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## Subjective well-being as a mediator for curiosity and depression

**Abstract:** Curiosity is a personality trait that is inversely related to depression and positively related to subjective well-being. However, the relationship between curiosity and these two outcomes is still unclear which hampers our general understanding of well-being. Based on research within positive psychology that showed character strengths such as curiosity can indirectly decrease depression, we hypothesized that the inverse relationship between curiosity and depression would be mediated by subjective well-being. Two hundred and fifty seven participants, between 18 and 64 years old ( $M = 24.50$ ,  $SD = 8.33$ ) completed a web-based survey comprising: The Curiosity and Exploration Inventory – II, Center for Epidemiological Studies – Depression and the Steen Happiness Index. We found that well-being mediated the relationship between curiosity and depression. The results indicate that curious individuals tend to report higher levels of subjective well-being which, in turn, is associated with lower levels of depression. Our findings contribute to the understanding of positive results obtained from clinical samples that underwent positive psychotherapy of depression.

**Key words:** curiosity, subjective well-being, depression, mediation

### Introduction

Positive psychology has recently become a prominent field for the investigation of well-being (Linley, Joseph, Harrington, & Wood, 2002). This approach stipulates that increased well-being can result from the use of character strengths, such as kindness or curiosity (Otake, Shimai, Tanaka-Matsumi, Otsui, & Fredrickson, 2006; Peterson & Seligman, 2004; Seligman, Steen, Park, & Peterson, 2005). Character strengths are considered personality traits related to virtues which constitute human core characteristics (Dahlsgaard, Peterson, & Seligman, 2005). For instance, the character strength “curiosity” is considered to be a psychological manifestation of the virtue of “wisdom”. Positive psychology stipulates that exercising personal strengths produces immediate excitement or invigoration and in the long term provides a sense of authenticity (Peterson & Seligman, 2004) which, in turn, leads to enhanced well-being and decreased depression (Park, Peterson, & Seligman, 2004).

### Character strengths indirectly decrease depression

Experimental studies have shown that exercising character strengths contributes to satisfaction with life and decreases depression (Seligman, Steen, Park, & Peterson, 2005; Proyer, Ruch, & Buschor, 2012; Sin & Lyubomirsky, 2006). Satisfaction with life and depression are often analyzed separately as they are not two ends of the same dimension (Larsen, Hemenover, Norris, & Cacioppo, 2002). In fact, studies have shown the relative independence of well-being and ill-being (Larsen & McGraw, 2011) and satisfaction with life versus dissatisfaction with life (Mazaheri & Theuns, 2009).

The evaluative space model (Larsen, McGraw, & Cacioppo, 2001) posits that people are able to experience happiness and sadness concurrently during short periods of time, because positivity and negativity result from different processes within the affective system. However, such mixed-states are unstable and higher-order regulatory processes would produce bipolarity over time (Larsen & McGraw, 2011). Nevertheless, in this view negative states may be

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addressed not only directly (e.g., through concentrating on problems, analysis, interpretation and remedy of their origins) but they can be reduced indirectly through expanding the scope of positive experiences (Seligman, Rashid, & Parks, 2006). In this context, meaning in life, for example, induced by gratitude and grit was shown to be an indirect suicide resiliency factor (Kleiman, Adams, Kashdan, & Riskind, 2013).

Indirect strategies to relieve negative outcomes are the central component of positive psychotherapy. In an efficacy study positive group psychotherapy was provided to people diagnosed with unipolar depression (Seligman, Rashid, & Parks, 2006). The intervention had only a minimal reference to negative symptoms and concentrated mainly on identifying and learning how to use character strengths, cultivate positive emotions, engagement, and savor positive experience. The results of the study showed that positive psychotherapy was more efficacious in reducing depressive symptoms than traditional clinical treatment, even if the clinical treatment was supplemented with antidepressant medication. The difference in the effects of positive psychotherapy remained significant during a 1-year follow-up.

The putative mechanism underlying the influence of positive interventions on depressive symptoms was proposed (Seligman et al., 2006). This model posits that negativity attracts attention stronger than positivity. Similar findings have been observed in other domains of human functioning which support the model and likely is evolutionary adaptive (see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001, for a review). This negativity bias, however, can be counteracted by intentional activity infusing daily experiences with positive meaning (Seligman et al., 2006). In this context, curiosity as a strength of character seems to play a significant role in shifting from negativity to novel positive experience.

### Curiosity and increased well-being against depression

Curiosity is one of the most common strengths of character (Peterson et al. 2007; Linley et al., 2007) and has been regarded as one of the most fundamental psychological concepts (Spielberger, 2006). In spite of its prevalence and significance, curiosity has often been underestimated as a factor that may contribute to well-being (Kashdan, 2009). Indeed, recent studies have shown that curiosity is related to overall satisfaction with life (Peterson, Ruch, Beermann, Park, & Seligman, 2007), satisfaction with work (Peterson, Stephens, Park, Lee, & Seligman, 2010) and meaning in life (Kashdan & Steger, 2007). Additionally, existing studies showed positive associations between well-being and intrinsic motivation (Ryan & Deci, 2000), flow (Nakamura & Csikszentmihalyi, 2005), or openness to experience (McCrae & Costa, 1999) which are all related to curiosity (Kashdan et al., 2009). Thus, we can expect that curiosity will also have positive effects on well-being.

Kashdan and colleagues proposed a two-factor concept of curiosity comprising *stretching* and *embracing* (Kashdan et al., 2009). *Stretching* reflects the motivation

to seek out knowledge and new experiences, whereas *embracing* is related to willingness to accept the uncertain nature of life. Curiosity as a character strength has a developmental trajectory facilitating growth, expansion, and transcendence. For instance, people high in trait curiosity reported more frequent growth-oriented behaviors and searching for meaning in life on days when they were more curious (Kashdan & Steger, 2009). Curious individuals have more eagerness to self-initiate life-enhancing activities (Kaczmarek et al., 2013) because they perceive them as easy, socially approved, and beneficial (Kaczmarek, Kashdan, Drajkowski, Bujacz, & Goodman, 2014). Moreover, curious individuals pay more attention to their activities and invest more cognitive resources into information processing (Kashdan et al., 2009). Taken together, curious individuals initiate behaviors which enhance their personal growth and build consequential personal resources, whereas lack of curiosity can result in intolerance of uncertainty which is a risk factor for anxiety disorders (Dugas, Freeston, & Ladouceur, 1997). Therefore, curiosity may work as a protective buffer against adverse psychological outcomes by increasing well-being.

### The current study

In the present study, we predicted that curiosity would have an indirect effect on depression through increased subjective well-being. We assumed that people high on curiosity would be more attracted to positive aspects of life and that this tendency can counteract the impact of negativity. Curious individuals allocate their attention onto subjects that are intrinsically interesting to them (Nakamura & Csikszentmihalyi, 2002), and as a result, they are less likely to become preoccupied with negative thoughts that might increase depression. Thus, we expected that a mediation model will best explain the relationships between curiosity and two experiential outcomes: subjective well-being and depression. More specifically, we hypothesized that subjective well-being acts as a mediator between curiosity and depression (the hypothesized model). Additionally, an alternative model was tested in which depression is the mediator and subjective well-being is considered an outcome variable (the alternative model). The alternative model comes from the studies showing that depression has a negative impact on curiosity (Rodrigue, Olson, & Markley, 1987; Spielberger & Starr, 1994). Specifically, depression can decrease curiosity as an exploratory activity (Rodrigue, Olson, & Markley, 1987), and additionally anxiety was found to inhibit curiosity (Spielberger & Starr, 1994). However, Litman and Spielberg (2003) did not find an association between curiosity and depression.

### Method

#### Participants

Two hundred and fifty seven adults participated in this study by completing a web-based survey. Most of them (85%) were recruited through invitations placed on popular message boards in Poland. Moreover, those who completed

the survey were asked to invite their acquaintances to take part in the study. This snow-ball technique resulted in the remaining 15% of the sample. The mean age of the participants was 24.50 years ( $SD = 8.33$ ) with a range from 18 to 64 years. Of the participants, 73.4% were females and 2% did not disclose their gender. Missing values for all variables (<1%) were imputed using expectation-maximization algorithm in SPSS 21.00. Before starting the survey all participants gave their informed consent. All participants took part in the study voluntarily and did not receive any compensation.

## Measures

The web-based survey comprised the following measures:

*The Curiosity and Exploration Inventory – II* (Kashdan, Gallagher, Silvia, Winterstein, Breen, Terhar, & Steger, 2009) in Polish (Kaczmarek et al., 2013) comprises 5 items for stretching (e.g. ‘Everywhere I go, I am out looking for new things or experiences’) and 5 for embracing (e.g. ‘I am the type of person who really enjoys the uncertainty of everyday life’). Ratings occurred on a 5-point scale from 1 ‘very slightly or not at all’ to 5 ‘extremely’. As the subscales for stretching and embracing were strongly correlated,  $r = .72$ ,  $p < .001$ , they were joined into a single measure of curiosity with a high internal consistency (Cronbach’s  $\alpha = .86$ ).

Well-being was measured with the *Steen Happiness Index* (Seligman, Parks, Steen, & Peterson, 2005) validated into Polish (Kaczmarek, Stanko-Kaczmarek, & Dombrowski, 2010), which is a measure of subjective well-being closely related to satisfaction with life (Kaczmarek, Bujacz, & Eid, in press). A 10-item version of the scale was used which requires participants to read a series of statements and pick the one that best describes them during the past week. Response alternatives range from a negative ‘Most of the time I am bored’ to an extreme positive ‘Most of the time I am fascinated by what I am doing’. Each response is assigned a value between 1 (unhappy) and 5 (most happy). The items cover the areas of pleasure ‘My life is filled with pleasure’, engagement ‘Time passes so quickly during all of my activities that I do not even notice it’ and meaning ‘I have a very clear idea about my purpose in life’. In this study the scale showed a high internal consistency (Cronbach’s  $\alpha = .84$ ).

Nine items taken from the Depression scale from the *Center for Epidemiological Studies* (Radloff, 1977; Ziarko, Kaczmarek, & Haładziński, 2013) were used to quantify the frequency of depressive symptoms during the past week (e.g. ‘I had crying spells’, ‘I felt sad’). The items were rated on a scale from 1 ‘rarely or none of the time (less than 1 day)’ to 4 ‘most or all of the time (5-7 days)’. Also this scale showed a high internal consistency (Cronbach’s  $\alpha = .88$ ).

## Analytical strategy

In order to test the hypothesis that the negative

relationship between curiosity and depression is mediated by subjective well-being, we used the Sobel test along with the product-of-coefficients bootstrapping strategy (Preacher & Hayes, 2008). Bootstrapping is regarded as more robust and based on fewer assumptions than normal theory tests (Preacher & Hayes, 2008). In bootstrapping an effect is significant if the produced confidence interval does not include zero. We used SPSS 21.00 and the PROCESS macro (Preacher & Hayes, 2008) for the computations. The variables were standardized before the analysis. To test multicollinearity between curiosity and well-being in the regression model we estimated the variance inflation factor (VIF) and multicollinearity tolerance (TOL). A problem with multicollinearity is indicated by a TOL below 0.2 and a VIF above 10 (Bowerman, & O’Connell, 1990; Mendard, 1995).

## Results

Descriptive statistics and correlations between the variables are presented in Table 1. There was no problem of multicollinearity for the model, TOL = 0.79, VIF = 1.26.

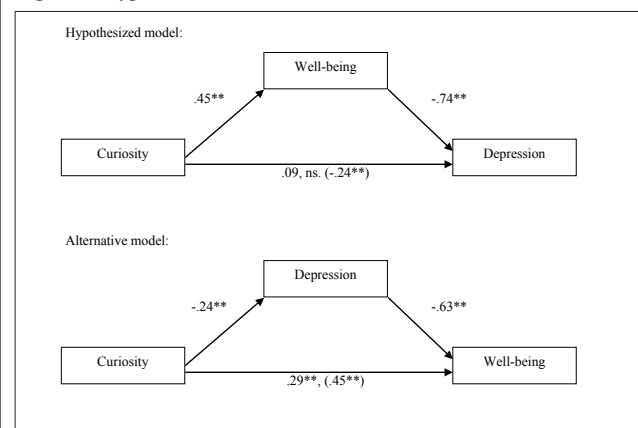
**Table 1. Descriptive statistics and correlations between study variables**

	<i>M</i>	<i>SD</i>	curiosity	well-being
curiosity	32.17	8.09		
well-being	30.55	7.33	.46**	
depression	15.82	6.00	-.25**	-.71**

Note. \*\* $p < .01$

The model with path coefficients is presented in Figure 1. As hypothesized, well-being mediated the relationship between curiosity and depression as indicated by an indirect effect,  $\beta = -.34$ ,  $SE = 0.05$ ,  $z = -7.21$ ,  $p < .001$ , 95%CI [-.44, -.25]. The total effect of curiosity on depression (path c),  $\beta = -.25$ ,  $SE = .06$ ,  $t = -4.09$ ,  $p < .001$ , was no longer significant when the mediator (well-being) was entered into the model (path c’),  $\beta = .09$ ,  $SE = .04$ ,  $t = 1.87$ , n.s., which is indicative of a complete mediation. The model explained a substantial amount of the variance in depression,  $R^2 = .51$ ,  $F(2, 254) = 129.76$ ,  $p < .001$ .

**Figure 1. Hypothesized and alternative mediational model.**



Note. Numbers in brackets represent the coefficient of variables without controlling for the mediator

\*\*  $p < .01$ , numbers in brackets represent the association of variables without controlling for the mediator

An alternative model was tested in which depression was a mediator and well-being was the dependent variable. However, the alternative model showed worse estimates. The total effect of curiosity on well-being (path  $c$ ),  $\beta = .45$ ,  $SE = .05$ ,  $t = 8.18$ ,  $p < .001$ , was reduced but remained significant after the mediator (depression) was introduced in the model (path  $c'$ ),  $\beta = .29$ ,  $SE = .04$ ,  $t = 7.14$ ,  $p < .001$ . This indicates that there may be a partial mediation, an indirect effect  $\beta = .15$ ,  $SE = 0.03$ ,  $z = -3.96$ ,  $p < .001$ , 95%CI = [.07; .24]. The path coefficients were also displayed in Figure 1. (see page 202).

## Discussion

The current study aimed at testing the hypothesis that the association between trait curiosity and depression is mediated by subjective well-being. The results showed that well-being mediated the relationship between curiosity and depression. An alternative model with depression as the mediator and subjective well-being as the outcome indicated only a partial mediation.

These findings suggest that curiosity can counteract the tendency to focus attention on negative aspects of life (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Seligman et al., 2006). Consequently, curious individuals may be more oriented towards these areas of life that are intrinsically rewarding, which leaves less room for negativity. The alternative model that indicated partial mediation of depressive symptoms between curiosity and well-being could be consistent with studies where depression inhibited curiosity (Rodrigue, Olson, & Markley, 1987; Spielberger & Starr, 1994). Depression, decreasing curiosity as an exploratory activity (Rodrigue, Olson, & Markley, 1987), would have indirect negative impact on well-being.

There are several caveats concerning the findings of this study. First, the sample was a self-selected group of volunteers. Participants in Internet surveys on well-being usually show below the average levels of happiness (Howell, Rodzon, Kurai, & Sanchez, 2010). Furthermore, we did not offer any incentives for participation in this study. We relied solely on intrinsic motivation of the participants which is related to curiosity (Ryan & Deci, 2000). Therefore, we cannot exclude the possibility that participants in our study were more curious than the average in population. Both issues suggest that the results might be mostly applicable to individuals who are less happy and more curious than the average. Further studies could use different incentives to attract more diverse motivations to participate in the survey and include a more heterogeneous group of people. Second, we tested our hypothesis in a non-clinical sample using a web-based survey that restricts its practical implications. Finally, the results supported the hypothesized model and indicated that it explained the data better than the alternative model in which a direct negative association of curiosity and depression was assumed. Yet, although path-analysis allows for interpretation of causal effects (Pearl, 2012), only further experimental designs that manipulate with curiosity can provide direct validity of the

model and determine whether subjective well-being buffers depression, depression affect subjective well-being, or the causal influences are bidirectional.

As noted earlier, using signature strengths promotes well-being (Proyer, Ruch, & Buschor, 2012; Seligman et al., 2005). The observed mechanism may apply mostly to people with high curiosity. Curiosity is one of the most frequent strengths of character (Peterson, et al. 2007). This might explain why we observed significant effects even without controlling whether the participants regarded curiosity as one of their signature strengths. Nonetheless, the ranking of a particular character strength in the whole profile should be controlled in further studies on the happiness-boosting function of character strengths.

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