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# Intellect and openness differentially predict affect: Perceived and objective cognitive ability contexts



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Keywords: Ability Affect Intellect Mood Openness Intelligence Wellbeing	The characteristics of Openness and Intellect suggest they may be differentially correlated with affect. In Study 1 $(n = 224)$ we examined associations between Openness/Intellect and well-being. Additionally, we included variables related to ability perception: subjectively assessed intelligence and satisfaction with intelligence. In Study 2 $(n = 216)$ we explored how Intellect/Openness predict subjective stress states related to performance of intelligence tests. Across studies, Intellect was consistently correlated with more positive affective states (mood and satisfaction), and lower stress. Openness – affect associations were inconsistent across studies, although Openness correlated with higher task-related worry and lower positive emotionality. Furthermore, in Study 1, satisfaction with one's intelligence fully mediated associations between Intellect and measures of positive affect. In Study 2, warry mediated the association between Intellect and intelligence test performance.

#### 1. Introduction

Numerous studies have shown the importance of personality for affect and subjective well-being (DeNeve & Cooper, 1998). Among various personality traits two especially have received the most theoretical and empirical attention: Extraversion and Neuroticism. Generally, both cognitive and affective components of well-being are associated with higher Extraversion and lower Neuroticism (Diener & Lucas, 1999). Specifically, it has been found that neurotics tend to experience negative affect and tense arousal, while extraverts have a tendency towards high levels of positive affect, hedonic tone, and energetic arousal (Matthews, Deary, & Whiteman, 2009; Thayer, 1989; Watson, 2000; Zajenkowski, Goryńska, & Winiewski, 2012). These associations are not surprising given that positive and negative emotions are defining characteristics of Extraversion and Neuroticism, respectively (see Watson, 2000). Besides Extraversion and Neuroticism, other major personality traits (such as Big Five) were also studied in the context of affective functioning but these studies have been less frequent. For instance, it was found that Agreeableness predicted higher positive affect (DeNeve & Cooper, 1998) and happiness (Steel, Schmidt, & Shultz, 2008), and Conscientiousness showed a weak positive correlation with life satisfaction (Weiss, Bates, & Luciano, 2008), positive affect (Soto, 2015) and energetic arousal (Goryńska, Winiewski, & Zajenkowski, 2015). In studies conducted so far, Openness did not exhibit robust relationships with affect and well-being. In some studies Openness correlated with higher positive affect, but it did not show significant associations with negative affect (Gutierrez, Jimenez, Hernandez, & Puente, 2005; Watson, 2000). Goryńska et al. (2015) measured mood of students six times during an academic semester and found that Openness occasionally predicted high levels of energetic arousal and hedonic tone. Furthermore, Matthews et al. (1999) found that Openness was associated with lower distress in the performance context. Although some evidence exists that Openness may be related to affect, some researchers claim that Openness has more in common with cognition than with affective states (Watson, 2000). In the current investigation we challenge this view by showing that the inconsistency in previous findings might be due to differing conceptualizations of Openness.

Openness has been described variously by researchers as Culture, Openness to Experience, Intellect or Imagination (see e.g. DeYoung, 2014). Recent debate on this trait, however, revealed that Openness reflects two equally central aspects of the broader factor, which are correlated but separable. These aspects were identified as Openness and Intellect and the compound label of Openness/Intellect for the broad trait has been proposed (DeYoung, Quilty, & Peterson, 2007). To avoid confusion with similar labels of other constructs, e.g., intelligence, DeYoung et al. (2007) provided clear definitions and operationalizations of the two aspects. Intellect encompasses intellectual engagement

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with abstract and semantic information, whereas Openness reflects engagement with perceptual and aesthetic domains, artistic interest and fantasy proneness (DeYoung, Grazioplene, & Peterson, 2012). At the measurement level, Intellect contains mainly items describing perceived intelligence, e.g. Am quick to understand things, Have a rich vocabulary, and intellectual engagement, e.g. Avoid philosophical discussions - reversed; Like to solve complex problems (DeYoung et al., 2007). In contrast, the Openness scale involves items reflecting sensational experiences, e.g., See beauty in things that others might not notice), fantasy, e.g., Seldom daydream-reversed), and artistic creativity (e.g., Believe in the importance of art (DeYoung, 2014). Although the two aspects are inter-related, they differentially predict a number of variables. For instance. Intellect has been associated with intelligence (DeYoung, Quilty, Peterson, & Gray, 2014) as well as working memory capacity and related brain activity (DeYoung, Shamosh, Green, Braver, & Gray, 2009). Openness, on the other hand, has been linked with creativity and creative achievements in the arts (Kaufman et al., 2016). Moreover, Kaufman et al. (2010) reported a double dissociation, in which Intellect predicted working memory but not implicit learning, whereas Openness predicted implicit learning but not working memory. Furthermore, Openness and Intellect were found to differentially predict psychopathology. For instance, in one investigation Aesthetics and Feelings, the facets of the NEO PI-R that are markers of the Openness aspect, were associated with depression (Wolfenstein & Trull, 1997). Moreover, DeYoung (2014) noticed that Openness is positively related to Neuroticism and that Openness may contribute to risk for internalizing disorders by allowing a greater range of stimuli into awareness, which would lead to a greater range of stimuli in which to detect conflict or threat. Furthermore, DeYoung et al. (2012) suggested that Openness might be also close to positive schizotypy which comprises magical ideation, perceptual aberration, and overinclusive thinking. The central feature of all symptoms of positive schizotypy can be described as apophenia, which is the erroneous perception of patterns or causal connections (DeYoung et al., 2012). Indeed, positive schizotypy or apophenia appears to be related to Openness but not Intellect (DeYoung et al., 2012).

The contrasting theoretical conceptualizations and empirical characteristics of Openness and Intellect suggest that the two aspects of Openness/Intellect may differentially predict affect. First, although Intellect is associated with analytical and fluid reasoning (DeYoung et al., 2014) which might be regarded as 'cool' rather than 'hot' processes, there are reasons to believe that it will be significantly associated with high positive affect. Most importantly, Intellect reflects perception of one's cognitive ability and pleasant experience related to the investment of cognitive resources. Moreover, intelligence, which is primary correlated with Intellect (DeYoung et al., 2014), seems to be related to higher level of well-being, since it is modestly negatively correlated with traits related to maladjustment, including neuroticism, depression, negative emotionality, somatic symptom reporting, public self-awareness and social anxiety (see Austin, Boyle, Groth-Marnat, Matthews, et al., 2011). These findings would then suggest that Intellect is associated with greater positive mood and well-being. Additionally, a source of affective experience in high Intellect individuals might be related to the enjoyment of thinking, problem solving, and cognitive engagement.

In contrast, Openness seems to be related to negative emotionality. The findings presented above indicate that Openness correlates with depression (Wolfenstein & Trull, 1997) and Neuroticism (DeYoung et al., 2007) which are strongly related to negative mood and low level of well-being (e.g. Watson, 2000). Moreover, Openness shares some aspects with schizotypy and symptoms of schizophrenia-spectrum disorders (Chmielewski, Bagby, Markon, Ring, & Ryder, 2014; DeYoung et al., 2012) which are known be associated with negative emotionality and increased anxiety (Morrison & Wells, 2007; Ohi et al., 2016). Taking these findings into account, it might expected that Openness would be associated with negative mood and low well-being.

#### 2. The current research

The principal aim of the research was to test the hypothesis that Intellect correlates with positive mood and well-being, whereas Openness is associated with negative mood and stress outcomes. Beyond the basic issue of the nature of bivariate relationships between Intellect/Openness aspects and affect, the literature reviewed raises three further questions that the current research also aimed to address.

Q1. What is the range of well-being variables sensitive to Intellect/ Openness? Specifically, we aimed to test whether the traits are associated only with purely affective variables including mood, or whether the traits also predict cognitive aspects of well-being including higher life satisfaction, higher self-assessed intelligence, and lower worry.

Q2. What processes might mediate associations between the traits and well-being? Various processes associated with Intellect/Openness might contribute to wellbeing but mediating mechanisms were neglected in the research reviewed. Cognitive appraisal processes are central to emotional outcomes (Lazarus, 1999), so, as a first step, we investigated self-evaluations of intellectual functioning as a mediator. People who appraise their intelligence positively may experience higher well-being, whereas those who evaluate their intelligence negatively may be prone to negative affect and stress.

Q3. Do affective correlates of Intellect/Openness traits contribute to objective performance differences? Associations between Intellect and performance on tests of cognitive ability and working memory (DeYoung et al., 2009, 2014; Kaufman et al., 2010) might at least in part be a consequence of the greater well-being associated with high Intellect. We thus aimed to test whether Intellect – cognitive ability associations were mediated by affective states experienced during test performance.

Two studies were run to address these questions. Study 1 focused on testing whether Intellect and Openness differentially predict a range of wellbeing variables including both affective and cognitive factors (Q1). The study also tested for a mediating role for personal satisfaction with one's intelligence (Q2). Study 2 investigated individual differences in responses to cognitive performance, again distinguishing affective and cognitive state dimensions (Q1). It also aimed to test whether any associations between Intellect/Openness traits and test performance were mediated by individual differences in affective and cognitive state (Q3).

Specifically, in Study 1 we examined simple associations between Openness, Intellect and well-being. The latter is typically defined as 'a person's cognitive and affective evaluations of his or her life' (Diener, Lucas, & Oishi, 2002, p. 63) that is a combination of global judgement of life satisfaction and the relative frequency of experiencing positive versus negative affect (Diener, Oishi, & Lucas, 2003). Generally, we expected Intellect to be associated with higher well-being, whereas Openness should correlate with lower well-being. Furthermore, we also included additional variables related to ability perception to test their mediating role for Intellect. In particular, we were interested to what extent subjectively assessed intelligence (SAI) and satisfaction with intelligence explain well-being among individuals scoring high on Intellect.

In Study 2 we wanted to see how Intellect and Openness predict state responses in the context of intelligence test performance. We decided to use the concept developed by Matthews et al. (2002) who proposed a multi-dimensional model of subjective stress state related to cognitive performance, including cognitive and motivational constructs in addition to affective dimensions. The general prediction was that Intellect would be associated with more pleasant experiences and higher motivation in the context of cognitive performance, whereas Openness would be related to more stressful experiences.

#### 3. Method

The research was approved by the ethics committee of Faculty of Psychology at University of Warsaw. Verbal informed consent was

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