The main aim of the present research was to study the prospective relationships of the five-factor model of personality and the internalizing and externalizing suprafactors of psychopathology. A sample of 323 young adults completed the NEO-FFI at Time 1 and different scales of symptoms 5 years later. Neuroticism prospectively predicted the internalizing factor, while extraversion, low agreeableness and low conscientiousness predicted the externalizing factor. We found additional paths between introversion and social phobia symptoms, and between low agreeableness and psychopathy symptoms. These relationships remained significant, even when controlling for previous symptoms, except for extraversion. Gender had no moderation effect on the interrelationship between personality and psychopathology factors. The present study extends previous research about personality and psychopathology, and suggests different ways in which they can be related.

1. Introduction

There is strong evidence to indicate that the most prevalent mental disorders tend to co-occur more frequently than expected by chance (Krueger & Markon, 2006a). One hypothesis accounts for these observed comorbidities: apparently distinct mental disorders may be manifestations of common underlying spectra (Eaton, South, & Krueger, 2010). Studies into the structure of mental disorders support this hypothesis (Krueger, 1999b). The resemblance between the hierarchical structure of psychopathology and the hierarchical structure of personality also suggest a link between personality and higher order factors of psychopathology (Krueger & Markon, 2006b).

1.1. Structure of psychopathology

In the first study conducted into patterns of comorbidity among ten common mental disorders in adults, Krueger (1999b) described a hierarchical structure defined by two higher-order internalizing and externalizing latent factors. The bifurcation of the internalizing second-order factor led to two lower level latent factors: anxious-misery/distress (major depressive episode, generalized anxiety disorder (GAD), dysthymia) and fear (social phobia, simple phobia, panic disorder, agoraphobia). The externalizing factor covered alcohol dependence, drug dependence and antisocial personality disorder (APD) (Krueger, 1999b). Despite some minor differences between subsequent studies and the former (e.g., no differentiation of fear and distress factors, Kessler et al., 2011; inclusion of a larger number of disorders, Kotov et al., 2011), the internalizing and externalizing classical suprafactors of psychopathology remained stable over time (Kessler et al., 2011), between age groups (Achenbach & Edelbrock, 1984) and between gender groups (Eaton et al., 2012) when employing clinical vs. community samples (Kessler et al., 2011; Miller et al., 2012), and when using symptom scales, symptom counts of psychiatric diagnostic categories or categorical diagnoses (Krueger, Markon, Patrick, Benning, & Kramer, 2007; Markon, 2010).

1.2. Interrelationships between personality and psychopathology

Evidence from different types of studies suggests a certain degree of specificity in the relationship between personality domains and both spectrums of psychopathology. For instance in
a meta-analysis, Kotov, Gamez, Schmidt, and Watson (2010) compared anxiety, mood and substance use disorder (SUD) to find that all the diagnostic groups were high on neuroticism and low on conscientiousness. However, the effect size of neuroticism was the strongest for mood and anxiety disorders, while SUD related less to neuroticism, but associated more with disinhibition and disagreeableness. Previous works have also related high negative affect, high unconscientious disinhibition and high disagreeable disinhibition to other externalizing symptoms and disorders (i.e., pathological gambling, aggressive behavior and antisocial behavior) in other meta-analyses (MacLaren, Fugelsang, Harrigan, & Dixon, 2011; Malouff, Thorsteinsson, Rooke, & Schutte, 2007).

Although many research works have focused on the study of personality and specific disorders, only a handful of studies have focused specifically on the relationship of personality with the comorbidity factors of mental disorders/symptoms. Such studies are especially important because, rather than representing noise, the comorbidity among common mental disorders indicates personality bases of psychopathology (Krueger & Tackett, 2003). In line with this, Khan, Jacobson, Gardner, Prescot, and Kendler (2005) found that high neuroticism appears to be a broad vulnerability factor for comorbidity between different pairs of internalizing and externalizing disorders, while novelty seeking is modestly important for comorbid pairs of externalizing disorders. Krueger, McGue, and Iacono (2001) reported a relation in both gender groups between low constraint and neuroticism, these being externalizing and internalizing factors respectively, and another relation between introversion and the internalizing factor, but only in women. Miller et al. (2012) pointed out that introversion can distinguish distress (high neuroticism, low extraversion) from the fear (high neuroticism) factor.

Although these cross-sectional studies can be useful for understanding the comorbidity of mental disorders and symptoms, this is a potential confound because responses to different personality inventories can differ depending on their current psychopathological status (Krueger, Caspi, Moffitt, Silva, & McGee, 1996). For this reason, prospective studies are especially recommendable because they allow us to explore the relationship between personality and psychopathology when controlling for previous symptomatology. Along these lines, Krueger (1999a) found a link between high negative emotionality at the age of 18 and affective and anxiety disorders, and with SUD and APD 3 years later when controlling for the corresponding mental disorders at the age of 18, while there is a prospective link between low constraint and SUD/APD. However in Krueger’s study, the dependent variables represented a sum of diagnostic criteria for each specific disorder, but not the shared variance between groups of symptoms.

1.3. The present study

Therefore, the present study empirically investigated the relationship between the five-factor model of personality (FFM; John, Naumann, & Soto, 2008) and the suprafactors of internalizing and externalizing symptoms in a 5-year longitudinal design. Specifically, we hypothesized a relation between neuroticism and the internalizing factor, and to a lesser extent, to the externalizing factor. Moreover, we predicted a relation between both disinhibition domains (low agreeableness and low conscientiousness) and the externalizing spectrum 5 years later (Krueger & Markon, 2006b; Krueger et al., 2001). We also expected these relationships to remain significant in both groups of gender, even when controlling for previous symptomatology (Krueger, 1999a; Krueger et al., 1996).

2. Measures and methods

2.1. Participants and procedure

We posted advertisements around the university during 2004–2005 (Time 1, T1), which helped us form an initial sample of 470 young adults. Three hundred and twenty-three of them continued to collaborate 5 years later (Time 2, T2; 31.28% attrition). At T1, 91.90% were undergraduates and their mean age was 21.18 (SD = 2.26) (age range = 18–29 years). At T2, 47.81% were students, 20.63% were employees, 10.63% were unemployed, 7.81% were government employees and 13.12% reported other occupations. Moreover, 57.89% lived with their parents, 6.50% lived alone, 19.50% lived with a partner and 16.11% indicated other living arrangements (e.g., roommates). These 323 participants completed the personality inventory (NEO-FFI) at T1 and T2, and different internalizing (BDI-II, SP, PSWQ, ACQ) and externalizing (APD, LSRP, AUDIT, CPQ, SOGS) scales at T2 (see the Section 2.2 for acronyms).

A subsample of 241 of them (66% females, T1 Mage = 20.90, age range = 18–29 years) completed additional scales for internalizing (BDI-II, SP and Anx) and externalizing (APD and AIS-UJl) symptoms at T1 (see the Section 2.2 for acronyms). The participants of this subsample were significantly younger (t = 3.90, p < .001) and there were more women (66% vs. 50%; χ² = 6.62, p < .05) as compared with those who did not complete the psychopathology scales at T1 (N = 82 of 323). However, we found no significant differences in personality (T1) or psychopathological symptoms (T2) between these groups.

Participation was voluntary and anonymous. At both time points, participants provided informed consent. They received 20 euros at T1 and 40 euros at T2 for participating in the research.

2.2. Measures

2.2.1. Personality

The NEO-FFI (Costa & McCrae, 1999) is a 60-item inventory that assesses the five broad domains of personality: neuroticism (N); extraversion (E); openness to experience (O); agreeableness (A); conscientiousness (C). Participants answered items on a 5-point Likert-type scale that ranged from 0 (strongly disagree) to 4 (strongly agree).

2.2.2. Internalizing symptoms

The Beck Depression Inventory – second edition (BDI-II; Sanz, García-Vera, Espinosa, Fortun, & Vázquez, 2005) comprises 21 items based on the diagnostic criteria of depression of DSM-IV (e.g., hopelessness, guilt or suicidal thoughts). Items include a 4-point scale that ranges from 0 to 3.

The Social Phobia (SP) 5-item scale forms part of the Fear Questionnaire (FQ, Marks & Mathews, 1979). Participants indicate how much they avoid specific situations related to social situations (e.g., “Acting to an audience”). The anchors of each response category rank from 0 (would not avoid it) to 8 (always avoid it). The Penn State Worry Questionnaire (PSWQ, Nuevo, Montorio, & Ruiz, 2002) is a self-report questionnaire with 16 items that evaluates the intensity and excessive concern about specific content concerns. Its normal use is to act as a screening for GAD. Each response category ranges from 0 (nothing) to 4 (a lot).

The Agoraphobic Cognitions Questionnaire (ACQ, Chambliss, Caputo, Bright, & Gallagher, 1984) assesses the frequency of cognitions that participants experience when anxious with 14 items. These cognitions usually relate to panic and agoraphobic disorders (e.g., “I’m going crazy”). It estimates each item on a 5-point scale ranging from 1 (never) to 5 (always).
With the Anxiety (Anx) scale of the Symptom Check List-90-R (SCL-90-R) (Derogatis & Kazdin, 2000), participants completed 10 items related to the anxiety sensations, feelings and thoughts that they experienced during the last week, which range from 0 (nothing) to 4 (a lot).

2.2.3. Externalizing symptoms

We assessed the Antisocial Personality Disorder (APD) symptoms on the 7-item scale (true/false) of the International Personality Disorders Examination (IPDE, López-Ibor, Pérez-Urdániz, & Rubio, 1996) according to DSM-IV diagnosis criteria.

The Levenson’s Self-Report Psychopathy Scale (LSRP, Lynam, Whiteside, & Jones, 1999) is a 26-item four-point scale that ranges from 1 (strongly disagree) to 4 (strongly agree). It assesses different symptoms related to psychopathy, such as manipulative orientation, selfishness or callousness.

We employed two scales from the Alcohol Use Disorders Identification Test (AUDIT, Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) to assess alcohol-related problems (AP): The “alcohol dependence” and “harmful alcohol use”. Participants respond to items on a 5-point Likert scale that ranges from 0 (never) to 4 (daily or almost daily).

The Cannabis Problems Questionnaire (CPQ, Copeland, Gilmour, Gates, & Swift, 2005) is a self-report 27-item questionnaire in which participants have to answer 0 (no) or 1 (yes) if they have had various problems related to cannabis consumption in the last 3 months (e.g., “smoking in the morning to get yourself going”).

The South Oaks Gambling Screen (SOGS, Echeburúa, Báez, Fernández-Montalvo, & Pérez, 1994) is a questionnaire based on DSM-III and DSM-III-R criteria for pathological gambling. It is necessary to sum 20 dichotomous items to calculate the total questionnaire score; values can be either 0 (no) or 1 (yes).

The Alcohol Intake Scale-UJI (AIS-UJI; Grau & Orte, 1999) is a semi-structured questionnaire that allows the calculation of drinking quantity during the week.

3. Analysis

Using the SPSS 21, we conducted descriptive analyses in the whole group, and then separately for males and females. We used the EQS 6.1 to perform a series of Structural Equation Models (SEM).

We first performed a confirmatory factor analysis (CFA) to test the adequacy of grouping symptom scales (T2) into two suprafactors of internalizing and externalizing psychopathology. Second, according to the hypothesized model (N → internalizing and externalizing factors; A and C → externalizing factor), we inputted the measures of personality at T1 as predictors. We took into account the suggestions obtained from the Lagrange multiplier (LM) and Wald tests to include, or to remove, additional paths to those hypothesized in the model (Byrne, 2006).

Third, in order to simplify the model (i.e., reduce the number of variables) and to study the relationships of FFM (T1) and psychopathology factors (T2), when controlling for previous psychopathology (T1) and current personality dimensions (T2), we ran a cross-lagged panel model between personality and psychopathology in the subsample of participants that completed all the measures in both time frames (N = 241). This required the calculation of factor scores for the internalizing and externalizing factors with the scales assessed in T1 (BDI-II, SP, Anx, APD, AIS-UJI) and T2 (BDI-II, SP, PSWQ, ACQ, Anx, APD, LSRP, AUDIT, CPQ, SOGS, AIS-UJI). We included the correlations between the residuals of the endogenous variables in the cross-lagged model to explain that predictors cannot fully explain the covariance left over.

To test the invariance of the structure of psychopathology, and the moderation effect of gender in the personality and psychopathology relationships, we performed multi-group analyses. Then we tested the differences in the model fit when adding the constraints between groups of gender (i.e., constraints in the factor loadings, variances and covariance in the CFA, and among personality – psychopathology paths in the SEM and cross-lagged panel model). We analyzed the relative goodness-of-fit between increasingly constrained models by the scaled χ² difference test (Satorra & Bentler, 2001) with the “sdfit” software.

Given the nonnormality of the data (i.e., kurtosis), we used the Satorra-Bentler robust methods (Satorra & Bentler, 2001). We evaluated model goodness-of-fit using the Satorra-Bentler chi-squared (s.χ²), the normed s.χ²(s.χ²/df.), the comparative fit index (CFI), the incremental fit index (IFI), the McDonald Fit Index (MFI), and the root mean square error of approximation (RMSEA). A nonsignificant s.χ²; a normed s.χ² between 1 and 2; a CFI, IFI and MFI ≥ .95; and a RMSEA ≤ .05 indicate that the model adequately fitted the data (see Byrne, 2006 for a review of fit indices).

4. Results

Supplementary Material 1 (SM1) provides the descriptive analyses and Cronbach alphas. Females scored significantly higher for N, A, and significantly lower for externalizing symptoms than males. The effect size of the differences was medium for N, A, APD and psychopathy symptoms, and low for GAD, social phobia, gambling and alcohol use.

The CFA results showed that a correlated model of the internalizing and externalizing symptoms (see Fig. 1) adequately fitted the data (see Table 1). The nonsignificant differences in fit suggested invariance between gender groups when we included the constraints in the factor loadings (s.χ²diff (7) = 8.90, p > .05), variances (s.χ²diff (2) = 2.32, p > .05) and covariance (s.χ²diff (1) = .19, p > .05) between males and females.

Next we included the five dimensions of personality assessed at T1 as predictors. The hypothesized model did not fit to the data (see Table 1). When we added the paths suggested by the LM test (E → social phobia and externalizing, A → psychopathy), removed the nonsignificant paths suggested by the Wald test (N → externalizing), and removed Openness because it did not relate to any dependent variable, the fit indices were excellent (see Table 1).

![Fig. 1. The CFA of the internalizing and externalizing factors at T2. N = 323. Over unidirectional lines are factor loadings. Over bidirectional lines are bivariate correlations. The boxes include an explanation of total variance. **p < .001.](image-url)
Table 1

Fit indices of CFA, SEM, the cross-lagged panel model and the multi-group analyses.

<table>
<thead>
<tr>
<th></th>
<th>X^2/d.</th>
<th>df.</th>
<th>p</th>
<th>X^2/df</th>
<th>CFI</th>
<th>IFI</th>
<th>MFI</th>
<th>RMSEA</th>
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<tr>
<td>CFA (N = 323), Psychopathology symptoms at T2</td>
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<td>Fig. 1</td>
<td>37.30</td>
<td>26</td>
<td>.070</td>
<td>1.43</td>
<td>.961</td>
<td>.962</td>
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<td>.037</td>
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<td>Multi-group analysis</td>
<td>65.66</td>
<td>52</td>
<td>.097</td>
<td>1.26</td>
<td>.951</td>
<td>.954</td>
<td>.979</td>
<td>.040</td>
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<td>SEM (N = 323), Personality T1, psychopathology symptoms at T2</td>
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<tr>
<td>Hypothesised model</td>
<td>118.71</td>
<td>67</td>
<td>.000</td>
<td>1.77</td>
<td>.919</td>
<td>.922</td>
<td>.923</td>
<td>.049</td>
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<td>Final model (Fig. 2)</td>
<td>72.71</td>
<td>56</td>
<td>.066</td>
<td>1.30</td>
<td>.973</td>
<td>.974</td>
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<td>.030</td>
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<td>Multi-group analysis</td>
<td>142.53</td>
<td>112</td>
<td>.027</td>
<td>1.27</td>
<td>.950</td>
<td>.954</td>
<td>.954</td>
<td>.041</td>
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<td>Cross-lagged panel model (N = 241), Personality and psychopathology factors at T1 and T2</td>
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<td>Fig. 3</td>
<td>22.75</td>
<td>22</td>
<td>.416</td>
<td>1.03</td>
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<td>.999</td>
<td>.998</td>
<td>.012</td>
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<tr>
<td>Multi-group analysis</td>
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<td>44</td>
<td>.364</td>
<td>1.06</td>
<td>.997</td>
<td>.997</td>
<td>.995</td>
<td>.022</td>
</tr>
</tbody>
</table>

Figure 2 offers the final model. As expected, N predicted the internalizing factor, and low C and low A predicted the externalizing factor. The addition of the cross-sex equivalence constraints for the six pathways between personality (T1) and psychopathology factors and variables (see Fig. 2) in the multi-group analyses (see Table 1) did not result in a significant degradation in fit (X^2diff (6) = 2.26, p > .05). This suggests no moderation effects of gender.

Before performing the cross-lagged panel model, we calculated the internalizing and externalizing factors at T1 and T2 with the subsample of 241 participants and we saved the scores in the database. Even when the factors did not exactly comprise the same scales, the bivariate correlations between INT T1–INT T2 (r = .54, p < .001) and EXTT1–EXT T2 (r = .53, p < .001) were high for a 5-year period. The fit indices were excellent when we compared the cross-lagged model (see Table 1). After controlling for the psychopathological symptoms at T1 and the cross-sectional correlations between personality and psychopathology, N T1 still predicted INT T2, and A T1 and C T1 still predicted EXTT2. EXT T1 also predicted C T2 and we also found a tendency from INT T1 to N T2 (β = .10, p = .085) (see Fig. 3). The multi-group cross-lagged panel model showed adequate fit indices (see Table 1). The addition of constraints in the 14 paths between the personality-psychopathological variables (see Fig. 3) across groups (X^2diff (14) = 13.19, p > .05) also suggested no moderation effects of gender.

5. Discussion

The present research aimed to study the prospective relationship between personality and psychopathological symptoms, and to test if these associations were robust, even when controlling for previous symptomatology and differences in gender. As expected, the SEM results showed that N predicted the internalizing factor 5 years later. However N did not relate to the externalizing factor, which goes against what we hypothesized. This result may be due to sample and assessment characteristics. Usually N relates to externalizing disorders when employing clinical samples. Nevertheless, a former work found this association to be lower in community samples (Kotov et al., 2010). Previous studies with middle-aged participants, which used symptom counts of the diagnosis criteria, have also found no associations between N and the externalizing factor (Krueger et al., 2001). Our results and previous evidence suggest that the role that N plays in the externalizing factor might be relevant when there is a larger number of externalizing symptoms and when gravity is greater.

Low A and low C also related prospectively to the externalizing factor 5 years later, which is in line with previous studies (Krueger, 1999a). We also observed a significant relationship between E and the externalizing factor. Normally no relation exists between E and the externalizing factor in clinical and adult samples. However, previous studies with adolescents and young adults have suggested that E might facilitate involvement in social situations where externalizing behaviors, such as alcohol use, can occur (Cooper, Agocha, & Sheldon, 2000). Thus E in our sample might play a similar role. Some recent studies have also suggested that low E characterizes distress disorders (Miller et al., 2012). Our study indicates no significant associations between low E and depression or generalized anxiety symptoms. However, we found a significant association between low E and social anxiety symptoms, which is
in line with previous meta-analyses (Kotov et al., 2010) and some recent research work that used bottom-up designs (Markon, 2010).

Our results also indicate that low A has a stronger effect on psychopathy symptoms than the other externalizing symptoms, including APD (Decuyper, De Pauw, De Fruyt, De Bolle, & De Clercq, 2009). Thus the inclusion of additional psychopathy-related symptoms (axis II disorders, Dark Triad) can help the differentiation of an antagonism factor (Jones & Figueredo, 2012; Kotov et al., 2011), which better relates to low A characteristics than in the classical externalizing factor (SUDs and APD from the DSM-IV TR). However, it is necessary to conduct further research to test this hypothesis.

The prospective associations between personality and psychopathy symptoms remained significant when controlling for previous symptomatology (see Fig. 3), except for E1 to EXT2. These relationships between personality (T1) and psychopathology (T2) have been interpreted as evidence for the vulnerability hypothesis in previous studies (Klimstra, Akse, Hale, Raaijmakers, & Meeus, 2010); that is, the pre-existing personality traits of N may predispose to internalizing syndromes, whereas low A and low C traits may predispose to externalizing syndromes. However, other authors have interpreted similar results as supportive of the pathoplasty effect (De Bolle, Beyers, De Clercq, & De Fruyt, 2012). That is, premorbid personality functioning affects the expression, course or severity of a disorder (South, Eaton, & Krueger, 2010). Finally, there are reports of a relation between EXT1 and low CEXT2, and a tendency in INT1 and NINT2. These results suggest a complication (or scar) effect (De Bolle et al., 2012; Klimstra et al., 2010) in which experiencing a certain form of psychopathology scars an individual’s personality and changes it in key ways from premorbid functioning (South et al., 2010). Finally, all these results were invariant between males and females.

The present study has several limitations. First, the symptoms scales completed at T1 and T2 were not exactly the same. This could imply that some of the results obtained in the cross-lagged panel analysis may be due to differences between the INT and EXT factors estimated at T1 and T2. However, the strong correlations found between them at T1 and T2 indicate that they represent very similar stable factors. Second, both representativeness (i.e., young adults) and number limit the sample. Accordingly, the sample attrition of the present research was lower than those reported in similar previous studies (e.g., Klimstra et al., 2010; Krueger et al., 1996). Third, the internal consistency of the APD symptoms scale was lower than the recommended cut-off (see SM1). Fourth, we should recommend using categorical diagnosis in addition to the dimensional assessment of symptoms. Finally, although the cross-lagged panel model suggests various ways in which to link personality and psychopathology (i.e., vulnerability/pathoplasty, scar), this approach has several limitations (Rogosa, 1980), and it is necessary to provide more complex designs and a larger number of assessments to firmly clarify the role of these reciprocal pathways of influence (e.g., quantitative genetics, growth curve models).

6. Conclusions

The present study supports the hypothesized prospective associations between the FFM of personality and internalizing and externalizing factors. While a robust relation exists between N and the internalizing factor, low A and low C relate to the externalizing factor, even when considering previous symptomatology and differences in gender.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.paid.2015.02.002.

References


