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## RELATIONSHIPS: EMPIRICAL CONTRIBUTION

# UNDERSTANDING PERSONALITY PATHOLOGY IN ADOLESCENTS: THE FIVE FACTOR MODEL OF PERSONALITY AND SOCIAL INFORMATION PROCESSING

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This study seeks to integrate two research traditions that lie at the base of the understanding of personality pathology in adolescents. The first research tradition refers to normal personality according to the Five Factor Model (FFM). The second tradition specifies the key feature of personality disorder as the capacity to mentalize, which can be reflected in Social Information Processing (SIP). In a clinical sample of 96 adolescents, the authors investigated response generation, coping strategy, and memories of past frustrating experiences as part of SIP, as mediator in the relationship between personality and personality pathology, and a possible moderating role of personality on the relationship between SIP and personality pathology. The hypothesized mediation, by which the effects of personality dimensions on personality pathology was expected to be mediated by SIP variables, was found only for the effect of Neuroticism, most specifically on BPD, which appeared to be mediated by memories the patients had about past frustrating conflict situations with peers. Some moderating effects of personality on the relationship between SIP variables and personality pathology were found, suggesting that high Agreeableness and sometimes low Neuroticism can buffer this relationship. These results suggest that personality dimensions and social cognitions both independently and together play a role in adolescents' personality pathology.

A growing body of research recognizes the existence of personality pathology in adolescence (Durret & Westen, 2005; A. L. Miller, Muehlenkamp, & Jacobson, 2008; Westen & Chang, 2000). However, the theoretical understanding and therefore the assessment of personality pathology in adolescents remains a subject of discussion. Widiger and Mullins-Sweatt (2009)

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note that a personality disorder diagnosis can be quite stigmatizing because it suggests that "who you are and always have been, is itself a mental disorder" (p. 203). In contrast, they state that the Five Factor Model (FFM) description of personality disorder provides a more complete description of each person's self that recognizes and appreciates that the person is more than just the personality disorder. There are aspects to the self that can be adaptive, even commendable, despite the presence of the personality disorder.

## FIVE FACTOR MODEL OF PERSONALITY

The FFM represents a general consensus on the structure of normal personality, dividing personality into the five broad dimensions of Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (Costa & McCrae, 1990). The FFM is considered to be a valid and comprehensive taxonomy for describing personality differences in childhood and adolescence, and significant associations have been reported between FFM traits in childhood and adult personality and adaptation (van Aken, Hutteman, & Denissen, 2011). Mervielde, De Clercq, De Fruyt, and Van Leeuwen (2005), in an adolescent sample, largely replicated the associations between adaptive FFM facets and categorical Axis II disorders that are observed in adulthood (Trull, Widiger, & Burr, 2001). Integrating the classification of personality disorder with the FFM brings to an understanding of personality pathology a considerable body of scientific research on childhood antecedents, which helps to understand a developmental perspective on personality pathology (Widiger, De Clerq, & De Fruyt, 2009).

## FIVE FACTOR MODEL AND PERSONALITY PATHOLOGY

Saulsman and Page (2004) have reviewed studies in a meta-analysis examining the relationships between the five personality dimensions of the FFM and the diagnostic personality disorder categories of *DSM-IV*. The hypothesis underlying this research is that personality disorders can be conceptualized as extreme variants of normal personality dimensions. The meta-analysis supports the view that personality disorders can be conceptualized using the FFM. Given their individual diagnostic criteria, all personality disorders were found to have associations with FFM dimensions that are meaningful and predictable, although the FFM is better in conceptualizing and describing certain personality disorders (e.g., borderline personality disorder [BPD]) than others. Moreover, Neuroticism and Agreeableness are the dimensions common across personality disorders, while Extraversion and to a lesser extent Conscientiousness are unique to certain personality disorder categories. Saulsman and Page (2004) suggest that Neurotic and Disagreeable type traits are of primary importance because they are relevant to most personality disorders and that extraverted-introverted type traits are of secondary importance because they are relevant to only a few personality disorders. It is important to note that the FFM is a descriptive account of personality; it does not reveal how personality traits are related to specific (pathologi-

cal) behaviors. Also, in the realm of the relationship between the FFM and personality pathology, studies are needed that address personality processes or mechanisms by which personality traits "get outside the skin" and can develop into personality pathology (cf. Hampson, 2012).

## SOCIAL INFORMATION PROCESSING

Another research tradition in child and adolescent psychology that is relevant to the assessment of personality pathology in adolescents concerns the processing of social information. Each person's subjective experience and unique perception of the world may shape the development of personality, adaptation, and psychopathology (Shiner & Caspi, 2003). The role of cognitive factors in personality and psychopathology has been detailed by Crick and Dodge (1994) in their Social Information Processing model (SIP). In a child's social information processing, including factors such as attention and interpretation, a selective process of interactions with the social environment is shaped by individual differences in temperament and personality (cf. Shiner & Caspi, 2003). In their SIP model, Crick and Dodge assume that children enter social situations with a "database" of past experiences and biologically determined capabilities, which they may access during social encounters. Crick and Dodge describe how children process and respond to social information in six steps, including encoding and interpreting stimuli, clarifying one's goals, generating ways of responding to cues, and evaluating alternative responses across various domains. The SIP model has been the subject of much research concerning aggression in children (e.g., Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002) and has proven its relevance for the understanding of peer victimization (Graham & Juvonen, 1998), social withdrawal (Burgess, Rose-Krasnor, Wojslawowicz, Rubin, & Booth-LaForce, 2006; Wichman, Coplan, & Daniels, 2004), childhood anxiety (Bell-Dolan, 1995; Daleiden & Vasey, 1997; Suarez & Bell-Dolan, 2001), and childhood/adolescent depression (e.g., Garber, Keiley, & Martin, 2002).

More recently, attention has shifted to the relationship between SIP and more stable traits, such as shyness (Burgess et al., 2006), and attachment representations (Dwyer et al., 2010), but as far as we know, research on SIP has not often addressed relationships with personality traits or personality pathology. However, research has found some indirect links with the FFM of personality and different steps from the SIP model. In adults, Extraversion is linked with the frequent experience of positive moods (Hampson, 2012). This could imply that extraverted persons are more capable of regulating their moods because they have more adequate coping strategies (Carver & Connor-Smith, 2010). Moreover, Extraversion and Agreeableness are related specifically to social, interpersonal functioning (Widiger & Mullins-Sweatt, 2009). Disagreeable youth not only perceive more interpersonal conflicts in their environment, but they also attempt to resolve conflicts with destructive tactics (Jensen-Campbell & Graziano, 2001). This is reflected in the strong feelings of anger and frustration, which are not tempered by adequate self-control in disagreeable children. J. D. Miller, Lynam, and Jones (2008) found

that Agreeableness was negatively related to the generation of a higher percentage of aggressive responses to a situation and to the choice to enact such an aggressive response.

Children high on Neuroticism have difficulty settling and soothing themselves when aroused (Rothbart, Ahadi, Hershey, & Fisher, 2001). Shiner and Caspi (2003) describe how Neuroticism (or high negative emotionality) encompasses two related but distinct lower order traits. The first is "irritable distress," which assesses distress directed outward, including children's tendencies toward irritability, anger, and frustration. The second lower order trait is "anxious distress," which appears to assess inner-focused distress, including a child's tendency to withdraw fearfully from new situations. This could imply that highly neurotic children experience more negative emotions and show more angry and frustrated reactions (irritable distress) or avoidant reactions (anxious distress). Indeed, Hampson (2012) mentions a greater sensitivity to negative events as a central feature of Neuroticism.

Next, the dimension Conscientiousness taps children's individual differences in effortful control (Rothbart et al., 2001), which includes their capacities to plan behavior, inhibit inappropriate responses, focus and shift attention, take pleasure in low-intensity situations, and perceive subtle external stimuli. Active, effortful control in early childhood predicts better self-regulation of anger and joy later in childhood (Kochanska, Murray, & Harlan, 2000), and also in adults perceived behavioral control was found to mediate the effect of Conscientiousness on health behaviors (De Bruijn, Brug, & van Lenthe, 2009).

## SOCIAL INFORMATION PROCESSING, MENTALIZING, AND PERSONALITY DISORDERS

Consensus exists that problems in social functioning and disturbances in interpersonal relationships are key features in personality disorders. However, the nature of the association between personality disorders and social dysfunction remains unclear (e.g., Hill et al., 2008). Mentalizing and social cognition have been studied for two personality disorders in particular, BPD and antisocial personality disorder (ASPD) (e.g., Hessels, Van Aken, Orobio de Castro, & Van Voorst, 2013; Lobbestael, Cima, & Arntz, 2013; Sharp et al., 2011). ASPD is characterized by a pervasive pattern of disregard for, and violation of, the rights of others that begins in childhood or early adolescence and continues into adulthood (American Psychiatric Association [APA], 2000). BPD is characterized by interpersonal dysfunction, behavioral impulsivity, affective regulation, and identity disturbance. Beauchaine, Klein, Crowell, Derdidge, and Gatske-Kopp (2009) proposed a unified theory of ASPD and BPD that incorporates a number of overlapping biological vulnerabilities, environmental risk factors, and outward expressed features of both personality disorders. ASPD and BPD are described as disorders for which biological vulnerabilities interact with potentiating environments to produce debilitating and enduring personality disturbance (Beachaine et al., 2009). Chanen and Kaess (2012) state that in contrast to the relatively unstable

nature of the BPD diagnosis, both in adolescents and in adults, problems in social functioning are much more stable. The idea that mentalizing dysfunctions are at the foundation of these disturbances has now become widespread. Also, the importance of the developmental period of adolescence for social functioning, mentalizing capacities, and the onset of personality disorders is widely accepted. Despite this consensus, however, not much research has been conducted to advance the understanding of mentalizing capacities and difficulties in adolescents with personality pathology.

As Sharp et al. (2011) pointed out, there are two possible reasons why mentalizing has not yet been studied in relation to personality disorders in adolescents. The first reason is the controversy still associated with the diagnosis of personality disorder in adolescents. Many clinicians are still reluctant to diagnose a personality disorder in an individual under the age of 18, often out of fear of stigmatizing the person. As a result, most research on personality pathology in adolescence relies on instruments used to understand adult personality pathology. Thus, knowledge of childhood antecedents or developmental factors is lacking. This reason relates to the second reason mentioned by Sharp et al., which concerns problems with measurement instruments. Sharp et al. note that most instruments for evaluating social cognition measure Theory of Mind tasks, which show ceiling effects in older age groups or lack divergent validity for disorders except autism spectrum disorders. This means that those tasks are not suited for the assessment of personality disorders. We would like to add a third reason: a lack of consensus on how mentalizing can be operationalized. Although the concept of mentalizing has become a common factor in the past decade in theorizing about personality disorders, a valid method of operationalization still seems lacking, and a valid model describing real-life mentalizing in actual social situations is still missing. In our opinion, the SIP model is a candidate for providing such a description.

As far as we know, only two studies have addressed this topic. The first is the previously mentioned study by Sharp et al. (2011), who examined mentalizing in adolescents with emerging BPD. In their study, they subdivide mentalizing into (a) undermentalizing, which involves insufficient mental state reasoning, resulting in incorrect, "reduced" mental state attribution; (b) no mentalizing, which involves complete nonuse of mental state terms in explaining behavior; and (c) hypermentalizing, which reflects overinterpretive mental state reasoning, such as making overly complex inferences based on social cues that resulted in errors. The results of Sharp et al. show that neither undermentalizing nor complete absence of mentalizing was linked to borderline traits. In contrast, hypermentalizing was strongly associated with BPD features in adolescents.

The second study (with the present data set, Hessels et al., 2013) investigated relationships between features of Cluster B personality pathology in general, and ASPD and BPD specifically, and the mentalizing capacities reflected in social information processing by adolescents. Significant relationships were found between severity of personality pathology and SIP; the more severe the Cluster B personality pathology, the higher the intensity of reported emotions, the more likely adolescents were to choose inadequate

coping strategies and aggressive reactions in social situations, and the more positively they evaluated aggressive reactions. Severity of traits of ASPD and BPD had unique associations with distinctive SIP variables. These results suggest that the steps in the SIP model can be used to operationalize mentalizing problems. However, differentiation should be made between the SIP correlates of ASPD and BPD traits.

## RESEARCH QUESTIONS AND HYPOTHESES IN THE PRESENT STUDY

The present study seeks to contribute to the understanding of personality pathology in adolescents by using two theoretical models often used with children and adolescents to describe normal personality and the interaction with the social world—the Five Factor Model of personality (FFM) and the Social Information Processing model (SIP)—and studying their association with personality pathology.

This study will first investigate whether we can replicate associations between the FFM and personality pathology in adolescents. We will investigate relationships with Neuroticism and Agreeableness, which are the most prominent FFM factors related to personality pathology. We also will investigate the relationship between personality pathology and Extraversion and to a lesser extent Conscientiousness, which are unique to certain personality disorder categories (Saulsman & Page, 2004). Meta-analyses indicate that the FFM dimension Openness is not strongly related to personality disorders (Saulsman & Page, 2004; Skodol et al., 2011a, 2011b), but we will keep this fifth FFM dimension in our analyses for exploratory reasons. According to the meta-analysis by Saulsman and Page (2004), we expect that Cluster B personality pathology will be characterized mainly by negative associations with Agreeableness and Conscientiousness and by positive associations with Extraversion.

The second research question focuses on whether specific FFM dimensions are relevant for specific steps in SIP. We focused on three steps in the SIP model. The first is coping, which can be defined as strategies to regulate negative emotions associated with a social situation, which is reflected in Step 4 of the SIP model. Based on previous research investigating different FFM dimensions and behavior-related consequences, we expect that participants scoring high on Extraversion will show better coping strategies. The second SIP dimension we focus on is the generation of responses, which can be placed in Step 6 of the SIP model. We expect that participants scoring low on Agreeableness will have difficulties in enacting adequate or proactive responses, since earlier studies showed that Agreeableness was negatively related to the choice to enact aggressive responses. The third SIP factor we focus on is memories of earlier social frustration situations, which can be placed in the database of SIP. In line with findings of Shiner and Caspi (2003), we expect adolescent patients scoring high on Neuroticism to show difficulties in

accessing their cognitive repertoires, because they experience more negative emotions and show more angry and frustrated reactions or avoidant reactions. This can be a result of distorted cognitive repertoires.

The third research question is whether SIP can have a mediating effect, explaining the relationship between personality according to FFM and personality disorders. The expectation for this research question is that some specific variables of the SIP model will have a mediating effect between the FFM and personality psychopathology. Adolescent patients low on Agreeableness would be more likely to experience more conflicts, use more inadequate coping strategies, and respond in an aggressive way, which in turn would relate to Cluster B personality pathology. Adolescent patients high on Neuroticism would be more likely to use inadequate coping strategies, respond in an aggressive or avoidant way, and experience greater sensitivity to negative events, which in turn would relate to Cluster B personality pathology.

Finally, the fourth research question addresses possible moderator effects of personality on the relationship between SIP and personality pathology. Our hypothesis is that temperament or personality in children and adolescents plays a role in the relationship between the SIP variables and the actual personality pathology. For adolescents high on certain personality traits, these associations might be stronger than for adolescents low on these personality traits. Because testing for moderating effects involves the tests of many interaction effects in a multiple regression approach, to avoid overtesting, we limit our analyses of moderation effects to the two personality factors that have most consistently been found to be related to personality pathology (cf. Saulsman & Page, 2004): Agreeableness and Neuroticism. More specifically, we expect that positive scores on personality traits might have buffering effects, so that for adolescents high on Agreeableness and low on Neuroticism, the associations between SIP and personality pathology are expected to be weaker.

Summarizing, we expect (a) that Cluster B personality pathology will be characterized by negative associations with Agreeableness as well as Conscientiousness, and positive associations with Extraversion and (b) that adolescent patients scoring low on Agreeableness will enact less proactive responses and adolescent patients scoring high on Neuroticism will show more aggressive or avoidant responses and report more memories of comparable previous social frustrating situations. Furthermore, (c) we expect adolescent patients low on Agreeableness to use more inadequate coping strategies, and aggressive responses, which in turn would relate to Cluster B personality pathology, and that adolescent patients high on Neuroticism would be more likely to use inadequate coping strategies, express aggressive or avoidant responses, a would experience greater sensitivity to negative events, which in turn would relate to Cluster B personality pathology. Finally, (d) we expect that for adolescents high on Agreeableness and low on Neuroticism, the associations between SIP and personality pathology will be weaker.

## METHOD

### PARTICIPANTS

The sample consisted of adolescents referred to the outpatient ward for youth psychiatry Fornhese of GGZ Centraal in the Netherlands. They were referred, mostly by their family physicians, for assessment and treatment of psychiatric problems such as attention-deficit disorder, anxiety disorder, autistic spectrum disorder, eating disorder, depression, or personality pathology. After their first interview, all patients seen between March 2006 and September 2007 were asked to participate in this study. Ninety-six adolescents (53% of the patients who were asked) aged 12–18 years participated after informed consent was given by both the participants and their parents. Forty-four (46%) of the participants were boys, and 52 (54%) were girls. Their mean age was almost 15 years ($M$ = 14.87; $SD$ = 1.4). Their cognitive functioning was average (TIQ: $M$ = 99.8, $SD$ = 17, Range = 64–141), as measured with the Dutch translation of the Wechsler Intelligence Scale for Children (WISC-III NL) and the Dutch translation of the Wechsler Adult Intelligence Scale (WAIS). Participants' gender, age, and diagnoses on both Axis I and Axis II of *DSM-IV-TR* were comparable to those of the total patient group in the outpatient ward in the given period. As was to be expected from the general underestimation due to reluctance to diagnose personality disorders in children under the age of 18, only 5.2% of the participants were diagnosed with a personality disorder (mostly personality disorder not otherwise specified), as compared to 5.6% in the total patient group. The majority of the sample were White adolescents, which is comparable to the clients entering youth psychiatry in the Netherlands.

In a research session, a research assistant completed a structured interview regarding SIP, and participants filled in a questionnaire regarding the FFM. Information about cognitive functioning was gathered from the patients' files. When there was no recent intelligence test in a file, three subtests of the intelligence test were completed in the research session.

### MEASURES

*Severity of Cluster B Personality Pathology.* On an Axis II checklist, a well-trained clinical psychologist or psychiatrist assessed the severity of each criterion of Axis II pathology after two or three clinical interview sessions. The Axis II checklist included the exact formulations of all *DSM-IV* criteria for personality disorders. Scores varied from 1 to 3.3 on five-point rating scales ($M$ = 1.75, $SD$ = 0.60), and Cronbach's alpha was .94. A total Cluster B score was constructed as well as separate scores for ASPD and BPD pathology. The clinicians who assessed the Axis II pathology and *DSM-IV* diagnosis were not the same as the research assistant who completed the structured interview regarding SIP, so both variables were assessed independently of each other.

*Five Factor Model of Personality (FFM).* The Dutch translation of the Big Five Inventory, a 43-item instrument designed to measure the FFM factors

of personality, was used in which adolescents have to judge their own personalities. This measurement has high levels of internal consistency, factorial and external validity, and good applicability in different age groups (Denissen, Geenen, van Aken, Gosling, & Potter, 2008). After recoding negatively worded items, a mean score was computed for every FFM dimension.

Neuroticism: this dimension consists of eight items and measures whether the adolescent is anxious, irritable, touchy, nervous, and fearful. Internal consistency was high with a Cronbach's α of .82.

Extraversion: this dimension consists of eight items and measures whether the adolescent is talkative, introverted, quiet, reserved, and withdrawn. Internal consistency was high with a Cronbach's α of .80.

Openness: this dimension consists of 10 items and measures whether the adolescent is creative, complex, imaginative, artistic, deep, and innovative. Internal consistency was relatively high with a Cronbach's α of .75.

Conscientiousness: this dimension consists of nine items and measures whether the adolescent is organized, systematic, thorough, neat, and careful. Internal consistency was high with a Cronbach's α of .80.

Agreeableness: this dimension consists of nine items and measures whether the adolescent is kind, cooperative, sympathetic, pleasant, agreeable, and helpful. Internal consistency was acceptable with a Cronbach's α of .60.

*Social Information Processing*. SIP was assessed using the Social Information Processing Interview in Adolescents, which is based on the Interview Social Information Processing (Orobio de Castro, 2000; Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005). In this interview, participants were read six short vignettes of conflict situations among peers, in which the intentions and emotions were not clear. After every story, participants answered questions based on the SIP model. Participants were asked to describe the feelings they would experience in the presented situation, how they would react, and whether they had ever experienced something like this themselves. A research assistant and a clinical psychologist scored coping strategies, response generation, and the number of memories of past similar frustrating situations that were reported. SIP was assessed with open-ended questions concerning each vignette. To assess interrater reliability of coded open answers, trained clinicians independently coded transcriptions of randomly selected participants' answers to 60 vignettes.

*Coping strategies*, which included emotion regulation, were assessed with the questions "When you feel so [negative emotion mentioned by participant], can you think of something that could make you feel better? What can you think of?" Answers to these questions were coded as adequate coping when an attempt to solve the problem was mentioned (e.g., "I'll go to the teacher and explain what happened"), when an attempt was made to find distraction (e.g., "Go to my room and play my music"), or when a cognitive strategy was suggested (e.g., "I'll think it was not really a big deal"). Answers were coded as inadequate when any form of aggression was mentioned (e.g., "Yes! Beat him up! Then it's my turn to laugh!"), when only acts by another person were mentioned (e.g., "When he gives me a new one"), or

when respondents answered that they did not know or considered the issue irrelevant. Interrater agreement kappa was .62.

*Response generation* was assessed with the question "What would you do now?" Answers were coded in three categories: avoidant responses, prosocial responses, and aggressive responses. Interrater agreement kappa was .74.

*Recall of memories of past frustrating experiences* was assessed with the question "Have you ever experienced something like this story yourself?" The number of affirmative reactions (as victim, as frustrater, or without any further indication of the subject's role) over the six vignettes was counted.

*Additional Diagnosis*. After multidisciplinary assessment, the *DSM-IV-TR* diagnoses were assigned in consensus in a multidisciplinary staff meeting. On Axis I, 20.8% of the participants had as the primary diagnosis an autism spectrum diagnosis; 30.2% had a disruptive diagnosis, 20.8% had an internalizing diagnosis, and 28.1% had other diagnoses. Thirty-two percent of the participants had more than one diagnosis on Axis I, and the global assessment of functioning was 60 (*SD* = 5).

## STATISTICAL ANALYSES

Prior to conducting the analyses, we checked the assumptions of outliers and normality. In general, variables had acceptable levels of kurtosis and skewness, with the exception of avoidant responses and aggressive responses. Because only a few exceptions were found, we decided not to perform transformations. To explore the data, descriptive statistics were requested to give insight into the sample. After this, Pearson correlations were computed between the different study variables to check for significant relationships between the study variables.

We then examined whether the SIP variables mediate the link between FFM dimensions and personality pathology. For each FFM dimension, a mediation analysis was performed with all five SIP variables as mediators. Moreover, this was done for all three dependent variables (see Figure 1). Various multiple mediation analyses, using the recommendations proposed by Preacher and Hayes (2008), were performed. The multiple mediation analyses with bootstrapping procedures conducted in the present study were preferred above the causal step strategy (Baron & Kenny, 1986), because they increased power, reduced Type I error, did not impose the assumption of normality, and did reduce parameter estimation bias normally presented in simple mediation models due to omitted variables (Preacher & Hayes, 2008).

The assumption of normality of the sampling distribution of the total and specific indirect effects is questionable, particularly in small samples; therefore, mediation was assessed based on a point estimate (the mean $a \times b$ coefficient computed over the 1,000 samples) and bootstrapped 95% confidence interval (CI; 1,000 bootstrap iterations). In addition to traditional mediation methods (e.g., Baron & Kenny, 1986), multiple mediation models provide the added benefit of exploring more than one mediator at a time

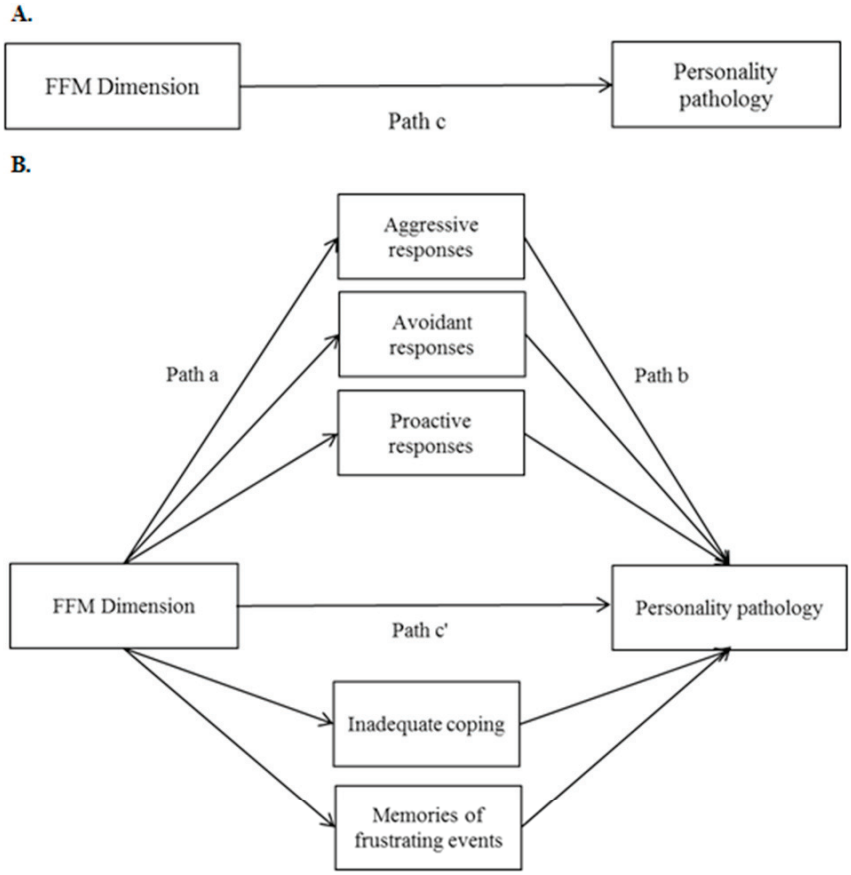


FIGURE 1. Multiple mediation model Part A is the direct effect, which is the unmediated effect of an FFM dimension on personality pathology (Path c). Part B is the multiple mediation model with Path c as the effect of an FFM dimension on personality pathology mediated by SIP variables.

by giving effect values for each model path while accounting for the other model paths. For every mediation model, a total effect—the effect of an FFM dimension on personality pathology, not considering the mediators—was reported (path c in Figure 1). A direct effect—the effect of an FFM dimension on personality pathology, controlled for the mediators—was given (Path c′ in Figure 1). Last, a total indirect effect—the effect via the mediators (Preacher & Hayes, 2008)—was reported (Path $a \times b$ or $c\text{-}c'$). The only requirement for mediation is that the indirect effect of $a \times b$ is significant (MacKinnon, Krull, & Lockwood, 2000; Schrout & Bolger, 2002). A mediator effect is significant if zero is not included in CI; the specific indirect effect is said to be significant at $p < .05$.

For the moderation analyses, a stepwise regression approach was followed in which, after the main effects of personality and SIP, the interaction

**TABLE 1. Means and Standard Deviations of Personality Disorders, Big Five Personality Characteristics, and SIP Variables of Adolescents**

| | Boys[a] | | Girls[b] | | Total | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| **Personality disorders** | | | | | | |
| Cluster B | 1.69 | 0.56 | 1.79 | 0.64 | 1.74 | 0.91 |
| Antisocial | 2.01 | 0.95 | 1.60 | 0.85 | 1.78 | 0.79 |
| Borderline | 1.67 | 0.63 | 2.03 | 0.87 | 1.87 | 0.61 |
| **Big Five dimensions** | | | | | | |
| Neuroticism | 2.78 | 0.60 | 3.41 | 0.85 | 3.12 | 0.80 |
| Extraversion | 3.56 | 0.73 | 3.35 | 0.77 | 3.45 | 0.75 |
| Openness | 3.18 | 0.60 | 3.34 | 0.72 | 3.26 | 0.67 |
| Conscientiousness | 3.03 | 0.72 | 3.07 | 0.76 | 3.05 | 0.74 |
| Agreeableness | 3.40 | 0.46 | 3.70 | 0.60 | 3.56 | 0.56 |
| **SIP variables** | | | | | | |
| Aggressive response | 1.00 | 1.18 | 1.31 | 1.44 | 1.16 | 1.32 |
| Proactive response | 4.74 | 2.95 | 6.36 | 2.58 | 5.56 | 2.87 |
| Avoidant response | 0.83 | 1.05 | 1.47 | 1.53 | 1.16 | 1.35 |
| Inadequate coping | 1.19 | 1.33 | 1.60 | 1.59 | 1.40 | 1.48 |
| Memories of past frustrating events | 1.45 | 1.49 | 2.20 | 1.67 | 1.83 | 1.62 |

*Note*. [a]$N = 41$ on personality disorders, $N = 43$ on Big Five dimensions, $N = 53$ on SIP variables. [b]$N = 52$ on personality disorders, $N = 50$ on Big Five dimensions, $N = 55$ on SIP variables.

terms of the centered variables were added. Cluster B, ASPD, and BPD were entered as dependent variables. In Step 1, a centered SIP variable was added into the model, as well as centered Neuroticism or centered Agreeableness. In the second step, the interaction term between the SIP variable and Agreeableness or Neuroticism was added to the model. If the interaction term was significant, the simple slopes tests recommended by Aiken and West (1991) was used to probe interactions involving a continuous variable. These tests determined the degree of association between an FFM factor and a personality disorder at one standard deviation above and below the mean of a moderator.

## RESULTS

### DESCRIPTIVE STATISTICS

Mean scores and standard deviations for the personality disorders, FFM dimensions, and SIP variables are shown in Table 1. A MANOVA was used to assess whether there were gender differences in personality disorders, FFM dimensions, and SIP variables. The multivariate test showed a significant main effect of gender, $F(14, 73) = 4.00$, $p < .001$, partial $\eta^2 = .43$. For ASPD, the univariate test showed a significant difference between boys and girls, $F(1, 86) = 5.38$, $p = .023$, partial $\eta^2 = .06$, with boys scoring higher than girls. Besides, a significant difference between boys and girls on BPD was found, $F(1, 86) = 4.49$ $p = .037$, partial $\eta^2 = .05$, with girls scoring higher than boys. Also, the univariate test showed that there is a significant gender difference

for Neuroticism, $F(1, 86) = 15.99$, $p < .001$, partial $\eta^2 = .16$, and for Agreeableness, $F(1, 86) = 5.37$, $p = .023$, partial $\eta^2 = .06$, with girls scoring higher on both personality traits. Finally, for the SIP variables, there was a significant gender difference for memories of past frustrating experiences, $F(1, 86) = 4.17$, $p = .044$, partial $\eta^2 = .05$, with girls having more of these memories than boys. For proactive responses, there was a significant gender difference as well, $F(1, 86) = 4.40$, $p = .039$, partial $\eta^2 = .05$, with girls showing more proactive responses than boys.

## CORRELATIONS BETWEEN PERSONALITY PATHOLOGY AND FFM DIMENSIONS

The relationships between FFM dimensions and personality pathology are displayed in Table 2. Cluster B personality pathology is significantly correlated with Extraversion ($p = .013$) and Agreeableness ($p < .001$). Patients with a higher level of Cluster B personality pathology score higher on Extraversion, whereas they score lower on Agreeableness. BPD pathology shows only a significant negative correlation with Agreeableness ($p < .001$), indicating that the higher the Agreeableness, the lower the BPD pathology. Last, ASPD pathology shows significant correlations with all FFM dimensions except for Openness. Patients scoring higher on ASPD pathology have lower scores on Neuroticism ($p = .021$), Conscientiousness ($p = .044$), and Agreeableness ($p = .001$), whereas they have high scores on Extraversion ($p = .002$).

## CORRELATIONS BETWEEN FFM DIMENSIONS AND SIP VARIABLES

Correlations between FFM dimensions and SIP variables are shown in Table 2. Giving an Avoidant Response was significantly correlated with Neuroticism ($p = .001$), Extraversion ($p = .013$), and Openness ($p = .049$). Patients who were more neurotic, less extraverted, and less open showed more avoidant responses. Moreover, aggressive response showed a significant correlation with Agreeableness ($p = .001$). Patients who were less agreeable showed more aggressive responses. Memories of past frustrating experiences were significantly correlated with Neuroticism ($p = .002$). Patients who were more neurotic showed more memories of past frustrating experiences. Finally, inadequate coping was significantly correlated with Conscientiousness ($p = .005$) and Agreeableness ($p = .023$). Patients who were less conscientious and less agreeable showed more inadequate coping strategies.

## CORRELATIONS BETWEEN SIP VARIABLES AND PERSONALITY DISORDERS

Various significant correlations were found between SIP variables and personality disorders, as displayed in Table 2. Aggressive response showed significant correlations with all three types of personality pathology. Patients with more severe Cluster B pathology ($p = .023$), more severe ASPD pathology ($p = .005$), or more severe BPD pathology ($p = .049$) all showed high levels of aggressive responses. Also, inadequate coping was significantly cor-

**TABLE 2. Pearson Correlations Between Personality Disorders, Big Five Dimensions, and SIP variables**

| Measures | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Cluster B | __ | | | | | | | | | | | | |
| 2. ASPD | .78** | __ | | | | | | | | | | | |
| 3. BPD | .88** | .57** | __ | | | | | | | | | | |
| 4. N | −.02 | −.25* | .18 | __ | | | | | | | | | |
| 5. E | .26 | .33* | .10 | −.55** | __ | | | | | | | | |
| 6. O | .10 | −.11 | .01 | −.09 | .24* | __ | | | | | | | |
| 7. C | −.19 | −.22* | −.21 | −.19 | .12 | .23* | __ | | | | | | |
| 8.A | −.37** | −.36** | −.35** | −.05 | .01 | .10 | .43** | __ | | | | | |
| 9. Agr | .24* | .29* | .21* | .01 | .07 | .03 | −.03 | −.34** | __ | | | | |
| 10. Pr | .07 | −.13 | .13 | .07 | −.001 | .08 | −.02 | .15 | −.03 | __ | | | |
| 11. Avr | .04 | −.06 | .14 | .35** | −.26* | −.21* | −.01 | −.06 | .07 | .02 | __ | | |
| 12. IaC | .24* | .28* | .22* | .18 | −.07 | −.09 | −.29* | −.24* | .15 | .62** | .08 | __ | |
| 13. MemFrus | .35** | .16 | .34** | .31* | .08 | .14 | −.17 | −.08 | .18 | .34 | .21* | .25* | __ |

*Note*. N = Neuroticism, E = Extraversion, O = Openness, C = Conscientiousness, A = Agreeableness, Agr = Aggressive response, Pr = Proactive response, Avr = Avoidant response, IaC = Inadequate Coping, MemFrus = Memories of past frustrating events.
*$p < .05$. **$p < .01$. *N* ranges from 88 to 93.

**TABLE 3. Mediation of Neuroticism on Personality Pathology Through Five SIP Variables (*N* = 88)**

| | | | Path *ab* | BCa 95% CI[c] | |
|---|---|---|---|---|---|
| | Path *a* ($se_a$) | Path *b* ($se_b$) | Point estimate | Lower | Upper |
| Cluster B | | | | | |
| Inadequate coping | 0.28 (0.19) | 0.08 (0.04) | 0.02 | –.00 | .08 |
| Avoidant responses | 0.59 (0.17)** | 0.02 (0.05) | 0.01 | –.05 | .08 |
| Proactive responses | 0.18 (0.29) | 0.05 (0.03) | 0.01 | –.01 | .05 |
| Aggressive responses | 0.04 (0.18) | 0.11 (0.05)* | 0.004 | –.03 | .06 |
| Memories of past frustrating events | 0.62 (0.20)* | 0.13 (0.04)* | 0.08 | .02 | .20 |
| Total | | | 0.13 | .02 | .28 |
| BPD | | | | | |
| Inadequate coping | 0.28 (0.19) | 0.08 (0.05) | 0.02 | –.00 | .09 |
| Avoidant responses | 0.59 (0.17)** | 0.08 (0.07) | 0.05 | –.03 | .20 |
| Proactive responses | 0.18 (0.29) | 0.11 (0.04) | 0.02 | –.04 | .11 |
| Aggressive responses | 0.04 (0.18) | 0.16 (0.06) | 0.01 | –.04 | .08 |
| Memories of past frustrating events | 0.62 (0.20)* | 0.13 (0.05) | 0.08* | .01 | .21 |
| Total | | | 0.17* | .02 | .35 |

*Note*. BCa = bias correct and accelerated confidence intervals. Paths a and b are unstandardized regression coefficients. [c]If the 95% confidence interval produced by the bootstrap does not include zero, then the criteria for mediation have been met. *$p < .05$. **$p < .01$.

related with all three types of personality. Patients with Cluster B pathology ($p = .020$), ASPD pathology ($p = .007$), and BPD pathology ($p = .039$) all showed high levels of inadequate coping strategies. Finally, memories of past frustrating experiences showed significant correlations with Cluster B ($p = .001$) and BPD ($p = .001$) as well, which indicated that patients with more severe Cluster B pathology and more severe BPD pathology have more of these memories.

## TEST OF MEDIATION

Table 3 shows the unstandardized coefficients of Path *a* (independent variable on mediator) and Path *b* (mediator on dependent variable) as well as the point estimate and CIs of all specific indirect effects for the significant mediation model.

We examined whether the five SIP variables mediate the link between the five FFM dimensions and Cluster B personality, ASPD, or BPD. With two exceptions (presented below), none of the models showed significant indirect effects (Path $a \times b$), indicating that the five SIP variables did not mediate the link between one of the FFM dimensions and Cluster B personality pathology, ASPD, or BPD.

The first significant mediation effect that was found concerned the effect of Neuroticism on Cluster B personality pathology and BPD. The total effect of Neuroticism on Cluster B (Path c; $B = –.02$, $t = –.19$, $p = .848$)[1] was not significant, nor was the direct effect of Neuroticism on Cluster B adjusted for

1. Hayes (2009) recommends reporting unstandardized regression coefficients.

the mediators (Path c′; $B = -.14$, $t = -1.71$, $p = .092$). The direct effect was smaller than the total effect (and almost significant), which indicates partial mediation by the five mediators. The total indirect effect was significantly different from zero, indicating that the effect of Neuroticism on Cluster B was mediated by the five proposed mediators. Also, the total effect of Neuroticism on BPD (Path c; $B = .18$, $t = 1.72$, $p = .089$) was not significant, nor was the direct effect of Neuroticism on BPD adjusted for the mediators (Path c′; $B = .01$, $t = 0.05$, $p = .959$). The direct effect was smaller than the total effect, which indicates partial mediation by the five mediators. The total indirect effect was significantly different from zero, indicating that the effect of Neuroticism on BPD was mediated by the five proposed mediators.

In both cases, the total indirect effect can be further divided into the indirect effects of each of the mediators. Only memories of past frustrating events showed a significant positive indirect effect on the link between Neuroticism and Cluster B personality pathology, and between Neuroticism and BPD, indicating that memories of past frustrating events were a significant mediator. The positive indirect effect showed that patients with higher levels of Neuroticism had more memories of past frustrating events and consequently they had higher levels of Cluster B personality pathology or BPD. The total model for Cluster B is significant, $F(6, 81) = 4.09$, $p = .001$, and accounted for 23.23% of the variance in Cluster B personality pathology. The total model for BPD is also significant, $F(6, 81) = 4.23$, $p = .001$, and accounted for 23.84% of the variance in BPD.

## TESTS OF MODERATION

As mentioned, moderation analyses were only performed with Agreeableness and Neuroticism as factors of the FFM, and with all SIP variables.

*Moderation by Agreeableness of the Relationship Between Aggressive Responses and Personality Pathology.* Results of the moderation analysis showed that, after adding the main effects of Agreeableness and aggressive response to the prediction of Cluster B pathology; the interaction term added 6% of the explained variance, $Fchange(1, 84) = 6.55$, $p = .01$. Simple slope tests showed that the slope of the line representing the link between Aggressive responses and Cluster B pathology was positive and of medium effect size (Cohen, 1993) for individuals showing low levels of Agreeableness ($B = -0.11$, $\beta = 0.24$ $t(87) = 2.04$, $p = .045$, $d = 0.44$). The simple slope for individuals scoring high on Agreeableness was not significant. The same moderation effects were found for ASPD, 5% additional explained variance, $Fchange(1, 84) = 5.01$, $p = .03$, and BPD, 7% additional explained variance, $Fchange$ $(1, 84) = 7.32$, $p = .01$. Moreover, the simple slope tests showed the same pattern of significant results for individuals showing low levels of Agreeableness for ASPD, $B = 0.21$, $\beta = 0.30$, $t(87) = 2.53$, $p = .013$, $d = 0.54$, and for BPD, $B = 0.13$, $\beta = 0.22$, $t(87) = 2.15$, $p = .035$, $d = 0.46$. No significant slopes were found for individuals scoring high on Agreeableness.

*Moderation by Agreeableness of the Relationship Between Avoidant Responses and Personality Pathology.* Moderation analyses showed also that after adding the main effects of Agreeableness and avoidant responses to the prediction of Cluster B pathology; the interaction term added 5% of the explained variance, $Fchange(1, 84) = 5.42$, $p = .02$. The simple slope test showed that none of the results were significant. These results indicated that the slope is significant when individuals score more than one standard deviation above or below the mean on Agreeableness. The same moderation effect was found for BPD; the interaction term added 8% of the explained variance, $Fchange(1,84) = 8.24$, $p = .01$. Simple slope tests showed that the slope of the line representing the link between avoidant responses and BPD was positive and of medium effect size (Cohen, 1988) for individuals showing low levels of Agreeableness, $B = 0.24$, $\beta = -0.41$, $t(87) = 2.81$, $p = .006$, $d = 0.60$. No significant slope was found for individuals scoring high on Agreeableness.

*Moderation by Agreeableness of the Relationship Between Proactive Responses and Personality Pathology.* The moderation analyses showed that after adding the main effects of Agreeableness and proactive response to the prediction of ASPD, the interaction term added 7% of the explained variance, $Fchange(1, 84) = 7.95$, $p = .01$. Simple slope tests showed that the slope of the line representing the link between proactive responses and ASPD was negative and of medium effect size (Cohen, 1988) for individuals showing low levels of Agreeableness, $B = -0.15$, $\beta = -0.48$, $t(87) = -2.67$, $p = .009$, $d = 0.57$. No significant slope was found for individuals scoring high on Agreeableness.

*Moderation by Neuroticism of the Relationship Between Memories of Frustrating Experiences and Personality Pathology.* Finally, after adding the main effects of Neuroticism and memories of past frustrating experiences to the prediction of BPD, the interaction term added 9% of the explained variance, $Fchange(1, 84) = 9.44$, $p < .01$. Simple slope tests showed that the slope of the line representing the link between memories of past frustrating events and BPD was positive and of large effect size (Cohen, 1993) for individuals showing high levels of Neuroticism, $B = 0.30$, $\beta = 0.61$, $t(87) = 4.39$, $p < .001$, $d = 0.94$. No significant slope was found for individuals scoring low on Neuroticism.

## DISCUSSION

This study investigated response generation, coping strategy, and memories of past frustrating experiences as mediators as well as moderators in the relationship between personality and personality pathology. There were five major findings.

First, relationships between FFM dimensions and personality pathology were found. Adolescent patients with a higher level of Cluster B personality pathology scored higher on Extraversion, whereas they scored lower on

Agreeableness. Patients scoring higher on BPD had a lower score only on Agreeableness, while patients scoring higher on ASPD had lower scores on Neuroticism, Conscientiousness, and Agreeableness, whereas they had high scores on Extraversion.

When comparing these results to the literature, we see that the important role of Agreeableness in (adolescents') personality pathology in general, and in BPD more specifically, is confirmed, stressing again the social-interactional nature of these problems. Not fully confirmed was the importance of Neuroticism, or Emotional Stability. Also notable was the difference in FFM scores between ASPD and BPD pathology. Clearly, ASPD was related to unfavorable scores on all FFM dimensions except Openness. The profile of ASPD very much resembles the profile of an undercontrolled personality type (cf. Asendorpf, Borkenau, Ostendorf, & van Aken, 2001), for which a pattern of externalizing behaviors is consistently reported (van Aken & Dubas, 2004). The only FFM dimension that was related to the level of BPD was Agreeableness.

Second, relationships between FFM dimensions and SIP variables were found. Adolescent patients who were more neurotic, less extraverted, or less open showed more avoidant responses. Patients who were less agreeable showed more aggressive responses. Patients who were more neurotic showed more memories of past frustrating experiences. Finally, patients who were less conscientious and less agreeable showed more inadequate coping strategies. Because, to our knowledge, this is the first study that connects the FFM with the SIP model, further research is needed to determine whether these associations are specific for adolescents (as opposed to younger children), specific for patients with personality pathology (as opposed to healthy controls), or both.

Third, various significant relationships were found between SIP variables and personality pathology. Patients with more severe Cluster B pathology, and specifically with more severe ASPD pathology or BPD pathology, showed high levels of aggressive responses and high levels of inadequate coping strategies. Moreover, patients with more severe Cluster B or BPD pathology reported more memories of past frustrating experiences. This finding could be linked to problems in mentalizing due to the implication that adolescents with more severe Cluster B personality pathology and specifically more severe BPD become overwhelmed by memories of past frustrations or trauma and do not focus enough attention on the present social situation. There are two possible explanations of this problem. The first possibility is that adolescents with more severe Cluster B personality pathology and specifically more severe BPD have encountered more frustrating situations in their development and therefore have stored more negative experiences in their database. This hypothesis is consistent with literature concerning trauma and personality pathology (Jang, Stein, Taylor, Asmundson, & Livesley, 2003). The second possible explanation is that these adolescents lack the skills to cope with negative situations, and therefore experience more helplessness and insecure feelings compared to adolescents with more healthy coping skills. This could promote their perception of more negative and frustrating experiences.

Fourth, the hypothesized mediation, by which the effects of personality dimensions on personality pathology were expected to be mediated by SIP variables, was restricted to some of the effects of Neuroticism. The effect of Neuroticism on Cluster B personality pathology (and more specifically on BPD) was mediated by memories of past frustrating events of the type described in the vignettes, for example, conflict situations among peers in which intentions and emotions were not clear. Given the small sample size, we need to be cautious about interpreting this finding, and we would need replication of these findings. Nevertheless, these findings are similar to two of the person-environment patterns described by Caspi and Roberts (2001), who studied how personality can interact with the social environment. First, the *evocative interaction pattern* describes how a person triggers a certain response from people around the individual, for example, the child who gets bullied in different situations at different times. This could mean that highly neurotic adolescents trigger more socially frustrating encounters. Second, the *reactive interaction pattern* describes how different adolescents can interpret and react differently in the same situation. This interaction pattern resembles social cognition and could mean that, compared to less neurotic adolescents, highly neurotic adolescents are more likely to interpret social situations as frustrating or that they are more likely to remember the frustrating situations.

Fifth, a moderating effect of Agreeableness on the relationship between SIP variables and personality pathology was found. For adolescent patients high on Agreeableness, the relationship between the SIP variables aggressive and avoidant response and pathology (in terms of general Cluster B pathology, as well as BPD and ASPD [the latter effect only for aggressive response]) was smaller, but the effect of proactive responses was bigger. This seems to suggest that Agreeable adolescents might have additional social and interactional skills that more or less buffer the effect of their social-cognitive impairments. One additional moderating effect was found for Neuroticism: Patients high on Neuroticism showed a larger effect of memories of past frustrating experiences on their BPD pathology. However, since such an effect was not consistently found for Neuroticism, nor for various SIP variables, it should be replicated first to warrant further discussion.

These findings endorse the general notion that social functioning is a central concept during adolescence, when developing of social autonomy, forming intimate relationships, and establishing a new balance in the relationship with parents are important developmental tasks. Moreover, these findings reinforce the growing consensus that problems in social functioning are a central key to personality pathology (Fonagy, Luyten, & Strathearn, 2011). The importance of addressing problems in social functioning from a developmental perspective is also noted by Chanen and Kaess (2012), who state that in contrast to the relatively unstable nature of the diagnosis of borderline personality disorder, both in adolescents and in adults, problems in social functioning are much more stable.

Three caveats should be considered with respect to the current results. First, they should be considered preliminary given the small sample size. Although our results do seem to suggest certain patterns, separate results

should be regarded with some caution and need to be replicated in future research. Second, the sample did not consist specifically of adolescents with diagnosed personality disorders. The reason for this, as we mentioned in the Introduction and the Method section, is that there is still a strong reluctance to diagnose personality disorders in adolescents. However, we believe our approach has value: By measuring the severity of Cluster B personality pathology in a more general group of clinically referred adolescents, we were able to test our hypotheses. Although this approach brings along comorbidity, we know that is simply the case: Personality disorders in adolescents have high levels of comorbidity (Chanen & Kaess, 2012). Further studies should of course refine these results by studying more pure groups of adolescents with specific personality disorders. Third, the use of vignettes to measure SIP brings with itself a limitation because real-life social information processing is far more complex and involves integration of visual and auditory information, as well as constant interaction with others, which makes the social situation more complex and dynamic. Future studies should include observational studies of social situations encountered by adolescents with personality pathology. Also, specific attention should be given to emotional processes, for example, empathy and emotion regulation processes, because they are relevant for both types of personality pathology.

In sum, our study showed that both personality dimensions and social cognitions play a role in adolescents' personality pathology. These contributions can be considered partly additive, partly SIP mediating the effect of personality on personality pathology, and partly personality moderating the relationship between SIP and personality pathology.

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