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Traits and Ties:

Sex-Differentiated Associations Between Maladaptive Personality Traits and Egocentric Social Networks

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Abstract

Background: Interpersonal dysfunction is a core feature of personality disorders (PDs), yet it remains poorly understood how maladaptive personality traits as defined by the Alternative Model of Personality Disorders (AMPD) of the DSM-5 relate to an individual's most important social relationships. To date, no study has applied an egocentric social network (eSN) approach that simultaneously captures the unique contributions of all five AMPD trait domains and tests the moderating role of sex.

Methods: In a cross-sectional online survey, 303 adults (152 men, 151 women; aged 25–45) recruited via Prolific UK completed the Personality Inventory for DSM-5 Brief Form Plus Modified (PID-5BF+M) and named the ten most important people in their lives. Composition (alter attributes, social roles, ego–alter tie quality) and structure (density, centralization) of their eSN were quantified. Hierarchical regression analyses tested the unique contribution of the five maladaptive trait domains (Model 1) and the moderating role of sex (Model 2).

Results: Maladaptive traits were differentially associated with eSN features. Detachment was the most pervasive predictor, relating to a lower likelihood of including a romantic partner, lower importance, closeness, perceived support, contact frequency, satisfaction, and reduced network density. Antagonism predicted shorter relationship duration, while psychoticism predicted more frequent conflicts. Sex moderated several effects, particularly for disinhibition and psychoticism, including their associations with perceived support and the presence of work contacts in the network.

Conclusions: Maladaptive personality traits have differential, partly sex-dependent, unique contributions to how individuals appraise their social networks. Egocentric network analysis is a promising approach for identifying personalised targets of interpersonal

functioning in personality pathology. These trait-specific profiles may inform sex-sensitive assessment and intervention planning in clinical practice.

Keywords: personality disorders, Alternative Model of Personality Disorders, maladaptive personality traits, egocentric social networks, interpersonal functioning, sex

Traits and Ties:
Sex-Differentiated Associations Between Maladaptive Personality Traits and Egocentric Social Networks

1 Background

Personality disorders (PDs) affect approximately 7.8% of the global population [1] and place a considerable burden on individuals and society. This burden encompasses not only emotional distress and social difficulties, but also high economic costs as, for example, a high utilization of healthcare services including emergency care in borderline personality disorder (BPD) [2]. PDs are characterized by enduring maladaptive behaviors and internal experiences that deviate from cultural expectations, causing significant impairment across various life domains [3, 4]. Interpersonal dysfunction is widely recognized as a core feature of PD manifesting in difficulties in forming and maintaining social relationships, issues with intimacy, and loneliness [5, 6]. PDs have traditionally been diagnosed using categorical approaches such as in the International Classification of Diseases (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders (DSM) [7, 8]. However, these models have been criticized for their rigidity, symptom overlap of categories, and subjective criteria [9, 10]. Dimensional models have been proposed to overcome these shortcomings and have been introduced in the ICD-11 [11] and the Alternative Model of Personality Disorders

(AMPD) of the DSM-5 [3, 9, 10, 12–14]. The AMPD defines a PD based on the severity of impairments in personality functioning. These impairments are conditional to the diagnosis of PD (criterion A). This is complemented by capturing the manifestations of personality pathology by the assessment of maladaptive personality traits (criterion B) [15]. So far, studies are sparse that investigate whether maladaptive personality traits are differentially associated with features of the individual's social relationships and whether these associations are influenced by the individual's sex. Particularly, studies using an egocentric social network approach are missing that capture how maladaptive personality traits are associated to an individual's view on their most important social relationships in the context of the composition and structure of their social network (SN) and investigate the moderating influence of an individual's sex.

1.1 Maladaptive personality traits in the Alternative Model of Personality Disorders

Criterion B of the AMPD specifies maladaptive personality traits in five domains, that is, negative affectivity, detachment, antagonism, disinhibition, and psychoticism. These traits are postulated to represent maladaptive extensions of the predominant framework in contemporary personality psychology, that is, the Five-Factor Model (FFM) of personality [16], offering a transdiagnostic dimensional perspective on personality pathology [17]. Four of the AMPD domains have a close conceptual resemblance to FFM domains, that is, neuroticism corresponds to AMPD negative affectivity, extraversion to AMPD detachment, agreeableness to AMPD antagonism, and conscientiousness to AMPD disinhibition. In contrast, the association between openness to experience and AMPD psychoticism has been questioned [18], for critical discussion see [19]. In line with personality trait models, the AMPD personality trait domains refer to ways of thinking, feeling, and behaving that are conceptualised as dynamic constructs allowing for a differential responsiveness to situations

and contexts. Nevertheless, they are regarded as considerably more stable than the symptom severities characterizing psychopathology in categorical approaches to PDs [20].

Sex differences in the expression of these traits are recognized, but are not fully delineated. A growing body of evidence highlights notable sex differences in maladaptive personality traits such as higher detachment, antagonism, and disinhibition in men linked with externalizing psychopathology [21–23] or higher Negative Affectivity in women linked with the prevalence of internalizing disorders [23]. Taken together, sex differences in the expression of maladaptive traits are increasingly recognized, yet their implications for interpersonal functioning remain insufficiently understood and warrant further investigation.

1.2 Interpersonal functioning in PD

Beyond self-functioning, interpersonal functioning is part of criterion A of the AMPD constituting one of the core domains of psychopathology in PD. The prominence of interpersonal difficulties in PD has even led to the proposal to reconceptualise PD as 'interpersonal disorders' based on contemporary integrative interpersonal theory (see e.g. [24, 25]). However, this approach has been questioned by researchers, who argue that the trait model implemented in criterion B of the AMPD is even superior, as it includes additional facets of PD while similarly predicting dynamic processes of psychopathology (see e.g. [26]). Independently of this ongoing theoretical debate about the best conceptualisation of PD, there is consensus that interpersonal impairments are closely related to PD. For example, Tyrer et al. [27] showed that lower personality functioning is related to more severe social dysfunction assessed as impairments in vocational functioning, difficulties in building and keeping close relationships and feeling lonely. Maladaptive personality traits have been linked to interpersonal impairments indicated by the level of loneliness for all five AMPD traits with the strongest association for detachment followed by negative affectivity [28]. Moreover,

lower levels of perceived social support were associated with higher levels of antagonism in individuals diagnosed with BPD, as well as detachment and psychoticism in a non-clinical control group [29].

1.3 Egocentric networks and Personality Disorders

The features of an individual's social relationships considered in the following are neither conceptualised as predictors nor as consequences of interpersonal impairments, but as their correlates, that is, as indicators of how impairments in interpersonal functioning are reflected in the way individuals appraise the people who are most important to them. One approach to capturing an individual's social relationships is analysing egocentric social networks (eSNs), also known as personal SNs. This analysis provides an individualized approach to social functioning since an individual (ego) assesses their relationships with the most important people (alters) in their social lives without a restriction to a specific social domain such as romantic partners, family members or peers. The composition of an eSN refers to the features of the alters and quantitative or qualitative features of the ego-alter relationship (ties). The structure of an eSN is inferred from the ego's assessment of alter-alter ties and allows to calculate features of eSNs, such as its cohesion or centralization.

So far, studies using the approach of eSN analysis in PD are sparse and focus on the eSN's composition. Most of these studies investigated eSNs in individuals either diagnosed with BPD or characterized by the level of BPD features [30–36]. Other PDs are only sparsely investigated (e.g. [31, 37, 38]). Most studies in BPD revealed small eSNs with negative relationships and frequent conflicts, and a lack of positive relationships in regard to social support and closeness. To our knowledge, studies investigating the association between maladaptive personality traits and eSN features have not been conducted to date. The most closely related study examined the link between maladaptive personality traits of the AMPD

and relationships with parents and a close friend [39]. Pairwise correlation analyses revealed differential associations of the quality of relationships, but not the frequency of contacts, with all maladaptive traits. For example, weaker relationship strength with parents and a close other was related with higher negative affectivity, higher detachment, and higher psychoticism, while higher discomfort to a close other was associated with higher antagonism and higher disinhibition. However, these findings are based on pairwise associations preventing the identification of unique contributions of single traits. An additional canonical correlation approach supported a differential association between combinations of traits with features of the relationships. However, the authors included a measure of personality functioning (AMPD criterion A) beyond the traits. The high correlations between measures of criterion A and B [40] restrict conclusions about the relevance of the different maladaptive personality traits independently of the level of personality functioning.

1.4 Aim of the current study

In the present study, we investigate whether AMPD maladaptive personality traits are differentially associated with the composition and structure of an individual's eSN when taking the interdependencies between traits into account. Additionally, we explored whether the associations between maladaptive traits and appraisals of social relationships are moderated by sex, that is, whether these associations differ between men and women. The nature of our study is primarily exploratory. However, based on previous findings, we hypothesized that, 1) higher levels of maladaptive personality traits will predict variability in the evaluations of relationships. Based upon previous studies, we expected that 2) each of the traits will contribute uniquely and differentially to variability in eSNs features.

2 Methods

The data for this cross-sectional study were collected between February 29 and March 2, 2024, via an online survey administered through REDCap [41] as part of a larger research project. The study was approved by the Research Ethics Board II of the Medical Faculty Mannheim of Heidelberg University, Germany.

2.1 Participants

Participants were recruited via the online research platform Prolific in the U.K. with age between 25 and 45 years as inclusion criterion. A sample size of 300 participants (50% men and women) was aimed for due to restricted financial resources. Initially, 306 individuals completed the study. Three participants were excluded because they named less than the requested 10 alters in their eSN. Additionally, data quality checks were performed based on outlier in completion times for assessing their eSN. Participants with durations below the 5th percentile were flagged as potential speeders. Since the rating scores of these participants did not emerge as outliers in the analyses, they were retained in the analyses. All participants provided informed consent and confirmed their commitment to providing thoughtful answers prior to completing the survey.

2.1.1 Maladaptive Personality Traits and Level of Personality Functioning

Maladaptive personality traits were assessed with the modified Personality Inventory for DSM-5 Brief Form Plus (PID-5BF+M [42]). The PID-5BF+M is a 36-item self-report questionnaire aligned to the AMPD. Items are rated on a 4-point Likert scale (0 = very false to 3 = very true). The questionnaire provides subscale scores for the maladaptive personality traits domains. Due to criticism of the psychometric properties of the anankastia domain [42, 43], we focussed our analyses on the five trait domains negative affectivity, detachment, antagonism, disinhibition, and psychoticism. For each trait domain the subscale score is the

192 average of 6 items with higher scores indicating a higher level of maladaptive traits. For these
193 five domains, the PID-5BF+M has demonstrated good psychometric properties, including a
194 stable hierarchical factor structure and good internal consistency across clinical and non-
195 clinical samples at the domain level (McDonald's ω = .70–.79 [43]). In the present study,
196 internal consistency was good across all five trait domains (Cronbach's α = .741–.824;
197 McDonald's ω = .750–.826, see supplementary material Table S1).
198 Additionally to the maladaptive traits, we further characterize the sample in regard to
199 the level of personality functioning with the Level of Personality Functioning Scale–Brief
200 Form 2.0 (LPFS-BF 2.0 [44]). The LPFS-BF is a self-report questionnaire with 12 items each
201 rated on a 4 point Likert scale (1-4). The total score is the sum of all items. It ranges from 12
202 to 48 with higher scores indicating stronger impairments of personality functioning. In the
203 present study, internal consistency was excellent for the total score and good for the self- and
204 interpersonal functioning sub-scales (Cronbach's α = .828–.911; McDonald's ω = .831–.912,
205 see supplementary material Table S1).
206
207 **2.1.2 Egocentric social network**

208 Participants (egos) were asked to name the ten people (alters) who had been most
209 important in their lives during the past six months. Participants characterized each alter (e.g.,
210 age, gender, social domain) and different facets of their relationship. Additionally, they rated
211 the closeness between pairs of alters (alter-alter ties) at the end of the survey. All ratings were
212 done on a 5 point Likert-scale (1-5) corresponding to an eSN approach with weighted ties
213 [45].

214 The features of the eSN's composition were derived on a network level by
215 aggregating the ratings of alter's attributes and ego-alter tie attributes across alters. In more

detail, the alter attributes included assessments of the alters' age and sex used to quantify the evenness between the alters (heterogeneity) and the egos and their alters (heterophily) in the eSN. Scores range between 0 and 1 with 0 indicating absolute homophily/homogeneity and higher scores a SN perfectly balanced regarding the similarity between ego and alters, and alters in regard to age or sex [46, 47]. Participants characterized their alters' social role in 18 different categories consolidated into the six broader categories romantic partner, family (parent, parent-in-law, sibling, grandparent, child, grandchild, and other family members such as uncles, aunts, nieces, or nephews), friends, coworkers (colleagues at work, boss at workplace), healthcare professionals, and other acquaintances (former partner, acquaintances from hobbies/leisure activities/clubs, roommate, neighbour, acquaintance met through illness e.g. at the hospital, and other). For each of these categories, we quantified the number of alters. The ratings of ego-alter tie attributes covered interaction features (the formal characteristics of the relationship, that is, the importance, duration, break-ups, contact frequency, conflict frequency) and positive functional-affective features (closeness, social support, as well as the ego's satisfaction with the closeness, received support and the contact frequency).

The features of the eSN structure were quantified based on the participants' ratings of the closeness of alter-alter ties in two complementary measures, that is, network density and degree centralization [48]. While network density refers to the cohesion within the eSN, degree centralisation describes the extent to which the cohesion is organized around particular alters. Table 1 summarises the assessed eSN characteristics. For further information on the wording of the items and response options, see the REDCap survey template provided as supplementary material.

Table 1

Descriptive Statistics of Egocentric Social Network Variables (Total Sample)

Variable	N	*M*	*Mdn*	*SD*	Range	*P25*	*P75*
Composition of eSN: Sociodemographic Alter Attributes							
age heterogeneity	303	1.00	1.09	0.38	0.00–1.70	0.80	1.28
sex heterogeneity	303	0.59	0.67	0.15	0.00–0.71	0.61	0.67
age heterophily	303	0.83	0.88	0.23	0.00–1.00	0.72	0.97
sex heterophily	303	0.85	0.97	0.21	0.00–1.00	0.88	0.97
Composition of eSN: Social Roles							
Partner	303	0.06	0.10	0.05	0.00–0.17	0.00	0.10
Family	303	0.35	0.30	0.21	0.00–1.00	0.20	0.50
Friends	303	0.37	0.36	0.22	0.00–1.00	0.20	0.50
Work colleagues	303	0.12	0.10	0.15	0.00–1.00	0.00	0.20
Healthcare	303	0.00	0.00	0.02	0.00–0.20	0.00	0.00
Other acquaintances	303	0.10	0.00	0.14	0.00–0.90	0.00	0.20
Composition of eSN: Formal Interaction Features of Ego-Alter Tie							
Importance	303	4.04	4.10	0.63	1.00–5.00	3.70	4.50
Relationship duration	303	5.45	5.50	0.69	2.00–7.00	5.00	6.00
Stability	303	1.17	1.00	0.27	1.00–2.60	1.00	1.20
Contact frequency	303	2.20	2.10	0.56	1.00–4.30	1.80	2.50
Conflicts	303	1.74	1.60	0.58	1.00–5.00	1.30	2.05
Composition of eSN: Positive Emotional Quality of Ego-Alter Tie							
Closeness	303	3.63	3.60	0.73	1.00–5.00	3.20	4.10
Social support	303	4.15	4.20	0.73	1.80–5.00	3.70	4.85
Closeness satisfaction	303	4.05	4.10	0.79	1.00–5.00	3.60	4.75
Support satisfaction	303	3.98	4.00	0.83	1.00–5.00	3.40	4.70
Frequency satisfaction	303	4.13	4.10	0.75	1.00–5.00	3.70	4.80
Structure of eSN							
Network density	303	0.56	0.53	0.25	0.00–1.00	0.38	0.73
Degree centralisation	303	0.31	0.28	0.19	0.00–0.94	0.17	0.44

Note. eSN = egocentric social network. Social role proportions sum to 1 within each ego network. Stability values > 1.00 indicate higher network instability. *P*25 and *P*75 denote the 25th and 75th percentiles, respectively. M = mean, Mdn = median, SD = standard deviation. All statistics refer to the distribution across participants of scores that were first aggregated within each ego network across the ten alters. Accordingly, M denotes the mean evenness index (0–1) for the sociodemographic alter attributes, the mean proportion of alters belonging to the respective category for the social roles, and the mean rating across alters on the 5-point response scale for the features of the ego–alter tie; for the structural measures, M denotes the mean network density and degree centralisation (0–1).

2.1.3 Statistical Analysis

Rating scores of the eSN items of the RedCap survey were extracted and aggregated on the network level for each participant using Matlab Version 2024a (The MathWorks Inc. Natick, Massachusetts).

Statistical analyses were conducted using the R environment for statistical computing (version 4.4.1). Analyses were run with the R packages betareg (version 3.2-4), pscl (version 1.5.9), sandwich (version 3.1-1), lmtest (version 0.9-40), car (version 3.1-3), and psych (version 2.4.6.26). ESN parameters were analysed using a hierarchical regression approach. In model 1, predictors were the z-transformed rating scores of five personality traits of the PID-5BF+M (negative affectivity, detachment, antagonism, disinhibition, and psychoticism). In Model 2, we extended model 1 by sex and the interaction terms between sex and the five trait scores. Sex was binarily coded for descriptive purposes (0 = male, 1 = female), but was effect-coded (-0.5=male, +0.5=female) for the regression analyses. We chose this coding scheme to center the interaction estimates, ensuring that lower-order terms reflect main effects at the "average" gender level, thereby minimizing non-essential multicollinearity [49, 50]. We tested whether the more complex model 2 improved the model fit of model 1 (F-test of change in R^2 (ΔR^2) and Likelihood Ratio Tests).

Regression analyses were done by Ordinary Least Squares (OLS) regression with HC3 heteroskedasticity-consistent robust standard errors (sandwich and lmtest packages [51]). In case of violations of the assumptions of OLS regression, we used, depending on the distribution of the outcome variables, Beta Regression for dependent variables bounded within the unit interval (0,1) and skewed (sex heterogeneity, age heterophily, and sex heterophily), Zero-Inflated Negative Binomial or Poisson regression for zero-inflated count outcomes (proportion of work contacts; stability), or Logistic Regression for binary outcomes (romantic partner: present vs. absent in the eSN). Because the evenness-based heterogeneity and heterophily indices can take the boundary values 0 and 1, they were rescaled to the open unit interval prior to beta regression following Smithson and Verkuilen [52].

Variance Inflation Factors (VIF; car package [53]) were calculated and revealed no issue with multicollinearity (all VIFs < 5). Influential cases were identified for each outcome using Cook's distance (criterion > 4/number of cases [54]) for Model 2 and excluded from both models to ensure comparability of model fit indices. The number of cases included in each analysis is reported in the corresponding supplementary regression table (Tables S8–S28).

Openness and transparency

Analysis code, the dataset analysed in the current study, and the REDCap survey template are available from the corresponding author on reasonable request. Supplementary tables and figures are provided in Additional file 1.

3 Results

3.1 Sample features

Sample characteristics are reported in Table 2. The majority of the sample was White, reported medium levels of educational backgound, was employed at the time of testing and in a romantic partnership. The overall level of personality functioning was relatively high (LPFS-BF 2.0: M = 24.64, SD = 8.26), with, however, up to 22.4% of individuals reporting severe levels of maladaptive personality traits. For descriptives separated for men and women, see Supplementary Table S2.

Correlations between the five PID-5 trait domain scores used as predictors in the regression analyses ranged from small to strong (r = .20 to r = .53; see Table 3). For sex-stratified descriptive statistics, see Supplementary Table S2.

Table 2
Sample Description (N = 303)

Variable	Total Sample *M* (*SD*) / *n* (%)
N	303
Age (years)	34.38 (5.73)
Education	
Bachelor's degree	122 (40.3%)
Master's degree	64 (21.1%)
Higher/secondary education (A-levels, BTEC, etc.)	42 (13.9%)
Some college, no degree	41 (13.5%)
Secondary school	22 (7.3%)
Trade/Technical/Vocational school	6 (2.0%)
PhD or higher	6 (2.0%)
Occupational status	
Employed	209 (69.0%)
Self-employed	29 (9.6%)
Out of work	23 (7.6%)
Homemaker	11 (3.6%)
Other	31 (10.2%)
Nationality/Ethnicity	
White	232 (76.6%)
Black	26 (8.6%)
South Asian	19 (6.3%)
Other/mixed	26 (8.6%)
Romantic partner (yes)	211 (69.6%)
LPFS Total Score	24.64 (8.26)
< 26* (none)	156 (51.5%)
26–31* (subclinical)	85 (28.1%)
31–36* (moderate)	40 (13.2%)
36–40.5* (severe)	14 (4.6%)
> 40.5* (extreme)	8 (2.6%)

Note. * LPFS cut-off for severity of impairments in personality functioning [44]. + LPFS = Level of Personality Functioning Scale;

Table 3

Descriptive Statistics, Cut-off Frequencies, and Intercorrelations of Maladaptive Personality Trait Domains

Maladaptive Personality Traits	1	2	3	4	5
1. Negative Affectivity	1.30 (0.71)	0.29***	0.19**	0.45***	0.40***
≥ 2+	68 (22.4%)	(p < .001)	(p = 0.001)	(p < .001)	(p < .001)
2. Detachment		1.02 (0.57)	0.32***	0.44***	0.43***
≥ 1.67+		30 (9.9%)	(p < .001)	(p < .001)	(p < .001)
3. Antagonism			0.79 (0.54)	0.40***	0.38***
≥ 1.33+			56 (18.5%)	(p < .001)	(p < .001)
4. Disinhibition				0.98 (0.60)	0.53***
≥ 1.6+				48 (15.8%)	(p < .001)
5. Psychoticism					0.99 (0.61)
≥ 1.67+					35 (11.6%)

Note. Diagonal cells: M (SD) / n (%) exceeding the cut-off for severe personality pathology (T ≥ 70) based on normative data for the PID-5BF+ derived from a representative German general population sample [55]. No population-specific norms are currently available for the PID-5BF+M in English-speaking samples. Off-diagonal cells (upper triangle): Pearson r and p-value. * p < .05, ** p < .01, *** p < .001. PID-5BF+M = Personality Inventory for DSM-5 Brief Form Plus Modified. 1: Negative Affectivity, 2: Detachment, 3: Antagonism, 4: Disinhibition, 5: Psychoticism.

3.2 Egocentric network analysis

Descriptive statistics for the eSN parameters are presented in Table 1 and, separately for men and women, in Supplementary Tables S3 to S7. Detailed regression results are reported in Supplementary Tables S8–S28, and interaction effects are shown in Supplementary Figures S1–S6.

Network composition

Alter attributes: age and sex

Age heterogeneity: Model 1 was not statistically significant ($F(5, 275) = 0.94$, $p = .458$, $R^2 = .017$, $R^2_{adj} = -.001$). Model 2 improved the model fit ($F(11, 269) = 3.50$, $p < .001$, $R^2 = .125$, $R^2_{adj} = .089$; $\Delta F(6, 269) = 5.56$, $p < .001$, $\Delta R^2 = .108$). Age diversity was higher in women compared with men ($\beta = 0.182$, $p < .001$). Additionally, disinhibition was a significant predictor depending on the participants' sex (disinhibition: $\beta = -0.117$, $p = .020$). Simple slopes analyses revealed that only for men disinhibition predicted higher age diversity ($b = 0.074$, $SE = 0.037$, $p = .048$), without a statistically significant effect for women ($b = -0.043$, $SE = 0.033$, $p = .197$). See Supplementary Table S8 and Figure S1.

Sex heterogeneity: Neither Model 1 nor Model 2 was statistically significant (beta-regression; Model 1: LRT $\chi^2(5) = 2.85$, $p = .723$, pseudo-$R^2 = .007$; Model 2: LRT $\chi^2(11) = 4.08$, $p = .968$, pseudo-$R^2 = .010$). See Supplementary Table S9.

Age heterophily: Neither Model 1 nor Model 2 was statistically significant (beta-regression; Model 1: LRT $\chi^2(5) = 2.19$, $p = .822$, pseudo-$R^2 = .010$; Model 2: LRT $\chi^2(11) = 7.51$, $p = .756$, pseudo-$R^2 = .031$). See Supplementary Table S10.

Sex heterophily: Neither Model 1 nor Model 2 was statistically significant (beta-regression; Model 1: LRT $\chi^2(5) = 0.49$, p = .993, pseudo-R^2 = .002; Model 2: LRT $\chi^2(11)$ = 3.05, p = .990, pseudo-R^2 = .016). See Supplementary Table S11.

Alter attributes: Social roles

Romantic partner: Model 1 was statistically significant (logistic regression; LRT $\chi^2(5)$ = 27.31, $p < .001$), with higher detachment predicting lower odds of including a romantic partner in one's ego network (β = −0.69, SE = 0.16, z = −4.45, p < .001) and higher disinhibition predicting higher odds (β = 0.55, SE = 0.19, z = 2.91, p = .004). Model 2 was also statistically significant (LRT $\chi^2(11)$ = 39.99, p < .001) and significantly improved model fit over Model 1 ($\Delta\chi^2(6)$ = 12.68, p = .048). In line with model 1, higher detachment predicted lower odds of including a romantic partner in one's ego network (β = −0.70, *SE* = 0.17, *z* = −4.08, *p* < .001), whereas higher disinhibition predicted higher odds (β = 0.67, *SE* = 0.20, *z* = 3.38, *p* = .001). Additionally, negative affectivity was a significant predictor depending on the participants' sex (β = 0.83, *SE* = 0.33, *z* = 2.53, *p* = .011). Simple slopes analyses revealed that higher negative affectivity was associated with higher odds of having a romantic partner in the ego network in women (b = 0.55, *SE* = 0.24, *p* = .024), but not in men (b = −0.29, *SE* = 0.22, *p* = .196). See Supplementary Table S12 and Figure S2A. Please note that of participants having a romantic partner, 89,1% reported their romantic partner as member of their eSN.

Family members: Model 1 was not statistically significant (hierarchical OLS regression: $F(5, 274) = 2.10$, $p = .065$, $R^2 = .037$, R^2adj = .019). Model 2 significantly improved model fit ($F(11, 268) = 3.00$, $p = .001$, $R^2 = .110$, R^2adj = .073; $\Delta F(6, 268) = 3.64$, $p = .002$, $\Delta R^2 = .073$). Women showed a higher proportion of family members in their eSN

than men (β = 0.065, *SE* = 0.024, *t* = 2.74, *p* = .006). Detachment and psychoticism were significant predictors depending on the participants' sex (detachment: β = 0.072, *SE* = 0.026, *t* = 2.75, *p* = .006; psychoticism: β = −0.071, *SE* = 0.029, *t* = −2.46, *p* = .014). Among men, higher detachment predicted a lower proportion of family members (b = −0.045, *SE* = 0.019, *p* = .018) and higher psychoticism a higher proportion of family members (b = 0.052, *SE* = 0.021, *p* = .015), without statistically significant effects among women (detachment: b = 0.027, *SE* = 0.018, *p* = .137; psychoticism: b = −0.019, *SE* = 0.020, *p* = .335). See Supplementary Table S13 and Figure S2B–C.

Friends: Neither Model 1 nor Model 2 was statistically significant (Model 1: $F(5, 288) = 1.70$, $p = .134$; Model 2: $F(11, 282) = 1.32$, $p = .211$; $\Delta F(6, 282) = 1.01$, $p = .422$). See Supplementary Table S14.

Work contacts: Model 1 was statistically significant (zero-inflated regression: $\chi^2(10) = 19.30$, p = .037). In the count component of Model 1, no predictors reached statistical significance (all *p*s > .22). In the zero-inflation component of Model 1, both higher antagonism (β = −0.493, *SE* = 0.240, *z* = −2.06, *p* = .041), and higher psychoticism (β = −0.634, *SE* = 0.269, *z* = −2.35, *p* = .019) were associated with lower odds of having no work contacts in their eSN. Model 2 significantly improved the model fit ($\Delta\chi^2(12) = 22.14$, $p = .036$). In line with model 1, there were no significant predictors in the count component (all *p*s > .08). The analysis of the zero-inflation component revealed that, in addition to the effect of antagonism, which was already a significant predictor in model 1 (β = −0.808, SE = 0.336, z = −2.41, p = .017), the effect of psychoticism was depending on the

participants' sex (β = −1.468, SE = 0.700, z = −2.10, p = .037); simple slope analyses indicated that higher psychoticism was associated with lower odds of reporting no work contacts and that this association was significant only among women (β = −1.405, SE = 0.554, z = −2.54, p = .012), but not among men (β = 0.064, SE = 0.427, z = 0.15, p = .882). See Supplementary Table S15 and Figure S2D.

Health contacts: Due to the low prevalence of health contacts in the sample (only 11 participants included an alter from this domain), regression analyses were not conducted.

Others: Model 1 was statistically significant ($F(5, 279) = 2.79$, $p = .018$, $R^2 = .048$, $R^2adj = .031$), with higher detachment predicting a higher proportion of other acquaintances (β = 0.019, $SE = 0.007$, $t = 2.63$, $p = .009$). Model 2 did not significantly improve model fit ($F(11, 273) = 1.79$, $p = .056$, $R^2 = .067$, $R^2adj = .030$; $\Delta F(6, 273) = 0.95$, $p = .458$). See Supplementary Table S16.

Ego–alter tie attributes: Formal Interaction features

Importance: Model 1 was statistically significant ($F(5, 282) = 6.53$, $p < .001$, $R^2 = .104$, $R^2adj = .088$), with higher detachment predicting lower importance (β = −0.199, SE = 0.034, $p < .001$). Model 2 improved the model fit ($F(11, 276) = 4.46$, $p < .001$, $R^2 = .151$, $R^2adj = .117$; $\Delta F(6, 276) = 2.55$, $p = .020$, $\Delta R^2 = .047$). In addition to the effect of detachment (β = −0.185, SE = 0.036, $p < .001$), importance was higher in women compared with men (β = 0.140, SE = 0.064, $p = .030$). See Supplementary Table S17.

Duration of relationships: Model 1 was statistically significant ($F(5, 274) = 4.45$, $p = .001$, $R^2 = .075$, $R^2adj = .058$), with higher antagonism predicting a shorter duration of

relationships (β = −0.156, SE = 0.038, p < .001). Model 2 was also statistically significant ($F(11, 268) = 3.21$, $p < .001$, $R^2 = .117$, $R^2adj = .080$). However, the increment in explained variance compared to Model 1 was only marginally significant, pointing to Model 1 as the more robust and parsimonious model ($\Delta F(6, 268) = 2.10$, $p = .054$, $\Delta R^2 = .042$). Exploratory detailed analyses of Model 2 revealed that, in addition to the effect of antagonism (β = −0.151, *SE* = 0.039, $p < .001$), the interactions of sex with antagonism (β = 0.163, *SE* = 0.078, $p = .037$) and psychoticism (β = −0.288, *SE* = 0.094, $p = .002$) were statistically significant predictors. Simple slopes analyses revealed that only for men, higher antagonism predicted a shorter duration of relationships ($b = -0.232$, *SE* = 0.057, $t = -4.11$, $p <$ .001), but higher psychoticism predicted a longer duration of relationships ($b = 0.196$, *SE* = 0.071, $t = 2.76$, $p = .006$; women: Antagonism $b = -0.069$, *SE* = 0.054, $t = -1.28$, $p =$ .202; Psychoticism $b = -0.091$, *SE* = 0.061, $t = -1.50$, $p = .136$). See Supplementary Table S18 and Figure S3.

Relationship instability (any_break): Relationship break counts were zero-inflated (58.9% reported no breaks). Given the distributional properties of the outcome, a Zero-Inflated Poisson (ZIP) regression was used, which outperformed the Zero-Inflated Negative Binomial model (AIC: 645.42 vs. 647.42). Model 1 was statistically significant ($\chi^2(10) =$ 21.62, p = .017). In the count component of Model 1, no predictors reached statistical significance (all *p*s > .17). In the zero-inflation component, higher detachment was associated with a lower probability of never experiencing any relationship breaks, indicating that individuals higher in detachment were more likely to report at least one relationship break in their network (β = −0.604, *SE* = 0.241, $z = -2.51$, $p = .013$). No other predictors were statistically significant in the zero-inflation component (all *p*s > .49).

Model 2 did not significantly improve model fit over Model 1 (LRT $\chi^2(12) = 14.11$, $p = .294$). See Supplementary Table S19.

Conflict (fights)*:* Model 1 was statistically significant ($F(5, 285) = 5.66$, $p < .001$, $R^2 = .090$, $R^2adj = .074$), with higher psychoticism predicting more frequent conflicts ($\beta = 0.088$, $SE = 0.032$, $p = .007$). Model 2 did not improve the model fit ($F(11, 279) = 3.07$, $p = .001$, $R^2 = .108$, $R^2adj = .073$; $\Delta F(6, 279) = 0.92$, $p = .482$). See Supplementary Table S26.

Contact frequency: Model 1 was statistically significant ($F(5, 271) = 4.09$, $p = .001$, $R^2 = .070$, $R^2adj = .053$), with higher detachment predicting lower contact frequency ($\beta = 0.139$, $p < .001$). Model 2 improved the model fit ($F(11, 265) = 3.37$, $p < .001$, $R^2 = .123$, $R^2adj = .086$; $\Delta F(6, 265) = 2.65$, $p = .016$, $\Delta R^2 = .053$). In addition to the effect of detachment ($\beta = 0.131$, $p < .001$), contact frequency was lower in women compared with men ($\beta = -0.197$, $p < .001$). See Supplementary Table S20.

Ego–alter tie attributes: Positive Emotional quality

Closeness: Model 1 was statistically significant ($F(5, 271) = 13.22$, $p < .001$, $R^2 = .196$, $R^2adj = .181$), with higher detachment predicting lower closeness ($\beta = -0.297$, $SE = 0.039$, $p < .001$). Model 2 did not improve the model fit ($F(11, 265) = 6.69$, $p < .001$, $R^2 = .217$, $R^2adj = .185$; $\Delta F(6, 265) = 1.20$, $p = .304$). See Supplementary Table S21.

Perceived support: Model 1 was statistically significant ($F(5, 279) = 9.56$, $p < .001$, $R^2 = .146$, $R^2adj = .131$), with higher detachment predicting lower perceived support ($\beta = -0.204$, $SE = 0.044$, $p < .001$). Model 2 improved the model fit ($F(11, 273) = 8.19$, $p <$

.001, R^2 = .248, R^2adj = .218; $\Delta F(6, 273) = 6.17$, $p < .001$, ΔR^2 = .102). In addition to the effect of detachment ($\beta = -0.177$, SE = 0.043, $p < .001$), perceived support was higher in women compared with men ($\beta = 0.316$, SE = 0.074, $p < .001$). Moreover, disinhibition and psychoticism were significant predictors depending on the participants' sex (disinhibition: $\beta = 0.227$, SE = 0.094, p = .017; psychoticism: $\beta = 0.251$, SE = 0.096, p = .009). Simple slopes analyses revealed that both higher disinhibition and higher psychoticism predicted lower perceived support for men (disinhibition: b = −0.225, SE = 0.076, t = −2.96, p = .003; psychoticism: b = −0.196, SE = 0.073, t = −2.67, p = .008), but not for women (disinhibition: b = 0.001, SE = 0.056, t = 0.03, p = .979; psychoticism: b = 0.055, SE = 0.061, t = 0.89, p = .372). See Supplementary Table S22 and Figure S4.

Satisfaction with closeness: Model 1 was statistically significant ($F(5, 278) = 11.75$, $p < .001$, R^2 = .175, R^2adj = .160), with higher detachment predicting lower satisfaction with closeness ($\beta = -0.240$, SE = 0.045, $p < .001$). Model 2 improved the model fit ($F(11, 272) = 6.91$, $p < .001$, R^2 = .218, R^2adj = .187; $\Delta F(6, 272) = 2.56$, p = .020, ΔR^2 = .043) revealing that the effect of disinhibition was influenced by the participants' sex ($\beta = 0.236$, SE = 0.095, p = .013). Simple slopes analyses revealed that higher disinhibition predicted higher satisfaction with closeness for women (b = 0.119, SE = 0.059, t = 2.03, p = .043), but not for men (b = −0.117, SE = 0.075, t = −1.57, p = .118). See Supplementary Table S23 and Figure S5.

Satisfaction with perceived support: Model 1 was statistically significant ($F(5, 282) = 10.65$, $p < .001$, R^2 = .159, R^2adj = .144) with higher detachment predicting lower

satisfaction (β = −0.245, SE = 0.048, p < .001). Model 2 did not improve the model fit ($F(11, 276) = 5.87$, $p < .001$, $R^2 = .190$, $R^2adj = .157$; $\Delta F(6, 276) = 1.74$, $p = .111$). See Supplementary Table S24.

Satisfaction with contact frequency: Model 1 was statistically significant ($F(5, 280) = 9.65$, $p < .001$, $R^2 = .147$, $R^2adj = .132$), with higher detachment predicting lower satisfaction (β = −0.202, SE = 0.045, p < .001). Model 2 improved the model fit ($F(11, 274) = 6.43$, $p < .001$, $R^2 = .205$, $R^2adj = .173$; $\Delta F(6, 274) = 3.35$, $p = .003$, $\Delta R^2 = .058$). In addition to the effect of detachment (β = −0.181, SE = 0.045, p < .001), satisfaction was higher in women compared with men (β = 0.250, SE = 0.077, p = .001) and higher psychoticism predicted lower satisfaction with contact frequency (β = −0.095, SE = 0.048, p = .048) independently of the participants' sex. Additionally, disinhibition was a significant predictor influenced by the participants' sex (β = 0.248, SE = 0.093, p = .008). Simple slopes analyses revealed that higher disinhibition predicted lower satisfaction with contact frequency for men (b = −0.164, SE = 0.075, t = −2.20, p = .029), but not for women (b = 0.084, SE = 0.056, t = 1.50, p = .134). See Supplementary Table S25 and Figure S6.

Network structure

Network density: Model 1 was statistically significant ($F(5, 289) = 2.98$, $p = .012$, $R^2 = .049$, $R^2adj = .033$), with higher detachment predicting lower network density (β = −0.036, SE = 0.015, p = .019) and higher disinhibition predicting higher network density (β = 0.060, SE = 0.018, p = .001). Model 2 did not improve the model fit ($F(11, 283) =$

485 1.93, p = .036, R^2 = .070, R^2adj = .033; $\Delta F(6, 283) = 1.04$, p = .398). See Supplementary
486 Table S27.

487 *Degree centralization:* Neither Model 1 nor Model 2 was statistically significant
488 (Model 1: $F(5, 286) = 2.12$, p = .063, R^2 = .036, R^2adj = .019; Model 2: $F(11, 280) = 1.65$, p
489 = .086, R^2 = .061, R^2adj = .024; $\Delta F(6, 280) = 1.24$, p = .286). See Supplementary Table S28.

490 **4 Discussion**

491 The present study investigated unique associations between AMPD maladaptive
492 personality traits (negative affectivity, detachment, antagonism, disinhibition, and
493 psychoticism) and the composition and structure of eSNs. Additionally, we explored whether
494 maladaptive personality traits relate differently to social network features of men and women
495 by integrating sex as moderator variable. Our findings revealed that maladaptive personality
496 traits are differentially related to facets of how people characterize the composition and
497 structure of their SN comprising the 10 most important individuals in their social lives. While
498 in line with our hypotheses, detachment, antagonism, disinhibition, and psychoticism were
499 uniquely related to eSN features, negative affectivity explained no eSN facet independently
500 of the other traits. Men and women differed in some aspects of their eSNs independently of
501 maladaptive personality traits. However, our findings also suggest that sex moderates the
502 associations between maladaptive personality traits and eSN features: for all five traits, most
503 of these associations emerged in men, but not in women.

504 **4.1 Detachment**

505 Consistent with theoretical models positing detachment as the maladaptive extension of
506 low extraversion [56, 57], this trait emerged as the most robust and pervasive predictor across
507 multiple outcome domains. Duijndam et al. [58] define detachment as a maladaptive trait

involving social withdrawal, anhedonia, and intimacy avoidance. Our findings corroborate this conceptualization: Higher levels of detachment were associated with less frequent contacts, less closeness, less social support and a lower satisfaction with these features of their relationships. Moreover, not having a romantic partner in one's SN, but more ties with other acquaintances, and more often experiencing at least one break-up of a relationship aligns with a lower importance attributed to the members of their SN in those high in detachment. This supports the view that detachment might function as a barrier to forming close bonds. Our findings also align with the recent multivariate analysis by Kwak and Kwon [39], who identified a distinct canonical mode characterized by high detachment and emotional callousness, significantly associated with weaker relationship strengths with significant others.

Beyond these compositional features, a lower cohesion of the SNs indicated by a lower density associated higher detachment with structural features of the eSNs. A low density indicates that the alters within the network are less closely interconnected with one another. This reduced cohesion may limit the extent to which social support can be redistributed among network members, related to a less efficient information and support flow across ties [59, 60].

The only eSN facet for which the relationship with detachment was moderated by sex was the number of family members that was lower only for men with higher levels of detachment. This sex-specific pattern may reflect women's generally more kin-centered networks compared to men's [61], leaving family ties particularly vulnerable to detachment-related withdrawal in men.

In sum, for detachment, our findings suggest that the association of detachment and eSN features is similarly important in men and women and forms a central predictor of relational disengagement.

4.2 Negative Affectivity

We expected that negative affectivity would be particularly important for individuals' eSN, because it is conceptualised as the maladaptive extension of neuroticism and characterized by a tendency to experience negative emotions, feelings of rejection, and a negative self-image. However, our findings revealed no unique association of negative affectivity with eSN features including the positive emotional quality of social relationships. The only notable exception was that higher negative affectivity was associated with higher odds of reporting a romantic partner in one's SN. This association was only observed for women, but not for men. If taken at face value, this association might reflect that women high in negative affectivity – a trait encompassing separation insecurity and fear of rejection – are particularly motivated to establish and maintain a romantic relationship and to count their partner among their most important contacts. However, this finding has to be interpreted with caution since it might rather point to women low in negative affectivity not having a romantic partner in general than not naming an existing partner among the 10 most important people in their life: Of the 50 women who did not name a romantic partner in their eSN, 40 (80%) were not in a romantic relationship.

Negative affectivity represents generalized internal distress that is characterized by nervousness, worry, and tension [62]. While painful to the individual, it does not seem to systematically deplete the appraisal of the composition and structure of one's SN, at least while other maladaptive traits are considered. This interpretation aligns with Kwak and Kwon [39], who found that negative affectivity primarily loaded onto a general factor of personality

554 dysfunction rather than forming a distinct pattern of interpersonal relatedness like
555 detachment.

556 In sum, for negative affectivity, our findings suggest that this trait might primarily
557 reflect internal distress without necessarily disrupting the appraisal of the composition and
558 structure of one's SN.

559 **4.3 Antagonism**

560 In line with our expectations, antagonism emerged as a relevant trait. However, its
561 unique relevance was strongly restricted: those high in antagonism reported shorter durations
562 of their relationships and this association was more pronounced in men. Since including the
563 sex interaction terms improved the model fit only marginally ($p = .054$), this sex difference
564 has to be interpreted with caution.

565 Conceptualised as the maladaptive opposite of agreeableness, it comprises tendencies
566 toward manipulativeness, callousness, and hostility, reflecting difficulties in cooperative and
567 empathic interpersonal functioning [17]. The shorter duration of relationships might point to
568 difficulties in maintaining bonds rather than alteration in the appraisal of formal or emotional
569 features of relationships. In line with this, those high in antagonism also more often named
570 people from their occupational domain as network members. While this might support the
571 interpretation of difficulties in maintaining close bonds, it might also explain the lower
572 duration of relationships in one's SN compared to eSNs, which more often include family
573 members among the 10 most important people. In general, more diverse SNs covering a
574 broader range of member from different social domains offer a broader range of social
575 resources and relational opportunities. This has the benefit of increasing the access to
576 divergent perspectives, beliefs, and ideas and might even protect somatic health [63].
577 However, this diversity comes at a cost, because it may hinder fast access to emotional

support and intimacy, which might be of particular importance when focussing on eSNs restricted in size to only the 10 people from the inner layers of the SN.

In sum, for antagonism, unique associations with eSN features were very sparse with our findings suggesting that they may be more relevant in men than in women.

4.4 Disinhibition

Disinhibition as the maladaptive opposite of conscientiousness is characterized by impulsivity, risk-taking, and a lack of consideration for future consequences [64]. In contrast to detachment, the associations of disinhibition with eSN features across men and women were sparse, but most were differentially important in men and women. Independent of the individual's sex, higher disinhibition was associated with a higher probability of naming a romantic partner in one's SN and a higher density of the eSN. These findings were opposite to the associations found for detachment, possibly reflecting a less selective social engagement. Reduced behavioral inhibition, as the main characteristic of disinhibition, may yield in denser SNs and a greater likelihood of including romantic partners, contrasting with the intimacy avoidance associated with detachment [56]. Additionally, higher disinhibition was associated with features of the network composition differentially for men and women. Among men, higher disinhibition was associated with greater age diversity in the ESN, pointing to a broader, more age-heterogeneous social network. However, men high in disinhibition experienced their networks also as less supportive and less satisfying in regard to the frequency of contacts. In contrast, women high in disinhibition experienced a higher satisfaction with the closeness to the members of their network. In consequence, higher disinhibition might add to the effects of detachment in dampening the positive emotional quality of social relationships in men, while dampening the effects of high detachment in women.

In sum, for disinhibition, the associations with social relationships were much more sex-specific than for detachment. This suggests that it is much more important to take sex differences into consideration when evaluating the impact of this maladaptive trait for social functioning.

4.5 Psychoticism

Psychoticism is conceptualised as the maladaptive extreme of openness to experiences. Within the AMPD, high psychoticism is characterized by unusual beliefs and experiences, eccentricity, and perceptual dysregulation, reflecting a tendency toward idiosyncratic thinking and unconventional behavior [17, 56].

Similarly to antagonism, those high in psychoticism more often named at least one member from their occupational social domain as member of their SN, although for psychoticism this was true only for women. Irrespective of sex, higher psychoticism was associated with reporting more frequent conflicts and also a lower satisfaction with the frequency of contacts in the individual SN. Specifically for men, higher levels of psychoticism were associated with perceiving lower overall support across their eSN, naming family members more often, and — in apparent contrast — reporting longer durations of their relationships, despite the broader pattern of relational difficulties.

In sum, for psychoticism, our findings imply that this trait might be underestimated in its importance for people's appraisal of the composition of their social networks and that it might be particularly important in men.

4.6 Strengths and Limitations

There are different strengths, but also limitations to the present study.

The major strength is, first and foremost, that this is to our knowledge the first study investigating the association between maladaptive personality traits and eSN features. In

addition, our sample included equal portions of men and women, enabling us to test the cross-gender validity of the AMPD model in the context of the appraisal of social relationships. Moreover and in contrast to most studies of eSN in the context of PD, our data allowed not only for the analysis of the eSN's composition, but also their structure.

Regarding limitations, the level of maladaptive personality traits in our sample is lower than would be expected in case of clinical samples of individuals with PD. This may have attenuated effect sizes by capturing only a restricted variance in maladaptive traits. Furthermore, our analysis was conducted at the trait domain level and could therefore not examine whether specific facets within a domain differ in their relevance for eSN characteristics. In line with these limitations, future studies with larger non-clinical as well as clinical samples are needed. However, studies aiming for finer-grained facet-level analysis have to cope with the issue that already traits do not represent distinct, non-overlapping domains, but show crossloadings challenging the aim to identify unique contributions of traits or even facets [65].

Given the exploratory nature of the analyses, we covered a broad range of eSN features without correction for multiple testing. Further independent studies are needed to replicate our findings confirmatorily testing specific hypotheses.

When interpreting our findings, it has to be kept in mind that eSNs describe the subjective view of an individual, which may be biased by self-view and social desirability. Particularly regarding the structure of eSNs, participants' views of alter-alter relationships may differ from the alters' own assessments [66]. Combining egocentric and sociocentric network approaches could deepen our understanding of how subjective biases contribute to interpersonal dysfunction in the context of PD.

Restricting the eSN size to 10 alters identified within the past six months may have overlooked how personality manifests across more distant network layers or different

temporal scales. Future studies are needed to investigate whether maladaptive personality traits are differentially associated with the composition and structure of these broader network layers. It would furthermore be important to extend data collection to different contexts and situations, as the personality trait model assumes that people are responsive to situational demands[20]. Moreover, previous research contradicted the assumption of a generalized interpersonal dysfunction in PD, but suggested unique patterns of impairment across different social domains [6]. Crucially, future assessments of social contacts should include digital and internet-based networks. Individuals high in detachment or negative affectivity may prefer digital communication to regulate anxiety, meaning that excluding these ties could distort the selection of relationships important for an individuals every-day life [67].

A further limitation concerns the fact that our analyses were restricted to the participants' sex. Sex and gender were not assessed separately, and the sample did not comprise a sufficient number of individuals with a gender identity other than man or woman to examine gender as a distinct moderator. Our findings therefore do not allow to disentangle the extent to which the observed moderation reflects biological sex, gendered expectations and socialisation, or their interplay. Future studies in more diverse samples are needed that assess sex and gender identity separately and that include individuals with diverse gender identities.

Finally, our study was cross-sectional which prevents drawing causal inferences. Longitudinal studies are required that analyse the directionality of observed associations and thereby inform psychotherapeutic interventions on how changes in the appraisal of SNs and maladaptive personality traits might affect each other over time.

4.7 Clinical and Theoretical Implications

The findings of this study point to the usefulness of integrating dimensional personality assessment into clinical case conceptualization and differentiating between the unique associations of the different traits. From a clinical perspective, the pervasive association between detachment and both the composition and structure of SNs highlights the need for clinicians to look beyond the mere size of a patient's SN and to take on a broader view. The negative appraisals related to different facets of the SN might form important targets as underlined by recent studies identifying these as the central targets for interventions counteracting loneliness [68, 69]. Moreover, social withdrawal and intimacy avoidance might be reflected in actual alterations in the individuals' SN as indicated by a higher portion of ties with less close acquaintances and a lower cohesion within the SN. Future studies are needed to investigate whether changes in these SN features are the consequence of high detachment and/or serve as maintaining mechanisms for pathology. Interventions should target the reduction of interpersonal withdrawal by promoting a re-evaluation of one's social relationship or fostering emotional engagement and relational commitment to reshape one's SN. Structured therapies such as Interpersonal Therapy (IPT) or Dialectical Behavior Therapy (DBT) modules focusing on interpersonal effectiveness are particularly well-suited to enhance the subjective experience of connectedness [70, 71]. However, the efficacy of such interventions need to be evaluated. In general, a more diverse SN including weak ties might also offer opportunities, such as a greater access to novel information, broader social resources, and bridging across different social circles [59, 72]. These strengths could be lost if interventions focus exclusively on strengthening close ties. A careful balance between promoting relational depth and maintaining network diversity may be warranted considering that a higher quality of social relations is often associated with a smaller number of social

698 relations, given cognitive and temporal constraints on maintaining bonds at high intensity
699 [22].

700 Short durations of relationships, break-ups or frequent conflicts might all indicate
701 issues in achieving a positive valenced and satisfying social environment. At the same time,
702 our findings imply that these interpersonal problems might be fostered by different
703 maladaptive personality traits, such as detachment, antagonism and psychoticism. While high
704 detachment might predispose people for social withdrawal and simply breaking up
705 relationships that are not sufficiently satisfying, psychoticism might increase conflict, and
706 antagonism might result in networks disproportionately composed of occupational contacts,
707 whose availability is inherently transient as workplace circumstances change [73]. In line,
708 recognizing the nuance between traits might allow for tailored therapeutic goals such as
709 strengthening commitment and reducing relationship loss in those high in antagonism, while
710 strengthening conflict resolution and the management of active interpersonal friction for
711 those high in psychoticism.

712 Finally, the moderating role of sex further highlights the necessity of gender-sensitive
713 approaches in both research and clinical practice. Therapeutic strategies must consider how
714 gendered expectations and socialization may amplify or buffer the interpersonal
715 manifestations of personality pathology [74, 75]. Furthermore, these findings have preventive
716 implications. Early identification of maladaptive traits and their interpersonal correlates may
717 facilitate psychoeducational programs during adolescence, buffering against the progressive
718 social withdrawal associated with detachment or conflicts associated with psychoticism.

719

4.8 Conclusions

In conclusion, the present study reinforces the value of dimensional approaches in capturing the nuanced interpersonal impacts of personality pathology. Our findings point to a differential unique contribution of the different maladaptive personality traits, that is, of each trait over and above the remaining four traits, in explaining variability in an individual's appraisal of the composition and structure of their SNs. Detachment emerged as the trait affecting the most facets of the eSNs. On the other hand, antagonism was specifically related to the formation of long-lasting social relationships. Moreover, the relationships of disinhibition and psychoticism with SN characteristics requires a particularly deeper understanding and a fine-grained view that takes differences between men and women into consideration. Social network analysis might be a promising methodological approach to further deepen our understanding of the challenges people with personality disorders might face in their individual social environment and inform psychotherapeutic interventions about relevant targets in the domain of social functioning.

List of abbreviations

AIC = Akaike Information Criterion; AMPD = Alternative Model of Personality Disorders; BPD = borderline personality disorder; DBT = Dialectical Behavior Therapy; DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, 5th edition; eSN = egocentric social network; FFM = Five-Factor Model; HC3 = heteroskedasticity-consistent covariance estimator type 3; ICD-10/ICD-11 = International Classification of Diseases, 10th/11th revision; IPT = Interpersonal Therapy; LPFS-BF 2.0 = Level of Personality Functioning Scale–Brief Form 2.0; LRT = likelihood ratio test; OLS = ordinary least squares; PD = personality disorder; PID-5BF+M = Personality Inventory for DSM-5 Brief Form Plus Modified; SE = standard error; SN = social network; VIF = variance inflation factor; ZIP = zero-inflated Poisson regression.

Declarations

Ethics approval and consent to participate

The study was approved by the Research Ethics Board II of the Medical Faculty Mannheim of Heidelberg University, Germany (approval number: 2022-623-AF5, Amendment 1). All participants provided informed consent prior to participation. The study was conducted in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

The dataset analysed in the current study, the analysis code, and the REDCap survey template are available from the corresponding author on reasonable request. Supplementary tables and figures are provided in Additional file 1.

Competing interests

A.K.-U. is Editor-in-Chief of Borderline Personality Disorder and Emotion Dysregulation and was not involved in the handling or peer review of this manuscript. The remaining authors declare that they have no competing interests.

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Authors' contributions

Y.U.-S. and S.L. designed the study. Y.U.-S. collected the data, conducted the statistical analyses, and drafted the manuscript. S.L. supervised the study and the statistical analyses and revised the manuscript. A.K.-U., A.S., and P.K. critically revised the manuscript. All authors read and approved the final manuscript.

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Additional files

Additional file 1: Supplementary Material. Format: DOCX. Contains Supplementary Tables S1 to S28 and Supplementary Figures S1 to S6: internal consistency of the PID-5BF+M and LPFS-BF 2.0 (Table S1), sample description (Table S2), descriptive statistics of all eSN variables by sex (Tables S3 to S7), full hierarchical regression tables for all eSN outcomes (Tables S8 to S28), and simple-slope plots of the sex × trait interactions (Figures S1 to S6).

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