some individuals are more vulnerable to the negative effects of adversity as a function of individual traits, be they of psychological (Kochanska & Kim, 2012), physiological (Cummings, El-Sheikh, Kouros, & Keller, 2007), or genetic (Caspi et al., 2002) nature. Extending this *Diathesis-Stress* perspective (Zuckerman, 1999), the *Differential Susceptibility* framework (Belsky & Pluess, 2009) suggests that such inherent traits may not just increase vulnerability to adversity but rather sensitivity to a variety of environmental influences, with more susceptible individuals being more affected by both *negative as well as positive* experiences (Pluess, in press). In other words, the same characteristics that make children more vulnerable to adverse experiences may also make them more responsive to beneficial exposures (Belsky & Pluess, 2009). The proposition—derived from *Differential Susceptibility* reasoning—that individuals may differ generally in their response to positive experiences as a function of inherent characteristics has recently been articulated in more detail in the concept of *Vantage Sensitivity* (Pluess & Belsky, 2013). According to this framework some people are more likely to benefit from positive exposures while others appear to be less responsive or even resistant to the positive effects of the same supportive experience. The suggested reason for such differences in response to positive experiences is that people differ fundamentally in their environmental sensitivity with some being more and some less sensitive (Pluess, in press). Although a fairly new concept, a growing body of empirical evidence reports individual differences in *Vantage Sensitivity* as a function of different psychological, physiological, and genetic characteristics in response to a wide range of positive exposures—including psychological intervention (for an overview, see Belsky & Pluess, 2013). For example, in their pioneering experimental study evaluating genetic moderation of a psychological intervention, Bakermans-Kranenburg, van IJzendoorn, Pijlman, Mesman and Juffer (2008) investigated whether a genetic polymorphism in the dopamine receptor D4 (DRD4) gene moderated the positive effects of a video-feedback parenting intervention on children's externalizing behaviour in a randomised controlled trial. Providing evidence for Vantage Sensitivity as a function of genetic differences of the child, the intervention proved effective in decreasing externalizing behaviour—but only for children carrying the DRD4 7-repeat gene variant. Children without this gene variant did not benefit from the intervention at all.

In the current study we sought to investigate Vantage Sensitivity as a function of *Sensory-Processing Sensitivity* (SPS)—a personality trait measured with the Highly Sensitive Person (HSP) Scale (Aron & Aron, 1997)—in response to a new universal school-based preventative depression intervention, the *SPARK Resilience* program (Boniwell & Ryan, 2009). About 20% of the general population is estimated to score particularly high on SPS, characterized by increased awareness and deeper processing of environmental subtleties as well as the tendency to be more easily overwhelmed when in very stimulating situations. SPS has been hypothesized to be the manifestation of a highly sensitive central nervous system, on which environmental influences register more easily and more deeply (2012). In a first experimental study 160 undergraduate students were randomly allocated to solve either very easy or very difficult math problems (Aron, Aron, & Davies, 2005). Students scoring high on SPS reported the highest negative affect when assigned to the "difficult" math problems condition but also the lowest negative affect when allocated to the "easy" condition, compared to students low on SPS in either experimental condition, providing the first empirical evidence that SPS may increase sensitivity to both negative and positive experiences.

The current study involved a sample of 363 11-year-old girls at a state school in one of the most deprived neighborhoods of England, representing the population most at risk for depressive disorders in the United Kingdom. Applying a nonrandomized two-cohort treatment/control design, the intervention was conducted in the treatment cohort only, which included all children in the same year at the same school, while the complete year-ahead cohort served as a control group. Based on the *Vantage Sensitivity* framework (Pluess & Belsky, 2013), it was hypothesized that girls scoring high on SPS would show a greater positive response (i.e., steeper decline of depression symptoms over time) to the preventative intervention than girls scoring low on SPS.

2. Method

2.1. Procedure

The SPARK Resilience program (Boniwell & Ryan, 2009) was delivered to all children of the same cohort in Year 7 (i.e., 6th grade) as part of the standard curriculum at a girls-only state school in East London, England. Data was collected on laptop computers during class at school, using an online questionnaire service, immediately before and after delivery of the program, as well as 6 and 12 months after the program was completed. The year-ahead cohort served as control group but was assessed only once at the end of school Year 8, exactly one year before the 12-month follow-up assessment of the treatment cohort was conducted. Consequently, the control data corresponds to the 12-month follow-up data of the treatment group, gathered when each of the cohorts were approaching the end of Year 8 (see Fig. 1 for flow chart).

2.2. Participants

The original evaluation study included 230 girls in the treatment and 208 in the control cohort (Pluess, Boniwell, Hefferon, & Tunariu, submitted). The current analysis is based on a subsample of 166 girls in the treatment cohort for whom data on SPS was available, and 197 girls in the year-ahead control cohort with completed depression questionnaires, resulting in a total sample of 363 participants. Due to failure to complete all questionnaires in time, and absences from school when data collection took place, sample size of the treatment cohort varied across repeated assessments with 141 girls at pre, 166 at post, 144 at 6-month, and 113 at the 12-month assessment (the statistical approach of the primary analysis allowed for inclusion of all 166 girls that provided data at least at one of the assessments). At the initial assessment, girls in the treatment cohort were on average 11.4 years old (SD = .49 years). There was no significant difference in age at the end of Year 8 between the treatment cohort at 12-months follow-up (M = 12.9 years, SD = .36) and the control cohort (M = 12.8 years, SD = .90). The sample was ethnically diverse, with 51.2% Asian, 18.1% Mixed, 19.3% African/Caribbean, 9.0% Caucasian, and 2.4% Middle Eastern in the treatment and 44.7% Asian, 17.8% Mixed, 29.4% African/Caribbean, 6.6% Caucasian, and 1.5% Middle Eastern in the control cohort. Distributions of ethnicities in treatment and control cohort were not significantly different (χ^2 = 5.63, p = .23). There were no significant differences in family size (both groups with M = 4.6 persons per household, SD = 1.81) or child-reported paternal education between treatment and control cohorts (both cohorts combined: 1.4% with less than secondary school, 19.6% with only secondary school, 20.4% with a university degree, 14.0% more than one university degree, and 44.6% unknown by the child). All children attended the same school in the borough of Newham, which was ranked the third most deprived area in all of England in the 2010 Index of Deprivation (Department for Communities and Local Government, 2011).

The study received ethical approval from the University of East London research ethics committee.