



# Predicting psychological need satisfaction and frustration from early maladaptive schemas and DSM-5 and ICD-11 personality traits

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## Abstract

The satisfaction of basic psychological needs is closely connected with an individual's well-being and mental health. The purpose of the present study was to examine the associations of persistent and pervasive negative cognitions about oneself and others (early maladaptive schemas) and pathological personality traits (DSM-5 and ICD-11 personality traits) with the satisfaction and frustration of basic psychological needs. To this aim, self-report measures of psychological need satisfaction (Basic Psychological Need Satisfaction and Frustration Scale), early maladaptive schemas (Young Schema Questionnaire – Short Form 3), and pathological personality traits (Modified Personality Inventory for DSM-5 and ICD-11 – Brief Form Plus), were administered in a community sample ( $N=322$ ,  $M_{age} = 35.3$  years,  $SD_{age} = 12.5$  years, 66% female). The data were analyzed using correlation analysis, linear regression analysis, and a machine-learning approach (XGBoost). The results showed strong negative relationships of early maladaptive schemas and pathological personality traits with the satisfaction and frustration of the needs for autonomy, relatedness, and competence, especially the disconnection/rejection and impaired autonomy/performance schema domains and the pathological personality traits of negative affectivity and detachment. Early maladaptive schemas predicted the frustration of the psychological needs for relatedness and competence above pathological personality traits. The study findings add to the understanding of current psychological need satisfaction.

**Keywords** Basic psychological needs · Early maladaptive schemas · Pathological personality traits · Personality disorders · DSM-5 · ICD-11

## Background

The concept of psychological needs has long been central to the study of motivation and personality (e.g., Maslow, 1943; Murray, 1938). Several theories of the basic psychological needs of individuals have been proposed (for an overview see Pittman & Zeigler, 2007). Baumeister and Leary (1995) suggested a set of criteria to evaluate whether a psychological need is fundamental, including affective consequences, the direction of cognitive processing, ill effects when thwarted, universality, the elicitation of

goal-directed behavior, and the non-derivability from other needs or motives. Recently, Dweck (2017) emphasized the links between basic needs and goals, suggesting that basic needs are related goals that have a chronic, high, and universal value and that are important for current well-being and optimal development in the future. In addition, Dweck (2017) suggested that basic needs are present from early in life and cannot be derived from other needs (cf. Baumeister & Leary, 1995). Different theories of psychological needs have concluded with a variety of fundamental psychological needs (Deci & Ryan, 2000; Dweck, 2017; Flanagan, 2010; Grawe, 2017; Pittman & Zeigler, 2007; Young et al., 2003). Arguably, the needs proposed in Self-Determination Theory (Deci & Ryan, 2000) have attracted most research interest (Ryan & Deci, 2017). In Self-Determination Theory, three innate basic psychological needs are defined: relatedness, competence, and autonomy. The satisfaction of these needs is viewed as a necessary condition for human thriving, psychological well-being, and growth (Ryan &

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Deci, 2017). Relatedness refers to feeling connected with others, loved, and being cared about (Baumeister & Leary, 1995; Ryan & Deci, 2000, 2017). Competence describes the experience of mastery and efficacy when interacting with one's environment (Ryan & Deci, 2017). Autonomy involves the experience of one's behavior as volitional and self-endorsed as opposed to being controlled by external pressures (Deci & Ryan, 2000). The centrality and universality of these needs have been demonstrated in cross-cultural studies (Chen et al., 2015; Sheldon et al., 2001). Further, associations between basic need satisfaction and well-being have been found across countries (Church et al., 2013; Martela et al., 2023; Ryan et al., 2022). Recently, a distinction has been made between need satisfaction and need frustration as two different aspects of need satisfaction where need frustration refers to the experience that one's basic psychological needs are threatened (Ryan & Deci, 2017; Vansteenkiste & Ryan, 2013; Vansteenkiste et al., 2020). Need frustration has been shown to be more strongly related to negative outcomes such as depression, anxiety, alcohol abuse, or self-injurious behaviors than low need satisfaction (Cordeiro et al., 2016; Vansteenkiste & Ryan, 2013). Due to the significance of basic psychological need satisfaction for an individual's well-being and mental health, it is important to gain knowledge about predictors of perceived basic psychological need satisfaction. The purpose of the present study was to examine the role of personality in terms of persistent and pervasive negative cognitions about oneself and others (early maladaptive schemas) and pathological personality traits for the satisfaction and frustration of basic psychological needs.

The notion of early maladaptive schemas was introduced with the development of schema therapy, which is a psychotherapeutic approach that integrates cognitive-behavioral, psychodynamic, and experiential techniques in the treatment of mental disorders (Young et al., 2003). Early maladaptive schemas can be briefly described as negative construals of oneself and others that are stable over time and rooted in the person's personality structure and identity (Young, 1999). In schema therapy, 18 specific early maladaptive schemas are currently defined that are organized into four domains: disconnection/rejection (early maladaptive schemas involving expectations that one's needs for intimacy and social belonging will not be met), impaired autonomy/performance (negative beliefs about one's ability to function independently and perform successfully), impaired limits (beliefs about grandiosity and the lack of self-control), and exaggerated responsibility and standards (early maladaptive schemas involving high internal standards) (Bach et al., 2018). Examples of specific early maladaptive schemas are the assumption that one is not worth being loved (defectiveness/shame), the belief that everything one does

has to be perfect (unrelenting standards), or the belief that one cannot trust others (mistrust/abuse). These schemas are believed to be developed in childhood through abuse or emotional neglect, i.e., a pattern of negative relational experiences where the child's emotional needs are not met (Rafaeli, Bernstein, & Young, 2011). Thus, frustrated basic psychological needs are thought to be the building blocks of early maladaptive schemas. In schema therapy, it is further assumed that early maladaptive schemas cause interpersonal problems and symptom disorders, such as depression or anxiety, and prevent the person from satisfying his or her basic psychological needs (Young et al., 2003). Hence, early maladaptive schemas are in schema therapy theorized to be the result of the frustration of psychological needs in childhood and impair psychological need satisfaction in adulthood in turn. Accordingly, the ultimate goal of schema therapy is to change early maladaptive schemas to enable the patient to satisfy his or her psychological needs (Young et al., 2003). In schema therapy, five basic psychological needs are proposed: secure attachment; autonomy, competence, sense of identity, freedom to express valid needs and emotions, spontaneity and play, and realistic limits and self-control (Young et al., 2003). Recently, Roediger et al. (2018) suggested adopting the needs proposed in Self-Determination Theory in schema therapy but to reframing the three needs into the two needs of attachment orientation (or connection/relatedness) and assertiveness orientation (comprising the needs for autonomy and competence). Studies support several assumptions made in schema therapy, e.g., the association between parental relationships in childhood and early maladaptive schemas (Lim & Barlas, 2019) and the relationships of early maladaptive schemas with mental disorders (Bär et al., 2023; Thimm & Chang, 2022) and interpersonal problems (Janovsky et al., 2020). However, despite the essential role of psychological needs in schema therapy, research into the relationship between early maladaptive schemas and need satisfaction is sparse (Pilkington et al., 2023). Phillips et al. (2019) found in a community sample of older adults that all individual early maladaptive schemas were negatively related to the satisfaction of the need for autonomy, with the highest correlations for the subjugation ( $r = -.68$ ), negativity/pessimism ( $r = -.64$ ), and vulnerability to harm or illness ( $r = -.62$ ) schemas. Except for the self-sacrifice and unrelenting standards schemas, early maladaptive schemas were also significantly and negatively associated with the satisfaction of the needs for competence and relatedness. Satisfaction of the need for competence was most strongly associated with the failure to achieve ( $r = -.62$ ), subjugation ( $r = -.55$ ), and insufficient self-control ( $r = -.53$ ) schemas. Satisfaction of the need for relatedness showed the highest correlations with the social isolation ( $r = -.63$ ), emotional deprivation

( $r = -.56$ ), abandonment, defectiveness/shame, and emotional inhibition ( $r$ 's =  $-.52$ ) schemas.

Similar to the relationships between basic psychological needs and early maladaptive schemas, a close connection between personality traits and the satisfaction of basic psychological needs has been suggested (DeYoung, 2015; DeYoung & Krueger, 2018a; Dweck, 2017; McCabe & Fleeson, 2016). Dweck (2017) described personality traits as characteristic styles for achieving needs-related goals. McCabe and Fleeson (2016) suggested that trait manifestations are tools for accomplishing goals. Relatedly, the Cybernetic Big Five Theory (DeYoung, 2015; DeYoung & Krueger, 2018a) proposes that personality traits reflect variations in mechanisms that have been developed evolutionarily to satisfy universal basic needs. Moreover, Cybernetic Big Five Theory assumes that a persistent lack of need satisfaction is an indication of impaired psychological functioning due to pathological personality traits (DeYoung & Krueger, 2018b). Pathological personality traits are included in the alternative model for personality disorders in the Diagnostic and Statistical Manual of Mental Disorders 5th ed., Text Revision (American Psychiatric Association, 2022) and the latest edition of the International Classification of Diseases (ICD-11, World Health Organization, 2018) in the diagnosis of personality disorders. The traits of the DSM-5 alternative model for personality disorders are conceptualized as maladaptive variants of the dimensions of the five-factor model of personality: negative affectivity (the experience of frequent and intense negative emotions and their behavioral manifestations), detachment (avoidance of interpersonal interactions and restricted emotional experience and expression), antagonism (exaggerated sense of self-importance, disregard of other's feeling, deception, and exploitation of others), disinhibition (impulsive and irresponsible behavior), and psychoticism (peculiar, eccentric, or bizarre cognitions and behaviors) (American Psychiatric Association, 2022). The ICD-11 model for personality disorders includes the additional trait of anankastia, which corresponds to maladaptive high conscientiousness in the five-factor model of personality (World Health Organization, 2018), i.e., perfectionism and emotional and behavioral constraint. Investigations into the associations between personality traits and the satisfaction and frustration of the basic needs proposed by Self-Determination Theory have so far focused only on normal traits, and the findings suggest that extraversion, agreeableness, and conscientiousness are positively related to psychological need satisfaction, while a negative association with neuroticism is commonly found (Bratko et al., 2022; Nishimura & Suzuki, 2016; Sulea et al., 2015; Van den Broeck et al., 2016). Associations with openness to experience have been weak and inconsistent (Bratko et al., 2022). Bratko et al. (2022) reported that

the five personality traits together explained 29%, 40%, and 37% of the variance of the satisfaction of the needs for autonomy, competence, and relatedness, respectively. A recent meta-analysis found that all traits of the five-factor model were significantly correlated with the satisfaction of the three psychological needs (Vukasović Hlupić et al., 2022). Low neuroticism and high extraversion showed medium-sized associations with the satisfaction of all three needs. In addition, high conscientiousness was relatively highly related to the satisfaction of the need for competence and high agreeableness to the satisfaction of the need for relatedness (Vukasović Hlupić et al., 2022). Nishimura and Suzuki (2016) examined the associations of personality traits with the frustration of basic psychological needs and found an inverse pattern of correlations with need satisfaction, i.e., positive associations with neuroticism, and negative relationships with extraversion, agreeableness, conscientiousness, and openness. These findings suggest close connections between normal personality traits and psychological need satisfaction. However, the associations between pathological personality traits and the satisfaction and frustration of basic psychological needs have not yet been investigated.

Thus, the purpose of the present study was to explore the associations of early maladaptive schemas and the pathological personality traits of the DSM-5 alternative model for personality disorders and ICD-11 with psychological need satisfaction and frustration. Based on the definition of early maladaptive schemas, it was generally expected that early maladaptive schemas were negatively associated with psychological need satisfaction and positively related to psychological need frustration. More specifically, it was expected that the satisfaction and frustration of the need for relatedness were especially associated with the early maladaptive schemas of the disconnection/rejection domain. The satisfaction and frustration of the needs for autonomy and competence were expected to be especially related to the impaired autonomy/performance schema domain. Further, due to the maladaptive nature of the DSM-5 and ICD-11 personality traits, these traits were expected to be negatively correlated with the satisfaction of basic psychological needs and positively correlated with the frustration of basic psychological needs. Based on studies on normal personality traits (Vukasović Hlupić et al., 2022), it was expected that the satisfaction and frustration of the needs for autonomy, relatedness, and competence were especially associated with negative affectivity and detachment. A second goal of the study was to compare the strength of the associations of early maladaptive schemas and pathological personality traits with psychological need satisfaction and to explore the incremental validity of early maladaptive schemas and pathological personality traits above each

other in the prediction of the satisfaction and frustration of basic psychological needs.

## Methods

### Participants

Participants in this project were recruited with the crowd-sourcing platform Prolific. Eligibility criterion for study participation were English as a first language. A total of 328 participants completed the study measures. Six participants were excluded from the study due to their responses to the validity items (see below), resulting in a final sample size of  $N=322$ . The mean age of the participants included in the analysis was 35.3 years ( $SD=12.5$  years). 66% ( $N=214$ ) were female, 32.6% ( $N=105$ ) were male, and three participants (0.9%) identified themselves as non-binary. Further sample characteristics are given in Table 1.

All participants were informed about the aim of the study and the researchers' contact information and provided their informed consent by agreeing to an informed consent statement at the beginning of the online survey. The participants were paid \$2.5. Ethical approval was applied for from the Regional Committee for Medical and Health Research. The

**Table 1** Sample descriptives

Demographic	Mean (SD) N (%)
Age	35.3 years (12.3 years) N (%)
Gender:	
Female	214 (66.5%)
Male	105 (32.6%)
Non-binary	3 (0.9%)
Marital status:	
Married	109 (33.9%)
In a relationship	107 (33.2%)
Single	92 (28.6%)
Divorced	6 (1.9%)
Separated	4 (1.2%)
Widowed	4 (1.2%)
Employment status:	
Full-time	146 (45.3%)
Part-time	69 (21.4%)
Unemployed	45 (14.0%)
Not in paid work	27 (8.4%)
Other	35 (10.9%)
Mental health treatment	
Currently	44 (13.7%)
In the past year	13 (4.0%)
In the past five years	24 (7.5%)
In the past ten years	14 (4.3%)
Outside the past ten years	9 (2.8%)
No	218 (67.7%)

committee concluded that approval from this entity was not required for the present investigation (ref. nr. 154909). The Norwegian Data Protection Service (NSD) was notified about the study (ref. nr. 638610).

### Measures

Current psychological need satisfaction was measured with the 24-item self-report inventory Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS; Van der Kaap-Deeder et al., 2020). Six four-item subscales assess the satisfaction and frustration of the needs for relatedness, competence, and autonomy, respectively. Items are answered on a five-point Likert scale from 1 (not at all) to 5 (completely true). Investigations into the BPNSFS have supported its reliability and six-dimensional structure (e.g., Heissel et al., 2018; Liga et al., 2020; Nishimura & Suzuki, 2016). In the present sample, the reliability coefficient omega ranged from 0.79 (autonomy dissatisfaction) to 0.91 (competence dissatisfaction) with a median of 0.85.

The Young Schema Questionnaire – Short Form 3 (YSQ-S3; Young, 2005) was used to assess 18 early maladaptive schemas and the four schema domains of disconnection/rejection (comprised of the emotional deprivation, social isolation/alienation, emotional inhibition, defectiveness/shame, mistrust/abuse, and negativity/pessimism early maladaptive schemas), impaired autonomy/performance (comprised of the dependence/incompetence, failure to achieve, subjugation, abandonment/instability, enmeshment, and vulnerability to harm or illness early maladaptive schemas), excessive responsibility and standards (comprised of the self-sacrifice, unrelenting standards, and punitiveness early maladaptive schemas), and impaired limits (comprised of the entitlement/grandiosity, approval-seeking, and insufficient self-control early maladaptive schemas) (Bach et al., 2018). The YSQ-S3 has 90 items that are rated on a six-point scale from 1 (“Completely untrue of me”) to 6 (“Describes me perfectly”). The questionnaire has shown satisfactory psychometric properties (Bach et al., 2017; Calvete et al., 2013). In the current sample, the reliability coefficient omega for the YSQ-S3 scales ranged from 0.66 (entitlement) to 0.92 (defectiveness/shame and social isolation) ( $Median=0.82$ ). The disconnection/rejection, impaired autonomy/performance, exaggerated standards, and impaired limits YSQ-S3 schema domain scales had omegas of 0.96, 0.95, 0.89, and 0.86, respectively.

The DSM-5 and ICD-11 personality traits were assessed with the Modified Personality Inventory for DSM-5 and ICD-11 – Brief Form Plus (PID5BF + M; Bach et al., 2020). The PID5BF + M is a shortened version of the Personality Inventory for DSM-5 (Krueger et al., 2012) with 36 items that measure the six trait domains of the DSM-5 alternative

model for personality disorders and ICD-11 (negative affectivity, detachment, psychoticism, antagonism, disinhibition, and anankastia). Items are rated on a four-point scale from 0 (very false or often false) to 3 (very true or often true). The scales showed satisfactory reliability (omega) in the current sample (negative affectivity: 0.89, detachment: 0.87, antagonism: 0.78, disinhibition: 0.82, psychoticism: 0.83, anankastia: 0.91).

Three validity questions from the Curran and Hauser (2019) study were included to identify and exclude inattentive participants. An affirmative answer to at least two of these questions was considered an invalid response to the survey.

## Procedure

The major steps of the study were as follows:

1. Data collection (see above).
2. Calculation of scales scores and descriptive statistics: Because all items had to be answered to proceed in the digital questionnaire, there was no missing data. For each scale, the scale item mean score was calculated. Descriptive statistics of the sample and the study measures were computed.
3. Correlation analysis: The associations of the YSQ-S3 and the PID5BF+M scales with the BPNSFS scales were examined using Pearson correlations. Following Cohen (1988), correlations of approximately 0.10, 0.30, and 0.50 were interpreted as small, medium, and large, respectively.
4. Linear regression analysis:
  - a. The six BPNSFS scales were regressed on the YSQ-S3 domain scales and the PID5BF+M scales in separate analyses.
  - b. The YSQ-S3 domain scales and the PID5BF+M scales were entered simultaneously to predict the BPNSFS scales in order to analyze the incremental validity of the YSQ-S3 domain scales and the PID5BF+M scales above each other in predicting the BPNSFS scales.
5. XGBoost analysis: The prediction of the BPNSFS scales from the YSQ-S3 domain scales and the PID5BF+M scales was further examined using a supervised machine learning approach. Machine learning methods are increasingly applied in psychological research to predict different outcomes (Rosenbusch et al., 2021) and have shown to be useful in the investigation of the relationship between personality constructs (Trognon et al., 2022). In the present study, the XGBoost algorithm (Chen & Guestrin, 2016) was utilized. XGBoost is widely used due to its efficiency and prediction accuracy (González et al., 2020). The algorithm is based on decision trees and iteratively adds new trees predicting the residuals of preceding trees (Chen & Guestrin, 2016). The XGBoost analyses included the following steps:
  - a. The data were split into training (70% of the sample) and testing sets (30% of the sample, stratified by gender).
  - b. The models were tuned using 10-fold cross-validation.
  - c. The best performing hyperparameter settings in terms of  $R^2$  were selected.
  - d. Variable importance plots were built to examine the most important predictors.
  - e. The performance of the models was evaluated on the testing sets.  $R^2$  and the root mean square error (RMSE) were used as accuracy metrics.

The statistical analyses were conducted in R (version 4.3.2; R Core Team, 2023). Scale reliabilities were calculated using the psych package (version 2.4.1; Revelle, 2024). To obtain descriptive statistics, bivariate correlations, and regression weights, the packages misty (version 0.6.1; Yanagida, 2024) and lm.beta (version 1.7-2; Behrend, 2023) were used. The R package tidymodels (version 1.1.1; Kuhn et al., 2020) and associated packages as well as xgboost (version 1.7.6.1; Chen et al., 2023) and vip (version 0.4.1; Greenwell & Boehmke, 2020), were used to tune and evaluate the different models and to visualize the results.

## Results

The means and standard deviations of the study variables and the correlations of the BPNSFS satisfaction and frustration scales with the YSQ-S3 domain and individual schema scales are shown in Table 2. Overall, the BPNSFS satisfaction scales were negatively correlated with the YSQ-S3 scales, and the BPNSFS frustration scales were positively associated with the YSQ-S3 scales. For the most part, the size of the correlations of the BPNSFS frustration scales with the YSQ-S3 scales exceeded the correlations of the BPNSFS satisfaction scales. On the YSQ-S3 domain level, the BPNSFS autonomy satisfaction and frustration scales were most highly correlated with the YSQ-S3 disconnection/rejection ( $r = -0.46$  and  $0.58$ ) and the YSQ-S3 impaired autonomy/performance scales ( $r = -0.39$  and  $0.55$ ). The BPNSFS competence satisfaction and frustration scales were most strongly associated

**Table 2** Descriptive statistics and bivariate correlations of YSQ-S3 and PID5BF + M scales with BPNSFS scales

	BPNSFS scales						
	M (SD)	Autonomy satisfaction ( <i>M</i> = 3.22, <i>SD</i> = 0.81)	Autonomy frustration ( <i>M</i> = 2.91, <i>SD</i> = 0.86)	Relatedness satisfaction ( <i>M</i> = 3.92, <i>SD</i> = 0.86)	Relatedness frustration ( <i>M</i> = 2.14, <i>SD</i> = 0.95)	Competence satisfaction ( <i>M</i> = 3.56, <i>SD</i> = 0.88)	Competence frustration ( <i>M</i> = 2.88, <i>SD</i> = 1.08)
<b>YSQ-S3 domain scales</b>							
Disconnection/rejection	2.78 (0.96)	−0.46***	0.58***	−0.59***	0.76***	−0.51***	0.70***
Impaired autonomy/performance	2.44 (0.85)	−0.39***	0.55***	−0.40***	0.67***	−0.63***	0.76***
Excessive responsibility	3.31 (0.78)	−0.09	0.36***	−0.06	0.31***	−0.10	0.44***
Impaired limits	2.81 (0.71)	−0.19	0.40***	−0.25***	0.39***	−0.24***	0.37***
<b>YSQ-S3 EMS scales</b>							
Emotional deprivation	2.28 (1.23)	−0.33***	0.35***	−0.56***	0.54***	−0.30***	0.39***
Abandonment	2.75 (1.29)	−0.30***	0.43***	−0.21***	0.53***	−0.44***	0.55***
Mistrust/abuse	2.92 (1.19)	−0.33***	0.53***	−0.44***	0.63***	−0.34***	0.53***
Social isolation	3.05 (1.29)	−0.41***	0.51***	−0.56***	0.70***	−0.49***	0.65***
Defectiveness	2.35 (1.18)	−0.41***	0.46***	−0.54***	0.69***	−0.56***	0.66***
Failure	2.65 (1.24)	−0.38***	0.42***	−0.38***	0.56***	−0.72***	0.77***
Dependence/incompetence	2.23 (0.93)	−0.27***	0.39***	−0.37***	0.52***	−0.60***	0.62***
Vulnerability to harm or illness	2.66 (1.11)	−0.35***	0.49***	−0.34***	0.57***	−0.44***	0.61***
Enmeshment	1.88 (0.88)	−0.16**	0.32***	−0.24***	0.36***	−0.26***	0.37***
Subjugation	2.50 (1.02)	−0.37***	0.53***	−0.39***	0.59***	−0.50***	0.63***
Self-sacrifice	3.48 (1.11)	−0.10	0.28***	0.07	0.15***	−0.06	0.25***
Emotional inhibition	2.87 (1.09)	−0.34***	0.45***	−0.44***	0.53***	−0.28***	0.48***
Unrelenting standards	3.65 (0.94)	−0.02	0.31***	0.00	0.22***	0.03	0.35***
Entitlement	2.51 (0.76)	0.03	0.20***	−0.14*	0.19***	0.17**	0.00
Insufficient self-control	3.03 (1.04)	−0.34***	0.39***	−0.33***	0.39***	−0.49***	0.49***
Approval-seeking	2.88 (1.01)	−0.06	0.28***	−0.07	0.28***	−0.13*	0.28***
Negativity/pessimism	3.19 (1.23)	−0.35***	0.49***	−0.32***	0.54***	−0.46***	0.65***
Punitiveness	2.80 (0.95)	−0.09	0.26***	−0.23***	0.37***	−0.21***	0.47***
<b>PID5BF + M trait domains</b>							
Negative affectivity	1.39 (0.75)	−0.29***	0.41***	−0.14*	0.42***	−0.42***	0.54***
Detachment	0.92 (0.62)	−0.46***	0.47***	−0.58***	0.56***	−0.42***	0.47***
Antagonism	0.74 (0.51)	−0.09	0.25***	−0.22***	0.24***	0.00	0.12*
Disinhibition	0.93 (0.58)	−0.26***	0.37***	−0.25***	0.40***	−0.33***	0.39***
Psychoticism	0.95 (0.62)	−0.21***	0.35***	−0.28***	0.42***	−0.24***	0.43***
Anankastia	1.16 (0.73)	−0.04	0.29***	−0.04	0.16**	0.00	0.21***

Note. *N* = 322. EMS = early maladaptive schema. \**p* < .05; \*\**p* < .01; \*\*\**p* < .001

with the YSQ-S3 impaired autonomy/performance domain ( $r = -0.63$  and  $0.76$ ) and the YSQ-S3 disconnection/rejection domain scales ( $r = -0.51$  and  $0.70$ ). The BNPSFS relatedness satisfaction and frustration scales were most highly correlated with the YSQ-S3 disconnection/rejection ( $r = -0.59$  and  $0.76$ ) and the YSQ-S3 impaired autonomy/performance ( $r = -0.40$  and  $0.67$ ) scales. With respect to the specific YSQ-S3 early maladaptive schema scales, the BNPSFS satisfaction scales were significantly negatively correlated and the BNPSFS frustration scales significantly positively correlated with most YSQ-S3 early maladaptive schema scales (Table 2). Deviating from this overall pattern, the YSQ-S3 entitlement scale was weakly, yet significantly at  $p < .01$ , positively correlated with BNPSFS competence satisfaction ( $r = 0.17$ ). BNPSFS autonomy satisfaction was most strongly correlated with the YSQ-S3 social isolation ( $r = -0.41$ ), defectiveness ( $r = -0.41$ ), and failure ( $r = -0.38$ ) scales, BNPSFS autonomy frustration with the YSQ-S3 subjugation ( $r = 0.53$ ), mistrust ( $r = 0.53$ ), and social isolation ( $r = 0.51$ ) scales, BNPSFS relatedness satisfaction with the YSQ-S3 emotional deprivation ( $r = -0.56$ ), social isolation ( $r = -0.56$ ), and defectiveness ( $r = -0.54$ ) scales, BNPSFS relatedness frustration with the YSQ-S3 social isolation ( $r = 0.70$ ), defectiveness ( $r = 0.69$ ), and mistrust ( $r = 0.63$ ) scales, BNPSFS competence satisfaction with the YSQ-S3 failure ( $r = -0.72$ ), dependence/incompetence ( $r = -0.60$ ), and defectiveness ( $r = -0.56$ ) scales, and BNPSFS competence frustration with the YSQ-S3 failure ( $r = 0.77$ ), defectiveness ( $r = 0.66$ ), social isolation, and negativity/pessimism (both

$r$ 's =  $0.65$ ) scales. However, beyond these scales, several other YSQ-S3 scales showed correlations with BNPSFS scales with large effect sizes (i.e.,  $r \geq 0.50$ ), especially with the BNPSFS relatedness and competence frustration scales (Table 2). Taken together, the BNPSFS satisfaction and frustration scales showed medium-sized to large correlations with the YSQ-S3 scales, especially the YSQ-S3 disconnection/rejection and YSQ-S3 impaired autonomy/performance domains.

The correlations of the BNPSFS scales with the PID5BF + M scales are also displayed in Table 2. Overall, the PID5BF + M scales were negatively correlated with the BNPSFS satisfaction scales and positively correlated with the BNPSFS frustration scales. The BNPSFS autonomy, relatedness, and competence satisfaction and frustration scales were most strongly associated with PID5BF + M detachment (autonomy:  $r = -0.46$  and  $0.47$ ; relatedness:  $r = -0.58$  and  $0.56$ ; competence:  $r = -0.42$  and  $0.47$ ) and negative affectivity (autonomy:  $r = -0.29$  and  $0.41$ ; relatedness:  $r = -0.14$  and  $0.42$ ; competence:  $r = -0.42$  and  $0.54$ ). In addition, PID5BF + M disinhibition, psychoticism, and anankastia showed medium-sized to large correlations with several BNPSFS satisfaction and frustration scales (Table 2). Thus, considerable associations between the BNPSFS and the PID5BF + M scales were found, with the PID5BF + M detachment and negative affectivity scales showing the largest correlations with the BNPSFS scales.

The results of the regression analyses predicting the BNPSFS scales from the YSQ-S3 domain and the PID5BF + M scales are shown in Table 3. The YSQ-S3

**Table 3** Standardized regression weights ( $\beta$ ) regressing BNPSFS scales on YSQ-S3 and PID5BF + M domain scales

	Autonomy satisfaction	Autonomy frustration	Relatedness satisfaction	Relatedness frustration	Competence satisfaction	Competence frustration
<u>YSQ-S3 domain scales</u>						
Disconnection/rejection	-0.48***	0.36***	-0.86***	0.67***	-0.13	0.27***
Impaired autonomy/performance	-0.18*	0.17*	0.08	0.23***	-0.80***	0.56***
Excessive responsibility	0.25***	0.03	0.36***	-0.19***	0.38***	0.00
Impaired limits	0.06	0.13*	0.02	0.01	0.12**	-0.04
adj. $R^2$	0.25	0.36	0.45	0.60	0.50	0.59
<u>PID5BF + M scales</u>						
Negative affectivity	-0.24***	0.23***	-0.02	0.28***	-0.39***	0.42***
Detachment	-0.44***	0.32***	-0.57***	0.43***	-0.36***	0.31***
Antagonism	0.02	0.08	-0.09	0.06	0.14**	-0.07
Disinhibition	-0.03	0.11*	0.02	0.06	-0.11	0.06
Psychoticism	0.02	0.02	-0.04	0.12*	-0.02	0.17**
Anankastia	0.15**	0.09	0.13*	-0.11*	0.23***	-0.08
adj. $R^2$	0.25	0.33	0.35	0.42	0.34	0.44
Incremental variance ( $\Delta$ adj. $R^2$ ) explained by YSQ-S3 domains above PID5BF + M traits	0.03**	0.06***	0.14***	0.18***	0.18***	0.16***
Incremental variance ( $\Delta$ adj. $R^2$ ) explained by PID5BF + M traits above YSQ-S3 domains	0.03**	0.03***	0.04***	0.01	0.01*	0.00

Note.  $N = 322$ . \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

domain scales explained between 25% (autonomy satisfaction) and 60% (relatedness frustration) of the variance in the BPNSFS scales (*Median* = 47.5%). YSQ-3 disconnection/rejection was the strongest individual predictor of the BPNSFS autonomy and relatedness satisfaction and frustration scales, and YSQ-S3 impaired autonomy/performance was the strongest individual predictor of the BPNSFS competence satisfaction and frustration scales (Table 3). As displayed in Table 3, the PID5BF + M scales explained between 25% (autonomy satisfaction) and 42% (relatedness dissatisfaction) of the variance in the BPNSFS scales (*Median* = 34.5%). PID5BF + M detachment was the strongest individual predictor of the BPNSFS autonomy and relatedness satisfaction and frustration scales, and PID5BF + M negative affectivity was the strongest individual predictor of the BPNSFS competence satisfaction and frustration scales (Table 3). The YSQ-S3 domain scales explained on average 12.5% of the variance in the BPNSFS scales above the PID5BF + M scales. The PID5BF + M scales explained on average 2% of the variance in the BPNSFS scales beyond the YSQ-S3 domain scales (Table 3). In summary, the YSQ-S3 domain scales and the PID5BF + M scales explained a substantial proportion of the variance in the BPNSFS scales. While the predictive power of the YSQ-S3 domain scales and the PID5BF + M scales was equally high for BPNSFS autonomy satisfaction and frustration, the YSQ-S3 domain scales explained a significantly higher proportion of the variance in the BPNSFS relatedness and competence satisfaction and frustration scales than the PID5BF + M scales, Table 4 displays the results predicting the BPNSFS scales from the YSQ-S3 domain scales and the PID5BF + M scales based on the XGBoost algorithm. The models using the YSQ-S3 domain scales as predictors explained between 16% (autonomy satisfaction) and 60% (competence frustration) of the variance in the BPNSFS scales (*Median* = 39%). The variable

importance plots (see Supplementary Material) showed that YSQ-S3 impaired autonomy/performance was the most important predictor of the BPNSFS autonomy satisfaction, competence satisfaction, and competence frustration scales. YSQ-S3 disconnection/rejection was the most important predictor of the BPNSFS autonomy frustration, relatedness satisfaction, and relatedness frustration scales. The models using the PID5BF + M scales as predictors explained between 19% (autonomy satisfaction) and 52% (competence frustration) of the variance in the BPNSFS scales (*Median* = 33.5%). The variable importance plots showed that PID5BF + M detachment was the most important predictor of the BPNSFS autonomy satisfaction, autonomy frustration, relatedness satisfaction, and relatedness frustration scales, whereas PID5BF + M negative affectivity was the most important predictor of the BPNSFS competence satisfaction and competence frustration scales (Supplementary Material). The PID5BF + M scales explained more variance in the BPNSFS autonomy satisfaction and autonomy frustration scales than the YSQ-S3 domain scales. The YSQ-S3 domain scales showed higher  $R^2$ -values for the BPNSFS relatedness frustration, competence satisfaction, and competence frustration scales. There was no difference for the BPNSFS relatedness satisfaction scale (Table 4). Including both the YSQ-S3 domain scales and the PID5BF + M scales in the models improved the prediction of the scores of the BPNSFS autonomy satisfaction, relatedness satisfaction, and the competence satisfaction scales beyond the YSQ-S3 domain scales and the PID5BF + M scales individually (Table 4). In all models, a YSQ-S3 domain scale was the most important predictor (Supplementary Material). Overall, the results of the XGBoost analyses were consistent with the findings from the linear regression analyses, showing moderate to strong predictive power of the YSQ-S3 domain scales and the PID5BF + M scales for the BPNSFS scales.

**Table 4** Prediction of the BPNSFS scales from the YSQ-S3 domain scales and the PID5BF + M scales using the XGBoost algorithm

	Autonomy satisfaction	Autonomy frustration	Relatedness satisfaction	Relatedness frustration	Competence satisfaction	Competence frustration
YSQ-S3 domain scales						
$R^2$	0.16	0.29	0.30	0.57	0.48	0.60
RMSE	0.79	0.81	3.41	0.59	0.59	2.57
PID5BF + M scales						
$R^2$	0.19	0.36	0.30	0.40	0.31	0.52
RMSE	0.93	0.80	1.01	0.70	0.68	0.71
YSQ-S3 domain scales and PID5BF + M scales						
$R^2$	0.21	0.35	0.38	0.56	0.53	0.56
RMSE	1.70	2.44	0.71	0.60	0.56	2.32

Note RMSE = root mean square error



## Discussion

The present study sought to investigate the associations of negative cognitions about oneself and one's relationships with others (early maladaptive schemas) and DSM-5 and ICD-11 personality traits with the satisfaction and frustration of basic psychological needs. To this aim, self-report measures of psychological need satisfaction, early maladaptive schemas, and pathological personality traits were administered in a community sample. The results showed strong negative relationships of early maladaptive schemas and pathological personality traits with the satisfaction of the needs for autonomy, relatedness, and competence. Low satisfaction and frustration of the needs for autonomy and relatedness had their highest correlations with the disconnection/rejection schema domain, and low satisfaction and frustration of the need for competence were most strongly associated with the impaired autonomy/performance schema domain. Psychological need satisfaction and frustration were primarily related to the pathological personality traits of negative affectivity and detachment. The schema domains predicted the satisfaction and frustration of the psychological needs for relatedness and competence above pathological personality traits.

As expected from theory and the conceptualization of early maladaptive schemas in schema therapy (Roediger et al., 2018; Young et al., 2003) and in line with previous research (Phillips et al., 2019), early maladaptive schemas and low satisfaction and frustration of the basic psychological needs proposed in Self-Determination Theory were closely connected in the present study with a number of medium-sized and large correlations between the YSQ-S3 and the BPNSFS scales. The linear regression and the XGBoost analyses showed that the YSQ-S3 domain scales explained a large proportion of the variance in the BPNSFS scales. In accordance with the hypotheses, low satisfaction and frustration of the needs for relatedness and competence were primarily associated with the disconnection/rejection and the impaired autonomy/performance schema domains, respectively. These findings suggest that low relatedness need satisfaction can be linked to early maladaptive schemas involving expectations that one's needs for close relationships and social belonging will not be met. Further, low competence need satisfaction can be accompanied by beliefs that one is unable to function independently and perform successfully. On the other hand, contrary to expectations, although low satisfaction and frustration of the need for autonomy were significantly correlated with the impaired autonomy/performance schema domain, the BPNSFS autonomy scales showed similar high correlations with the YSQ-S3 disconnection/rejection scale than the YSQ-S3 impaired autonomy/performance scale. In

the linear regression analysis, the YSQ-S3 disconnection/rejection scale emerged as a stronger individual predictor of the BPNSFS autonomy satisfaction and frustration scales than the YSQ-S3 impaired autonomy/performance scale. Similarly, in the XGBoost analyses, the YSQ-S3 disconnection and rejection domain emerged as the most important predictor of the BPNSFS autonomy frustration scale. The examination of the associations of psychological need satisfaction and frustration with the specific early maladaptive schemas allows a more fine-grained analysis of the relationships between early maladaptive schemas and the satisfaction of the psychological needs proposed in Self-Determination Theory and can shed light on the unexpected findings regarding the association between the satisfaction/frustration of the need for autonomy and the early maladaptive schema domains. Consistent with the results of the Phillips et al. (2019) study, the emotional deprivation, mistrust/abuse, social isolation, and defectiveness/shame early maladaptive schemas showed especially high associations with relatedness need satisfaction. That is, low relatedness need satisfaction can be tied to beliefs that one's needs for emotional support from others will not be met (emotional deprivation), that one is defective and unlovable (defectiveness/shame), that others cannot be trusted (mistrust/abuse), and that one is fundamentally different from other people and does not belong to a social group (social isolation). As in the Phillips et al. (2019) study, low satisfaction and frustration of the need for competence were most highly correlated with the failure schema, i.e., the belief that one will fail and perform poorly compared to one's peers. In addition, low competence need satisfaction showed strong relationships with the negative/pessimism (an exaggerated focus on the negative aspects of life), social isolation, and defectiveness/shame early maladaptive schemas. While the negative association of competence need satisfaction with the failure and negativity/pessimism schemas are conceptually meaningful, the reasons for the relationships with the social isolation and defectiveness/shame schemas are less obvious. Similarly, the associations of low autonomy need satisfaction with the subjugation early maladaptive schema (the belief that one has to yield control to others) are sound and in line with previous findings (Phillips et al., 2019). However, in the present study, low autonomy need satisfaction was also highly correlated with the social isolation and defectiveness/shame schemas. These early maladaptive schemas belong to the disconnection/rejection schema domain, which may explain why the disconnection/rejection schema domain showed a somewhat stronger association with autonomy need satisfaction than the impaired autonomy/performance schema domain in the linear regression analysis. The relationships of the defectiveness/shame and social isolation schemas with the satisfaction and frustration of the needs for competence

and autonomy suggest that the beliefs that one is defective and socially excluded interfere not only with the satisfaction of the need for relatedness but also with one's sense of autonomy and competence. Since the social isolation and defectiveness/shame schemas are among the early maladaptive schemas that are most strongly connected with mental disorders (Thimm & Chang, 2022), it can also be speculated that their associations with low satisfaction and frustration of the needs for autonomy and competence are mediated by psychopathology, e.g., depression. This possibility should be investigated in future research.

In line with proposals on the essential role of personality traits for accomplishing goals and satisfying psychological needs (e.g., DeYoung, 2015; DeYoung & Krueger, 2018a; Dweck, 2017; McCabe & Fleeson, 2016), strong associations of pathological personality traits with psychological need satisfaction and frustration were found in all statistical analyses. As hypothesized, the DSM-5 and ICD-11 personality traits were significantly correlated with low psychological need satisfaction and high psychological need frustration, especially negative affectivity and detachment. In addition, disinhibition, psychoticism, and anankastia exhibited substantial associations with psychological need satisfaction. These broad relationships correspond to findings obtained in studies on normal personality traits (Vukasović Hlupić et al., 2022). However, no positive associations of the DSM-5 and ICD-11 personality traits with psychological need satisfaction were found in the present study, and the effect sizes of the correlations with psychological need satisfaction and frustration were higher than those reported for normal personality traits in the Vukasović Hlupić et al. (2022) meta-analysis, as one could expect since pathological personality are more extreme than normal personality traits and, by definition, dysfunctional. Accordingly, the DSM-5 and ICD-11 personality traits explained more variance in psychological need satisfaction than normal personality traits in previous studies (cf. Bratko et al., 2022). The prominent role of negative affectivity and detachment is consistent with the results for neuroticism and extraversion found in studies on normal personality traits (Vukasović Hlupić et al., 2022). Neuroticism and introversion are strongly related to well-being and mental health (Ozer & Benet-Martínez, 2006; Soto, 2019; Widiger & Oltmanns, 2017), and it is therefore not surprising that negative affectivity and detachment are highly associated with low satisfaction and the frustration of basic psychological needs.

When comparing the predictive power of early maladaptive schemas and pathological personality traits in the prediction of current psychological need satisfaction and frustration, the results showed that the YSQ-S3 domain scales explained considerably more variance in the BNPSFS relatedness frustration and the competence satisfaction and

frustration scales beyond the PID5BF + M scales than vice versa. This suggests a closer conceptual relationship of these psychological needs with early maladaptive schemas than pathological personality traits. Different origins of the concept of early maladaptive schemas and the DSM-5 and ICD-11 personality traits may account for this result. Early maladaptive schemas were defined based on a theory of critical psychological needs in childhood (Young et al., 2003), while the DSM-5 and ICD-11 personality traits represent an extension of the lexical and factor analytical tradition to identify the major dimensions of normal personality traits into the realm of psychopathology (Krueger & Markon, 2014). From a Cybernetic Big Five Theory perspective, early maladaptive schemas can be considered characteristic adaptations, i.e., learned interpretations that were acquired in response to life experiences (DeYoung, 2015; DeYoung & Krueger, 2018a). Cybernetic Big Five Theory posits that pathological personality traits are typically linked to unsuccessful goal attainment, but that they exert their influence through the failure of characteristic adaptations (DeYoung & Krueger, 2018a). Therefore, characteristic adaptations are hypothesized to be more central to the nonattainment of psychological goals than pathological personality traits (DeYoung & Krueger, 2018a), which may explain why early maladaptive schemas showed stronger relationships with the satisfaction and frustration of some psychological needs than pathological personality traits in the present investigation.

The findings of the present study add to the understanding of current psychological need satisfaction. Given the importance of psychological need satisfaction for an individual's well-being (Ryan & Deci, 2017), clinicians should be aware of the substantial relationships of early maladaptive schemas and pathological personality traits with an individual's unsatisfied or frustrated basic psychological needs. Unmet psychological needs can be connected with underlying early maladaptive schemas or DSM-5 and ICD-11 personality traits. On the other hand, individuals with early maladaptive schemas and pathological personality traits are likely to experience psychological need frustration. Psychological interventions have been shown to be effective in modifying early maladaptive schemas (Dozois et al., 2014; Taylor et al., 2017; Wegener et al., 2013) and personality traits (Roberts et al., 2017; Sauer-Zavala et al., 2023), which may increase psychological need satisfaction. Self-Determination Theory emphasizes the role of promoting autonomy for treatment response and maintenance of treatment gains (Ryan & Deci, 2008). Autonomy satisfaction is further suggested to facilitate the satisfaction of relatedness and competence needs (Ryan & Deci, 2017).

When interpreting the findings of the current study, some limitations must be considered. First, no direction of

causality can be inferred due to the cross-sectional design of the study. In other words, it is not possible to determine whether early maladaptive schemas and pathological personality traits influence the satisfaction and frustration of basic psychological needs or whether frustrated psychological needs cause early maladaptive schemas or pathological personality traits. Furthermore, since all constructs in the study were measured using self-report instruments, the correlations are likely inflated due to shared method variance. Recently, the BPNSFS has been criticized for not adequately assessing the frustration of psychological needs (Murphy et al., 2023). Murphy et al. (2023) argue that the items in the BPNSFS that are supposed to measure need frustration assess dissatisfaction of psychological needs rather than active thwarting of needs. A final shortcoming of the current study is that only the trait part of the DSM-5 alternative model for personality disorders and the ICD-11 model for personality disorders was examined. The role of the severity of personality pathology in terms of impaired self- and interpersonal functioning for psychological need satisfaction needs further investigation.

Despite these limitations, it can be concluded that early maladaptive schemas and the DSM-5 and ICD-11 pathological personality traits show strong associations with the satisfaction of the needs for autonomy, relatedness, and competence.

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**Data availability** The study data are available from the corresponding author upon reasonable request.

## Declarations

**Ethical approval** Ethical approval was applied for from the Regional Committee for Medical and Health Research. The committee concluded that approval from this entity was not required for the present investigation (ref. nr. 154909). The Norwegian Data Protection Service (NSD) was notified about the study (ref. nr. 638610).

**Competing interests** The author has no competing interests to declare.

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