

## The Mediating Role of Perceived Control and Desire for Control in the Relationship between Personality and Depressive Symptomology

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### Abstract

*Introduction:* Depression constitutes a fundamental problem for society and understanding its aetiology is of unequivocal importance. Seminal theories implicated low perceived control, low desire for control and variations in personality factors in the manifestation of depression. This study, however, is the first to examine the mediating roles of both desire for control and perceived control in the relationship between personality and depressive symptomology.

*Methods:* A sample of 350 participants, ranging from 18 to 67 years of age ( $M = 22.8$ ,  $SD = 9.0$ ), were recruited through Durham University's social media pages. Participants completed the Revised NEO Personality Inventory, the Spheres of Control Scale, the Desire for Control Scale and Beck's Depression Inventory.

*Results:* Path analysis using Maximum-Likelihood Method indicated that desire for control and perceived control serially mediated the effect of extraversion, conscientiousness and agreeableness on depressive symptomology, with only neuroticism maintaining a direct effect. Extraversion and conscientiousness increased desire for control, whereas agreeableness diminished desire for control. Greater desire for control subsequently elevated perceived control, manifesting reductions in depressive symptomology.

*Discussion:* This study provides novel evidence that desire for control and perceived control mediate the relationship between personality and depressive symptoms. The clinical implications are discussed, evaluating the potential efficacy of therapies that bolster desire for control.

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## **1. Introduction**

Major depressive disorder (MDD) affects over 21% of the population (Auerbach et al., 2018; Kessler et al., 2007) and is characterised by persistent despondency and loss of interest in pleasurable activities (APA, 2013). These shocking statistics highlight our failure as a society to care for our population and the necessity for effective clinical interventions. Understanding the aetiology of MDD is unequivocally important, to facilitate the development of preventative measures and treatments for this disorder (Martino et al., 2019). However, the literature currently lacks a comprehensive model of the aetiology of depression (Carrozzino et al., 2019).

### **1.2 Perceived Control and Depression**

Humans strive for autonomy and early theorists attributed the development of depressive symptomology (DS) to the perceived absence of the ability to modulate environmental contingencies (Abramson et al., 1978; Seligman, 1975). ‘Hopelessness Theory’ builds on this by suggesting that low perceived control (PC) over one’s environment manifests MDD (Abramson et al., 1989). Low PC diminishes perceptions of self-worth, resulting in a state of ‘hopelessness’ in which the individual possesses generalised beliefs of low PC over their environment (Tobin & Raymundo, 2010). In contrast, high PC diminishes the extent to which one negatively appraises stressful events and protects individuals from DS (Galla & Wood, 2015; Millman et al., 2017).

Evidence for Hopelessness Theory comes from demonstrations that individuals with MDD report lower PC than non-depressed individuals (Bjørkløf et al., 2016; Crandall et al., 2018; Kleinberg et al., 2013; Volz et al., 2018). A recent large-scale meta-analysis highlighted the universality of this effect, reporting that the inverse relationship between PC and DS traverses across both individualistic and collectivistic societies (Cheng et al., 2013). Furthermore, longitudinal research suggests that PC maintains a causal role in depression, with reports that low PC precedes the onset of MDD (Bjørkløf et al., 2018; Tobin & Raymundo, 2010) and that reductions in DS are associated with prior increases in PC (Hamilton & Abramson, 1983). These results strongly support the causal role of low PC in depression.

### **1.3 Desire for Control and Depression**

Desire for control (DFC) is also implicated in MDD, referring to the extent to which one endeavours to exert influence over the environment. Preliminary evidence indicates that low DFC is associated with greater DS (Amoura et al., 2014; Burger, 1984; Hornsey et al., 2018). Indeed, low DFC is associated with various facets that contribute to MDD, including loneliness (Solano, 1987), poor academic performance (Burger, 1992) and maladaptive coping styles

(Gebhardt & Brosschot, 2002). Thus, the literature suggests that low DFC increases one's susceptibility to stress and consequently DS.

#### **1.4 Desire for Control, Perceived Control and Depression**

Hopelessness Theory entails the implicit assumption that PC mediates the effect of DFC on depression. It assumes that individuals seek to understand the causal basis of environmental events (Friedland & Keinan, 1991), particularly in situations of low PC (Greenaway et al., 2015). Higher DFC promotes greater effort in searching for causal relations, facilitating greater opportunity to generate causal attributions (Weary et al., 1993; Yost & Weary, 1996); such causal attributions proliferate perceptions of control, consequently reducing DS. Support comes from demonstrations that individuals with high DFC exhibit greater effort to identify the causal basis of stressful situations (Keinan & Sivan, 2001) and engage in greater goal-oriented behaviour (Brandstädter & Rothermund, 2002), both of which are associated with elevated PC (Amoura et al., 2013). These results suggest that PC mediates the relationship between DFC and DS. These two constructs have also been linked to one's personality traits.

#### **1.5 Personality and Depression**

The 'Five Factor Model' is a highly influential model of personality, which argues that personality constitutes neuroticism, extraversion, conscientiousness, agreeableness and openness to experience (Costa & McCrae, 1992; McCrae & Costa, 2013). Each of these factors will be discussed in turn, with reference to their relationship with DS.

Neuroticism refers to one's emotional stability (Assari, 2017). Both cross-sectional and longitudinal evidence indicates that higher neuroticism manifests greater DS (Assari, 2017; Griffith et al., 2010; Zinbarg et al., 2016). It has been suggested that increased neuroticism results in more negative appraisals of daily events (Sandi & Richter-Levin, 2009; Yusof et al., 2017), a characteristic trait of MDD. Evidence for this comes from a one-year longitudinal study, reporting that the effect of neuroticism on DS was partially mediated by participants' evaluations of daily hassles (Hutchinson & Williams, 2007). This suggests that neuroticism results in maladaptive appraisals of events, manifesting greater DS.

Extraversion relates to one's gregariousness, whereas conscientiousness concerns one's impulse control. Recent studies have reported an inverse relationship between DS and both extraversion and conscientiousness (Allen et al., 2018; Jourdy & Petot, 2017; Koorevaar et al., 2013); meta-analytic evidence from 175 independent samples has ascertained support for this (Kotov et al., 2010). Indeed, longitudinal evidence implies a causal role for low extraversion and low conscientiousness in depression (Goldstein et al., 2018; Wilson et al., 2014). It has been suggested that extraversion and conscientiousness promote the use of adaptive coping strategies

during the occurrence of negative events (Connor-Smith & Flachsbart, 2007; Carver & Connor-Smith, 2010), which have been suggested to protect individuals from depression (Wilt et al., 2012; Afshar et al., 2015). Therefore, contemporary literature advocates the role of both extraversion and conscientiousness as predisposing factors for MDD.

Agreeableness pertains to one's cooperativeness and interpersonal behaviour (Zalewska, 2018). The literature has repeatedly demonstrated that agreeableness maintains an inverse relationship with depressive symptoms in both cross-sectional (Koorevaar et al., 2017; Malouff et al., 2005) and longitudinal studies (Goldstein et al., 2018; Hovens et al., 2016). Indeed, agreeableness is implicated in the regulation of negative affect (DeNeve & Cooper, 1998), with reduced negative affect resulting in diminished DS (Zalewska, 2018).

Finally, openness to experience relates to one's cognitive flexibility and behavioural liberality. Contemporary research indicates that openness is unrelated to DS in both the general (Allen et al., 2018; Koorevaar et al., 2013, 2017) and clinically depressed population (Jourdy & Petot, 2017; Kotov et al., 2010; Malouff et al., 2005). A recent meta-analysis by Hakulinen et al. (2015) consisting of 117, 899 participants from a variety of backgrounds found supportive evidence for this assertion. Therefore, when investigating the pathways between personality, control constructs and DS in the current study, openness was omitted from the analysis.

### **1.6 Pathways between Personality, Perceived Control and Depression**

Hopelessness Theory postulates that personality factors represent stable facets that predispose individuals to depression, whereas control-related variables entail a more proximal influence on DS and mediate the relationship between personality and MDD. Recent evidence reported that perceived self-efficacy, a sub-facet of PC (Amoura et al., 2014), mediated the effect of neuroticism, extraversion and conscientiousness on DS (Ebstrup et al., 2011; Sahin & Cetin, 2017; Wang et al., 2014). Perceived self-efficacy entailed a positive relationship with both extraversion and conscientiousness but displayed an inverse relationship with neuroticism (Wiersma et al., 2011). Whilst perceived self-efficacy only partially mediated the effect of neuroticism on DS, it fully mediated the effect of both extraversion and conscientiousness (Ebstrup et al., 2011; Sahin & Cetin, 2017). Importantly, agreeableness was not mediated by perceived self-efficacy, maintaining a direct effect on DS (O'Shea et al., 2017).

### **1.7 The Current Study**

Despite evidence that PC mediates the effect of DFC on depression (Weary et al., 1993; Yost & Weary, 1996) and the effect of neuroticism, extraversion and conscientiousness on DS (Wang et al., 2014), it remains to be examined whether DFC and PC serially mediate the relationship between personality and depression. The current study aims to fill this gap in the literature by

empirically assessing the proposed pathways. Whilst sparse, there is some evidence that DFC possesses a positive relationship with extraversion (Burger, 2013; Wolfe & Kasmer, 1988) and conscientiousness (Auerbach et al., 2002), but displays an inverse relationship with neuroticism (Arndt & Solomon, 2003) and agreeableness (Auerbach et al., 2002; Ode & Robinson, 2007). Evidence that the effect of DFC on DS is mediated by PC (Keinan & Sivan, 2001) elucidates the possibility that DFC and PC serially mediate the relationship between personality factors and DS.

The current study examined the extent to which DFC and PC serially mediate the effect of neuroticism, extraversion, conscientiousness and agreeableness on DS; openness was omitted from this analysis, as prior research indicated that it is unrelated to DS (Allen et al., 2018; Hakulinen et al., 2015; Jourdy & Petot, 2017; Koorevaar et al., 2013, 2017). Elucidating the role of the respective facets in depression is unequivocally important, as understanding the aetiology of MDD would aid the development of efficacious therapeutic interventions. Firstly, the direct effects of both personality factors and PC on DS were assessed. Based on previous research (Assari, 2017; Koorevaar et al., 2013, 2017), it was hypothesised that neuroticism would display a positive relationship with DS, whereas extraversion, conscientiousness, agreeableness and PC would exhibit inverse relationships with DS. Secondly, the mediating role of PC in the effect of neuroticism, extraversion and conscientiousness on DS was examined. Prior research indicated that PC did not mediate the effect of agreeableness on DS (O'Shea et al., 2017; Sahin & Cetin, 2017); therefore, agreeableness was omitted from this aspect of the analysis. It was hypothesised that PC would partially mediate the effect of neuroticism on DS and fully mediate the effect of both extraversion and conscientiousness on DS (Ebstrup et al., 2011; Sahin & Cetin, 2017; Wang et al., 2014; Wiersma et al., 2011). Finally, exploratory analysis examined the extent to which DFC and PC serially mediated the effect of neuroticism, extraversion, conscientiousness and agreeableness on DS. Prior research indicates that PC mediates the relationship between DS and DFC (Weary et al., 1993; Yost & Weary, 1996), neuroticism (Wiersma et al., 2011), extraversion (Sahin & Cetin, 2017) and conscientiousness (Ebstrup et al., 2011). As DFC is associated with neuroticism (Arndt & Solomon, 2003), extraversion (Burger, 2013) and conscientiousness (Auerbach et al., 2002), it was hypothesised that DFC and PC would serially mediate the effect of neuroticism, extraversion and conscientiousness on DS.

## **2. Method**

### **2.1 Design**

This study utilised a cross-sectional correlational design to investigate the relationship between personality factors, PC, DFC and DS. Subsequent analysis investigated the mediating roles of PC and DFC in the relationship between personality factors and DS.

## 2.2 Participants

A sample of 350 participants, most of whom were university students, completed the online questionnaire. The sample consisted of 83 males, 266 females and 1 individual who did not specify their gender. The age of the participants ranged from 18 to 67 years, with a mean age of 22.8 years ( $SD = 9.0$ ). This opportunity sample was recruited primarily through Durham University's social media pages and participants were required to be at least 18 years of age to participate. Informed consent was given by all participants for both their participation and the use of their data in this research.

## 2.3 Measures

Participants provided their age and gender, before completing four questionnaires assessing personality factors, PC, DFC and DS. These are described below.

### *Personality Factors*

The 'Revised NEO Personality Inventory' (NEO-PI-R) was used to assess neuroticism, extraversion, conscientiousness and agreeableness (Costa & McCrae, 1992). This 44-item questionnaire required participants to rate the extent to which statements reflected their personality on a 5-point Likert scale, ranging from 'disagree strongly' to 'agree strongly'. The neuroticism scale concerned the extent to which individuals experience distress over daily events; for example, "Worries a lot." The extraversion scale assessed the extent to which individuals are outgoing; for example, "Is talkative." The conscientiousness scale measured one's personal control and thoughtfulness; for example, "Does things efficiently." The agreeableness scale regarded the individual's cooperativeness; for example, "Is generally trusting." The internal consistency for the neuroticism, extraversion, conscientiousness and agreeableness scales were  $\alpha = .859$ ,  $\alpha = .881$ ,  $\alpha = .811$  and  $\alpha = .791$ , respectively, showing satisfactory reliability (Santos, 1999). Evidence for the validity of the NEO-PI-R comes from reports that scores on this measure accurately predict behavioural responses to situations (Paunonen & Ashton, 2001).

### *Perceived Control*

The 'Spheres of Control Scale 3' (SOC 3) was used to assess PC (Paulhus & Van Selst, 1990). This scale consists of three subscales that assess PC across multiple domains of one's life. Firstly, the 'Personal Control' subscale assesses one's perceived self-efficacy; for example, "I can usually achieve what I want when I work hard for it." Secondly, the 'Interpersonal Control' subscale measures the perceived ability to develop and maintain relationships; for example, "I have no trouble making and keeping friends." Finally, the 'Socio-Political Control' subscale examines PC over one's political system; for example, "With enough effort, we can wipe out political

corruption.” This 30-item measure uses a 7-point Likert scale, ranging from ‘totally inaccurate’ to ‘totally accurate’, in which participants indicate the extent to which a statement reflects their opinions. To ascertain a holistic perspective over PC, the total score was calculated by summing scores from the three subscales, as recommended by Paulhus and Van Selst (1990). The internal consistency of the SOC 3 was  $\alpha = .804$ , demonstrating good reliability. This measure has received abundant support as a valid assessment of PC (Palenzuela, 1987) and is correlated with other measures of general and social self-efficacy (Sherer et al., 1982).

#### *Desire for Control*

The ‘Desirability of Control Scale’ (Burger & Cooper, 1979) was used to measure DFC. It consists of 20 items and examines one’s desire for self-efficacy; for example, “I enjoy making my own decisions.” This scale requires participants to indicate their agreement with various statements on a 7-point Likert scale, ranging from ‘the statement doesn’t apply to me at all’ to ‘the statement always applies to me’. The internal consistency of the scale was  $\alpha = .803$ , demonstrating good reliability. The literature has ascertained support for the concurrent validity of this measure (Burger, 1990) and scores on this scale have been demonstrated to be relatively stable over a 10-year period (Burger & Solano, 1994). Therefore, this scale provides a valid and reliable measure of DFC.

#### *Depressive Symptomology*

‘Beck’s Depression Inventory 2’ (BDI 2) was used to assess DS (Beck et al., 1996). This 21-item scale requires the individual to rate the extent to which various symptoms of depression apply to them. For example, statements range from “I don’t feel disappointed in myself” to “I hate myself”. The internal consistency of the scale was  $\alpha = .929$ , reflecting very good internal consistency (Santos, 1999). The validity of this measure is supported by evidence that it strongly predicts the onset of clinical depression (Arnau et al., 2001).

## **2.4 Procedure**

Ethical approval was ascertained from Durham University Ethics Committee. Prior to completing the study, participants received information regarding the potentially distressing content of the questionnaires. They were given information about the study and were required to provide informed consent before proceeding. Subsequently, participants disclosed demographic information, including their age and gender, before completing the NEO-PI-R, SOC 3, DFC Scale and BDI 2. After completing the questionnaires, participants were debriefed on the aims and purpose of the study. They were also provided with the experimenter’s contact details and mental health helplines.

### 3. Results

All the analyses were performed in SPSS. Firstly, the means, standard deviations (SDs) and zero-order correlations between the variables were calculated. Following this, various goodness-of-fit measures were used to assess model fit and non-significant parameters were subsequently omitted. Finally, path analysis using Maximum-Likelihood Estimates examined the direct and indirect effects of the variables on DS.

#### 3.1 Preliminary Analyses

The means, SDs and zero-order correlations between the variables are shown in Table 1. All variables were significantly correlated ( $p < .01$ ), except agreeableness with both extraversion and DFC ( $p > .05$ ). As none of the dependent variables possessed a bivariate correlation coefficient of greater than 0.9, multicollinearity was determined not to be an issue.

**Table 1.** Means, SDs and intercorrelations between the variables of interest (n=350)

Variables	N	E	C	A	DS	PC	DFC
<b>N</b>	-	-	-	-	-	-	-
<b>E</b>	-.42**	-	-	-	-	-	-
<b>C</b>	-.26**	.18**	-	-	-	-	-
<b>A</b>	-.25**	.09	.30**	-	-	-	-
<b>DS</b>	.61**	-.36**	-.18**	-.23**	-	-	-
<b>PC</b>	-.33**	.48**	.36**	.20**	-.35**	-	-
<b>DFC</b>	-.18**	.37**	.38**	-.07	-.17**	.49**	-
<b>Mean</b>	26.84	24.87	31.41	33.11	9.71	132.89	93.88
<b>SD</b>	6.82	6.86	6.12	6.03	9.56	17.40	14.07

*Note.* The table shows the Pearson's product-moment correlation coefficients between neuroticism (N), extraversion (E), conscientiousness (C), agreeableness (A), depressive symptomology (DS), perceived control (PC) and desire for control (DFC). \*  $p < .05$ , \*\*  $p < .01$ .

Preliminary analysis indicated that the sample size ( $n = 350$ ) was suitable for path analysis and that there was no missing data. The data was also examined for normality. Depressive symptomology was non-normally distributed, with a positive skew of 1.203 (standard error = 0.13); a logarithmic transformation was used to correct for positive skew. All other variables were normally distributed, as assessed by examination of skew indices. A path analysis using Maximum-Likelihood Method was conducted on the correlation matrix using AMOS<sup>TM</sup> 26 to assess the relationship between personality factors, control-related facets and DS.

#### 3.2 Goodness-of-Fit Indices

Various goodness-of-fit measures were used to assess model fit. Table 2 displays the fit statistics for the path model with the inclusion of the hypothesised parameters (model 1) and with the exclusion of all non-significant parameters (model 2). Close model fit is indicated by a non-



significant chi-squared test (Bollen, 1989), Root Mean Square Error Approximation (RMSEA) value of less than .08, and a Tucker Lewis Index (TLI), Goodness of Fit Index (GFI) and Comparative Fit Index (CFI) value of above .95 (Hu & Bentler, 1999). Despite the close fit of model 1, non-significant parameters were omitted to aid model parsimony. The fit indices highlight the close fit of the final model (model 2), despite the removal of non-significant paths. The significant chi-squared value is attributed to the test's sensitivity to sample size. This is supported by the indication of adequate model fit from the remaining inferential statistics that are less sensitive to such parameters. Model parsimony is assessed by the ratio of  $X^2$  to df, with values below 3 indicative of adequate model parsimony (Bentler, 1990). Model 2, but not model 1, entailed adequate parsimony, indicating that sufficient parameters were removed. Therefore, the final model is adequately parsimonious and entails good model fit.

**Table 2.** Goodness-of-Fit statistics for the models

Model	$X^2$	df	p	TLI	GFI	CFI	RMSEA	$X^2/df$
Model 1	9.707	2	0.008	0.867	0.992	0.987	0.105	4.854
Model 2	15.132	6	0.019	0.947	0.988	0.985	0.066	2.522

*Note.* Model 1 entails the inclusion of non-significant parameters. The non-significant parameters included the paths from neuroticism to DFC, extraversion to DS, conscientiousness to DS and agreeableness to DS. These parameters were removed from Model 2. The reported  $X^2$ , df and p values correspond to the chi-squared test.

### 3.3 Testing the Model

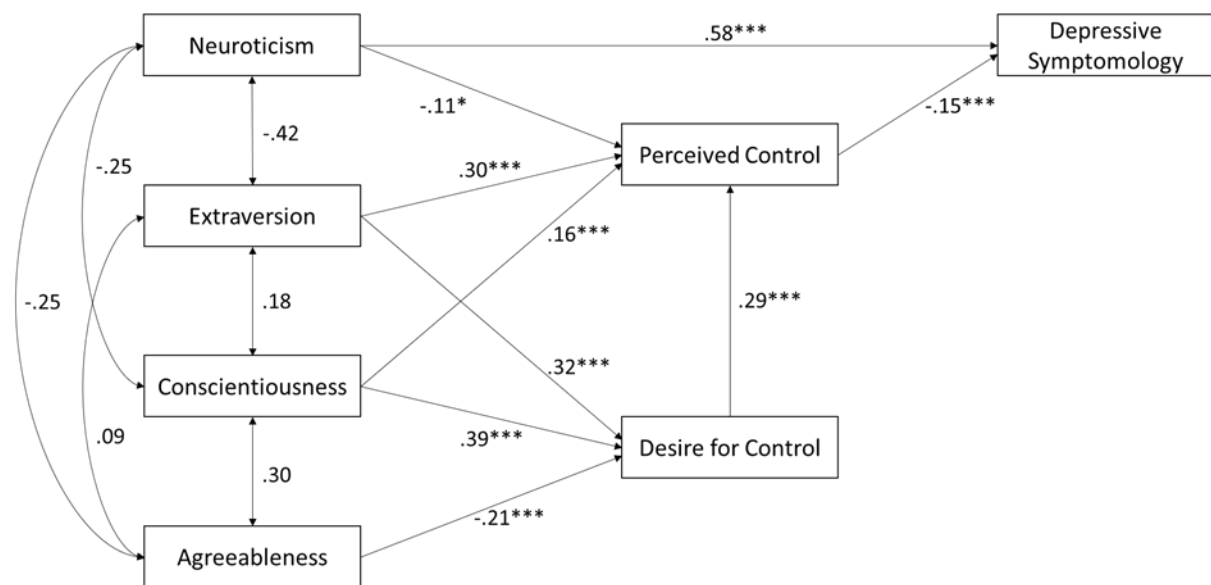
The direct effects of the variables of interest were subsequently assessed using Maximum-Likelihood Estimates. The standardised direct, indirect and total effects of the variables on DS can be found in Table 3. Neuroticism had a direct effect on DS ( $\beta = .58$ ,  $p < .001$ ), indicating a positive relationship between neuroticism and DS. However, with the inclusion of the mediator variables, extraversion, conscientiousness and agreeableness did not exhibit significant direct effects on DS ( $p > .05$ ); these parameters were subsequently removed from the model. Furthermore, PC also entailed a direct inverse effect on DS ( $\beta = -.15$ ,  $p < .001$ ). These direct effects entailed large effect sizes, indicating a strong relationship between DS and both PC and neuroticism.

**Table 3.** Standardised direct, indirect and total effects of the variables on DS

Variable	Direct Effect	Indirect Effect	Total Effect
Neuroticism	0.58	0.02	0.60
Extraversion	-	-0.06	-0.06
Conscientiousness	-	-0.04	-0.04
Agreeableness	-	0.01	0.01
Perceived Control	-0.15	-	-0.15
Desire for Control	-	-0.05	-0.05

Sobel’s test was used to verify the statistical significance of the indirect effects. Figure 1 depicts the final model, with the removal of non-significant parameters and the addition of theoretically informed parameters. The results indicated that PC significantly mediated the effect of neuroticism ( $p = .01$ ), extraversion ( $p = .003$ ) and conscientiousness ( $p = .002$ ) on DS. These results indicate that higher neuroticism, lower extraversion and lower conscientiousness are associated with lower PC, which is subsequently associated with greater DS.

**Figure 1.** Path model of the effects of personality factors on DS, as serially mediated by DFC and PC



*Note.* The standardised regression coefficients are displayed adjacent to the parameters. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Exploratory analysis examined whether DFC and PC serially mediated the effect of personality factors on DS. Analysis indicated that DFC and PC serially mediated the effect of extraversion ( $p = .001$ ), conscientiousness ( $p = .001$ ) and agreeableness ( $p = .001$ ) on DS. As neuroticism did not significantly predict DFC ( $p > 0.05$ ), the serial mediational role of DFC and PC in the effect of neuroticism on DS was not examined and this parameter was removed from the model. These results demonstrate that low extraversion and conscientiousness predict reduced DFC, which results in diminished PC and consequently greater DS. In contrast, higher agreeableness is associated with reduced DFC, manifesting lower PC and therefore higher DS. The squared multiple correlations highlighted that the model accounted for 42.4% of the variance in DS, representing a large effect size. Thus, the effects of extraversion, conscientiousness and agreeableness on DS were fully mediated by both PC and the serial relationship between DFC and PC, with only neuroticism maintaining a direct effect on DS.

## **4. Discussion**

The current study examined the extent to which DFC and PC serially mediate the effect of neuroticism, extraversion, conscientiousness and agreeableness on DS. In accordance with the first hypothesis, neuroticism exhibited a positive effect on DS, whereas PC displayed an inverse relationship. Further analysis indicated that PC partially mediated the effects of neuroticism, extraversion, conscientiousness and DFC on DS. These results were consistent with the second hypothesis, as PC entailed an inverse relationship with neuroticism and a positive relationship with extraversion, conscientiousness and DFC. Finally, DFC and PC serially mediated the effect of extraversion, conscientiousness and agreeableness on DS. The model accounted for a large proportion of the variance in DS and provides a novel insight into the aetiology of MDD, elucidating the serial mediational role of DFC and PC in the relationship between personality and depression.

### **4.1 Direct Effects on Depressive Symptomology**

#### **4.1.1 Perceived Control**

Firstly, the results indicated that PC maintains a direct effect on DS. This is consistent with prior demonstrations that low PC entails a causal role in the development of depression (Bjørkløf et al., 2018; Cheng et al., 2013; Crandall et al., 2018; Volz et al., 2018). These results support Hopelessness Theory and the assertion that low PC diminishes perceptions of self-worth (Tobin & Raymundo, 2010) and increases the extent to which one negatively appraises stressful events (Galla & Wood, 2015; Millman et al., 2017).

#### **4.1.2 Neuroticism**

In accordance with previous literature, greater neuroticism was associated with elevated DS (Assari, 2017; Griffith et al., 2010; Zinbarg et al., 2016). This trait has been implicated in more negative appraisals of daily hassles (Yusof et al., 2017) and maladaptive cognitive biases that have been implicated in MDD, including increased rumination, distress and anxiety (Beck & Bredemeier, 2016; Van der Veen et al., 2017). Indeed, each of these consequences of neuroticism contribute to DS.

### **4.2 Personality, Perceived Control and Depressive Symptomology**

#### **4.2.1 Neuroticism**

In line with Hopelessness Theory, the influence of personality factors on DS was mediated by proximal facets. The model indicated that PC partially mediated the effect of neuroticism on DS, with greater neuroticism resulting in reduced PC and subsequently elevated DS. These findings are supported by previous research (Ebstrup et al., 2011; Wang et al., 2014; Wiersma

et al., 2011) and it has been suggested that highly neurotic individuals perceive negative events as greater threats to autonomy than non-neurotic individuals (Widiger, 2011). Such cognitions are detrimental to one's self-esteem and may manifest overwhelming feelings of hopelessness (Widiger & Oltmanns, 2017). Thus, the results of this study indicate that neuroticism exhibits both a direct and an indirect effect on depression, which is partially mediated by PC.

#### **4.2.2 Extraversion**

The effect of extraversion on DS was also mediated by PC, suggesting that extraversion results in increased PC which manifests reduced DS. This is consistent with reports that perceived self-efficacy mediates the relationship between extraversion and depression (Ebstrup et al., 2011; Sahin & Cetin, 2017; Wang et al., 2014). It has been suggested that extraverts are more likely than introverts to view situational obstacles as challenges (Carver & Connor-Smith, 2010) and utilise problem-oriented coping strategies (Connor-Smith & Flachsbart, 2007). As problem-oriented coping strategies entail greater prospect of ameliorating the stressor, they affirm the ability of extraverts to modulate their environment, promoting PC and consequential reductions in DS.

#### **4.2.3 Conscientiousness**

Moreover, PC also mediated the relationship between conscientiousness and DS, such that conscientiousness manifests increased PC and subsequently reduced DS. These results support previous reports that perceived self-efficacy mediates the relationship between conscientiousness and depression (Ebstrup et al., 2011; Wang et al., 2014). Conscientiousness is associated with goal-oriented behaviour (Carver & Connor-Smith, 2010), problem-oriented coping strategies (Bartley & Roesch, 2011) and more adaptive appraisals of negative events (Besser & Shackelford, 2007). Such strategies maintain PC during negative life events, suggesting that conscientiousness bolsters PC which subsequently diminishes DS (Van der Veen et al., 2017).

### **4.3 Desire for Control, Perceived Control and Depressive Symptomology**

Exploratory analysis indicated that PC mediated the effect of DFC on DS, with increased DFC resulting in greater PC. Prior theories have suggested that high DFC engenders greater endeavour to elucidate the causal relations within one's environment (Weary et al., 1993) and that this promotes a greater frequency of causal deductions (Yost & Weary, 1996), augmenting PC and diminishing DS (Friedland & Keinan, 1991). The current study was the first, to the best of our knowledge, to empirically validate the mediating role of PC in the relationship between DFC and depression.

#### **4.4 Personality, Desire for Control, Perceived Control and Depressive Symptomology**

Subsequent analysis examined whether DFC and PC serially mediate the effect of personality factors on DS. The results provided novel evidence that DFC and PC serially mediate the effect of extraversion, conscientiousness and agreeableness on DS, but do not mediate the relationship between neuroticism and DS.

##### **4.4.1 Extraversion**

The effect of extraversion on DS was serially mediated by DFC and PC. This indicates that greater extraversion results in increased DFC, stimulating greater PC and subsequently reduced DS. Extraverts have been suggested to attempt to exert greater control over negative events than introverts, as introverts possess more pessimistic views regarding the tractability of negative situations (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007). Moreover, extraverts exhibit greater motivation to obtain social gratification (Fishman & Bellugi, 2011), a form of interpersonal control, indicating that extraversion stimulates greater desire for both situational and interpersonal control (Friedland & Keinan, 1991; Gecas & Schwalbe, 1983). It has been postulated that reduced attempts to exercise control in introverts proliferates low PC, as demonstrations of control are absent, resulting in greater DS.

##### **4.4.2 Conscientiousness**

Furthermore, the relationship between conscientiousness and DS was serially mediated by DFC and PC. This indicates that conscientiousness promotes increased DFC, resulting in decreased PC and reduced DS. Conscientiousness is defined by self-control (McCrae & Costa, 2013), however these results suggest that conscientiousness is an antecedent to high DFC which subsequently promotes greater perceived self-control. Indeed, conscientiousness is associated with greater desire for success in learning-based tasks (Colquitt & Simmering, 1998; Colquitt et al., 2000) and the inhibition of impulsive behaviours which may encompass maladaptive consequences (Tangney et al., 2018). Successful inhibition of such behaviours enhances PC, due to successful adherence to one's desires (Wiese et al., 2018). Thus, the current results might indicate that conscientiousness elevates PC by promoting the desire to inhibit behaviours which may entail negative consequences, resulting in consequential declinations of DS.

##### **4.4.3 Agreeableness**

Finally, the results indicated that DFC and PC serially mediate the effect of agreeableness on DS. This suggests that greater agreeableness results in reduced DFC, which subsequently diminishes PC and elevates DS. Agreeableness concerns the regulation of negative cognitions in the pursuit of behaving cooperatively (Zalewska, 2018). Cooperative behaviour promotes

social cohesion by concession in group decisions and assimilating one's views with others (Ode & Robinson, 2007). This reflects the relinquishment of situational control, as advocating one's opinions increases the prospect of one's views being adopted (Ode & Robinson, 2009). Indeed, highly agreeable individuals often possess goals of minimising interpersonal conflict (Argyle, 2013) and display reduced desire to ascertain situational control (John & Srivastava, 1999). Thus, agreeableness manifests reduced DFC in social situations, resulting in minimal effort to ascertain situational control (Greenaway, 2015). Such reductions in DFC subsequently lower PC, resulting in greater DS.

#### **4.5 Clinical Implications**

The current results entail several important implications for clinical psychology. As personality factors represent stable facets, they may provide an appropriate assessment of individuals 'at risk' of MDD. Specifically, these results provide a framework for identifying university students at risk of psychological difficulties. Indeed, recent evidence indicates that university students exhibit elevated DS (Ramlan et al., 2020). Preventative measures can subsequently be used to protect such individuals from depression. In addition, these results suggest that therapies aiming to minimise neuroticism and agreeableness but maximise extraversion and conscientiousness may provide an efficacious treatment for depression. Indeed, therapies that modulate personality factors have been reported to be effective in ameliorating MDD (Schleider & Weisz., 2018; Tang et al., 2009).

Furthermore, this study provides novel evidence that therapeutically enhancing DFC may ameliorate depression. Cognitive therapy (CT) for MDD aims to promote PC by challenging clients' perceptions that they lack control (Clarke et al., 2014). Whilst effective in diminishing DS (Segal et al., 2018), CT entails high relapse rates (Farb et al., 2018). Indeed, clients' environments are dynamic and, as the environment changes, they may fail to generalise perceptions of control to new domains, enhancing the risk of relapse. However, the current study suggests that therapies aiming to bolster DFC may be efficacious in decreasing DS. Due to the domain-general nature of DFC (Burger, 1990), such interventions would aim to increase patients' motivation to exert control across multiple environmental domains. This may result in more enduring reductions in DS than contemporary CT, as DFC is not domain-specific and is consequently more likely to generalise to novel situations. Thus, the current results suggest that personality factors may provide a valuable assessment of high-risk individuals and that therapeutic interventions for MDD might consider bolstering DFC.

#### **4.6 Limitations**

Despite the utility of this analysis, various limitations must be considered when interpreting the results. The overlapping content of the BDI and neuroticism scales may have inflated the correlations between neuroticism and DS, limiting inferences regarding the strength of this relationship. However, the remaining items had minimal similarity and previous research implies that such overlap does not significantly inflate correlations between neuroticism and DS (Uliaszek et al., 2010).

In addition, the cross-sectional design prevents the determination of whether the proposed relationships are causal. However, prior research demonstrated that personality factors are relatively stable over time (Elkins et al., 2017), advocating their distal role in depression. Longitudinal evidence also supports the causal role of both personality factors (Goldstein et al., 2018) and PC (Bjørkløf et al., 2018) in depression, with evidence that variations in PC dynamically modulate DS (Hamilton & Abramson, 1983). Thus, convergent evidence indicates that personality factors and control-related facets maintain a causal role in the aetiology of MDD.

#### **4.7 Future Research**

These findings present various avenues for future research. Firstly, future studies should examine the model with longitudinal data, to verify the causal nature of the proposed relationships. Secondly, the proposed explanations for the mechanisms underlying the mediational effects present predictions regarding the consequences of variations in personality and control-related facets. Subsequent research should rigorously examine the hypothesised nature of these relationships, to elucidate the mechanisms underlying these effects. Finally, Hopelessness Theory postulates that low PC over both positive and negative events manifests MDD. Future research should replicate the current model but distinguish between PC and DFC for both positive and negative events. This would subject Hopelessness Theory to scrutiny in a novel manner, examining the differential role of positive and negative control in the manifestation of MDD.

#### **5. Conclusions**

This study expands on previous literature by providing a novel insight into the aetiology of depression. The results indicated that both PC and neuroticism maintained direct effects on DS. Furthermore, the effects of neuroticism, extraversion, conscientiousness and DFC on DS were mediated by PC. Finally, this study ascertained novel evidence that DFC and PC serially mediate the effect of extraversion, conscientiousness and agreeableness on DS. This validates

Hopelessness Theory, suggesting that personality factors and control-related beliefs function as distal and proximal facets, respectively, in the aetiology of depression. These results highlight the value of integrating techniques that bolster DFC into contemporary therapeutic interventions for MDD, to promote more enduring reductions in DS. This is of unequivocal importance, as it is imperative that we improve the efficacy of treatments for this pervasive and devastating disorder.



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