



Gender-related differences in structural pathways involving alcohol-related aggressive behaviors, family conflicts, and Cluster B personality disorders in substance use treatment: engagement, discharge, and readmissions

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ABSTRACT

Background: Gender-informed addiction care needs evidence on whether alcohol-related aggressive behaviors, family conflict and Cluster B pathology influence treatment differently for men and women. Objective: To test gender-specific structural pathways associating years of problematic alcohol use, alcohol-related aggressive behaviors, partner conflict, child conflict and Cluster B diagnosis with appointment adherence, retention, therapeutic discharge and readmissions.

Method: Retrospective electronic health record study in Andalusia's public addiction treatment network (N = 4844 entrants, 2015–2021; 25.5% women). Multigroup structural modelling tested within-gender associations and gender differences in pathways to outcomes.

Results: Child conflict was more prevalent in women than men (31.7% vs 15.9%; $V = 0.17$; $p < 0.001$) and was associated with higher readmissions in women ($\beta = 0.101$; $p = 0.001$) but not men ($\beta = -0.029$; $p = 0.126$); partner conflict was associated with fewer readmissions in men ($\beta = -0.041$; $p = 0.019$). In men, alcohol-related aggressive behaviors were associated with lower appointment adherence ($\beta = -0.059$; $p = 0.001$). Cluster B diagnosis was associated with lower therapeutic discharge (men: $\beta = -0.063$; $p = 0.017$; women: $\beta = -0.138$; $p = 0.005$) and higher readmissions (men: $\beta = 0.062$; women: $\beta = 0.095$; both $p < 0.001$). Retention was associated with higher discharge and fewer readmissions in both genders (all $p < 0.001$). Meaningful gender-specific structural differences emerged only in the pathway associating child conflict to readmissions.

Discussion and conclusion: These pathways highlight child conflict as a gender-specific readmission risk marker for women and support family-focused, gender-informed interventions that strengthen adherence and retention.

1. Introduction

Alcohol is heavily studied given its major individual and societal harms (Bonomo et al., 2019), including its involvement in alcohol-related aggressive behaviors, such as threats or aggression toward others, and in family conflicts with partners or children, such as intense arguments or verbal abuse rather than minor disagreements (Bobes et al., 2007). In patients with substance use disorders (SUD), these

alcohol-related interpersonal problems may be especially relevant for treatment engagement and outcomes, particularly when they co-occur with Cluster B personality disorders. This focus is consistent with previous research showing substantial overlap between alcohol use disorder (AUD) and borderline and antisocial Cluster B disorders (De la Rosa-Cáceres et al., 2022). These personality disorders are marked by emotional dysregulation, impulsivity, and interpersonal instability, which may exacerbate alcohol-related interpersonal problems and

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interfere with treatment adherence, retention, and recovery (Garofalo & Wright, 2017; Linehan, 1993). In both community and clinical samples, aggressive behaviors tend to escalate with problematic alcohol use, just as problematic alcohol use predicts the development of such behaviors over time (Najman et al., 2019). These associations are stronger in men than in women (Cafferky et al., 2018; Eckhardt et al., 2019; Foran & O'Leary, 2008). However, the literature suggests that while some associations may be shared across men and women, others may differ based on sex- and gender-related clinical trajectories and social roles, making it important to test both common and gender-differentiated pathways in treatment processes and outcomes (Dacosta-Sánchez, Michelini, et al., 2024; Schamp et al., 2021; Towers et al., 2023).

Clinical research has been conditioned by an androcentric bias when analyzing gender differences, increasing the likelihood of Type II error due to the marked imbalance between men and women in treatment settings (Dacosta-Sánchez, Michelini, et al., 2024; Little, 2013). This historical bias may affect not only intervention development and the detection of gender differences in therapeutic outcomes, but also diagnostic definitions and clinical assessment practices (Dacosta-Sánchez, Michelini, et al., 2024; Torrens-Melich et al., 2021). This is particularly relevant for comorbid borderline and antisocial personality disorders, which have long exhibited gendered diagnostic patterns in clinical nosology, with antisocial personality disorder more frequently diagnosed in men and borderline personality disorder more frequently diagnosed in women (Expósito-Álvarez et al., 2021; Juarros-Basterretxea et al., 2022). As Kaplan (1983a, 1983b) noted in critiques of the DSM-III, definitions of normality and pathology were historically shaped by gendered assumptions. Later work suggested that, even when criteria are largely equivalent, clinicians may apply them in gender-biased ways during assessment (Anderson et al., 2001). More recently, AUD–personality research using the DSM-5 Alternative Model for Personality Disorders (AMPD) as a dimensional framework has suggested dimensional overlap between borderline and antisocial presentations, including AUD-related bridging facets such as risk-taking, hostility, callousness, and irresponsibility (De la Rosa-Cáceres et al., 2022). Notably, hostility is explicitly included in borderline personality disorder in the AMPD and emerged as a bridge facet in relation to AUD criteria, which is consistent with a less essentialist interpretation of gender-typed Cluster B diagnostic patterns. Additionally, empirical evidence on gender differences in therapeutic outcomes among patients with Cluster B disorders remains limited (Bozzatello et al., 2024; Qian et al., 2022).

In this context, a key clinical question is how overlapping Cluster B features translate into alcohol-related interpersonal dysfunction during treatment. In clinical samples, problematic alcohol use is also associated with a set of adverse clinical factors, such as greater severity of aggressive behaviors and family conflicts with partners or children (Eckhardt et al., 2019; Foran & O'Leary, 2008; Victor et al., 2021). Such interpersonal conflicts, in turn, are associated with poorer retention and poorer post-treatment recovery (Fish et al., 2015; Nakonezny et al., 2017). Clinical and review evidence further suggests that dysregulated interpersonal behavior undermines the therapeutic alliance, increases rupture, and elevates premature dropout, thereby hindering engagement (Eikelboom et al., 2025; Expósito-Álvarez et al., 2021; Garofalo & Wright, 2017; Koekoek et al., 2006; Linehan, 1993; Russell et al., 2025). This pattern also highlights factors that may sustain interpersonal conflict, including a longer history of problematic alcohol use (Castaño-Pérez & Calderón-Vallejo, 2014; EMCDDA, 2012). This is clinically relevant because women often exhibit a more rapid progression toward dependence or treatment initiation than men—a phenomenon known as the telescoping effect (Towers et al., 2023).

Building on prior literature documenting gender differences in alcohol-use trajectories, including the telescoping effect, in men, Cluster B disorders are associated with impulsivity and alcohol-related aggressive behaviors, potentially escalating partner conflict and reducing treatment effectiveness (Expósito-Álvarez et al., 2021; Juarros-

Basterretxea et al., 2020). In women, Cluster B disorders—especially borderline personality disorder—are associated with child-related family conflict and increased substance use (Eyden et al., 2016; Petfield et al., 2015). However, gender differences in alcohol-related aggressive behaviors remain unclear because most studies rely on men, and no studies have tested whether Cluster B disorder modifies the telescoping effect. Reviews call for larger samples of women to test whether these mechanisms generalize or differ (Brockdorf et al., 2025; Sontate et al., 2021; Towers et al., 2023).

Furthermore, although borderline and antisocial Cluster B diagnoses may partly reflect gender-biased diagnostic practices rather than fully distinct underlying psychopathology, the cited literature suggests gender-related differences in how these diagnoses, together with alcohol-related aggressive behaviors and family conflicts, are associated with treatment processes and outcomes. These patterns may reflect underlying gendered structural inequalities. However, no studies have examined whether the structural pathways involving alcohol-related aggressive behaviors, family conflicts, and Cluster B diagnoses differ across groups in ways that may reflect gendered mechanisms and help explain treatment processes and outcomes in patients with substance use disorders (SUD). Therefore, the general aim of this study is to explore whether these structural pathways differ across groups and help explain variations in treatment processes and outcomes.

The specific objectives are to: (i) analyze gender differences in years of problematic alcohol use, alcohol-related aggressive behaviors, family conflicts, and Cluster B diagnoses; (ii) examine gender differences in treatment processes and outcomes as a function of years of problematic alcohol use and across a priori registry-based groups (presence vs. absence) for alcohol-related aggressive behaviors, family conflicts, and Cluster B diagnoses; (iii) examine associations among years of problematic alcohol use, alcohol-related aggressive behaviors, family conflicts, and Cluster B personality disorders separately in the men's and women's groups; and (iv) simultaneously assess whether gender-related structural differences show explanatory capacity for treatment processes and outcomes across groups.

2. Methods

2.1. Design

Retrospective observational multicentric study using electronic health records (EHR).

2.2. Participants

This study included 4844 patients with SUD (25.5% women) who initiated treatment between January 3, 2015, and September 15, 2021, at 120 centers of the public addiction assistance network in Andalusia, Spain. Treatment engagement and outcomes were ascertained from EHR until 6 June 2023. Alcohol-related problem indicators were not recorded by default in the EHR. We initially extracted 5025 patients for whom this section had been documented during the study period. We then excluded 181 cases because of missing values or coding errors in years of problematic alcohol use, resulting in a final analytic sample of 4844 patients. Table 1 presents the sociodemographic and clinical characteristics of the analytic sample by gender, including comorbid SUD other than AUD. All disorders were diagnosed according to the *International Classification of Diseases, 10th Revision* (ICD-10; WHO, 2003).

2.3. Measures

According to database coding, variables were defined as follows:

- Gender (men/women): recorded as sex assigned at birth in the electronic health records; self-identified gender identity was not captured (Kaufman et al., 2023).

Table 1

Sociodemographic and clinical characteristics of the analytic sample by gender.

Variable	Men (n = 3608)	Women (n = 1236)
Age at treatment entry, M (SD)	44.2 (10.9)	46.3 (10.4)
Education %		
Primary	36.9	27.2
Secondary	19.4	19.0
Upper-secondary or higher	20.1	33.6
Employment status %		
Employed	38.1	31.0
Unemployed	39.8	45.4
Retired	19.6	14.3
Alcohol-related indicators, n (%)		
Partner conflict	1,735 (48.1)	536 (43.4)
Child conflict	572 (15.9)	392 (31.7)
Alcohol-related aggressive behaviors	1,369 (37.9)	424 (34.3)
Substance use disorders, %		
Cocaine use disorder	27.0	12.3
Cannabis use disorder	14.8	6.7
Opioid use disorder	5.0	2.3
Hypnotic/sedative use disorder	3.5	5.8
Cluster B personality disorders, n (%)		
Borderline personality disorder	207 (5.7)	158 (12.8)
Antisocial personality disorder	46 (1.3)	3 (0.2)

- Years of problematic alcohol use: years from primary substance-use onset to diagnosis/admission to treatment (Greenfield et al., 2010; Towers et al., 2023).
- Conflicts with partner, children, or aggressive behaviors related to problematic alcohol use: recorded as present (1) or absent (0). These indicators came from an optional, closed-ended EHR section on alcohol-related problems. Within the analytic sample, a value of 0 reflected clinician-recorded absence of the specific item rather than an unrecorded field; therefore, a 0 for partner conflict, child conflict, or aggressive behaviors did not exclude the presence of other alcohol-related problems documented in the same section, including economic problems, accidents due to intoxication, absenteeism from employment, loss of employment, and health problems. For child conflict, 0 values included both patients with no documented conflict despite having at least one child and patients without children. Specifically, among those coded 0 for child conflict, 57.7% had at least one child and 42.3% had no children. For partner conflict, the database did not include partner status; therefore, 0 values may reflect either absence of documented conflict or absence of a partner.
- Retention: months from treatment initiation to therapeutic discharge or dropout.
- Appointment adherence: proportion of scheduled appointments attended until discharge outcome.
- Discharge outcome: therapeutic discharge (goals achieved) vs. dropout against clinical advice.
- Readmissions: number of readmissions occurring ≥ 6 months after a prior discharge or dropout.

2.4. Procedure

This study used electronic health record (EHR) data from the Andalusian Plan on Drugs Information System, a centralized registry for addiction treatment centers in Andalusia, Spain. The registry follows the EMCDDA Treatment Demand Indicator Standard Protocol 3.0 (EMCDDA, 2012) and includes treatment-entry data, sociodemographic characteristics, substance-use indicators, diagnoses, and clinical follow-up.

2.5. Statistical analysis

Univariate analyses by gender described sample characteristics and SUD types. Bivariate tests (t , χ^2 , Pearson's r , and Spearman's ρ) examined gender differences and associations among years of problematic

alcohol use, alcohol-related indicators, and Cluster B diagnosis, overall and within each treatment outcome; effect sizes followed Rea and Parker (2014) and Cohen (2016). Structural invariance was assessed using multigroup SEM with WLSMV (THETA; discharge as binary with a probit link), comparing an unconstrained model with a model constraining structural paths to equality across groups using DIFFTEST (Asparouhov & Muthén, 2006; Millsap, 2011; Muthén et al., 1997). Model fit was evaluated using χ^2 , RMSEA, CFI, TLI, and SRMR, with conventional guidelines of CFI/TLI ≥ 0.95 , RMSEA ≤ 0.06 , and SRMR ≤ 0.08 for good fit, and CFI/TLI ≥ 0.90 and RMSEA ≤ 0.08 for acceptable fit (Hu & Bentler, 1999). To formally evaluate between-group differences in focal structural paths, we conducted exploratory follow-up Wald tests of parameter equality (MODEL TEST) and reported $\chi^2(1)$ p -values. Given the temporal ordering of the outcomes, only direct paths were specified and indirect effects were not formally estimated. Accordingly, intervening paths should not be interpreted as formally tested mediation effects. As a sensitivity analysis, we repeated all descriptive (Tables 2–4), bivariate, and multigroup SEM analyses after excluding patients with antisocial personality disorder ($n = 49$) to assess whether the main findings were driven by this subgroup.

All analyses were conducted using IBM SPSS Statistics v29.0.1.0 (IBM Corp., 2022) and Mplus v8.7 (Muthén & Muthén, 2021).

2.6. Ethics approval.

All data handling (storage and encoding) conformed to Spain's General Health Law (1986), Law 41/2002 governing patient rights, and the European Organic Law 3/2018 on data protection. The research was conducted in accordance with the Declaration of Helsinki and received approval from the Research Ethics Committee of the Andalusian Ministry of Health (Code 0661-N-22).

3. Results

3.1. Gender differences according to years of problematic alcohol use, alcohol-related aggressive behaviors, family conflicts, and Cluster B diagnoses

Compared with women, men reported more years of problematic alcohol use until treatment admission ($M_{\text{men}} = 17.5$, $SD_{\text{men}} = 11.7$ vs. $M_{\text{women}} = 13.5$, $SD_{\text{women}} = 10.6$; $p < 0.001$, $d = 0.35$). This pattern was also observed among patients with a Cluster B diagnosis, with a larger effect size ($M_{\text{men}} = 17.4$, $SD_{\text{men}} = 10.8$ vs. $M_{\text{women}} = 12.8$, $SD_{\text{women}} = 10.4$; $p < 0.001$, $d = 0.43$). Conflicts with children were more prevalent among women (31.7% women vs. 15.9% men; $p < 0.001$, $V = 0.17$). For the remaining variables (alcohol-related aggressive behaviors, conflicts with partner, and Cluster B diagnosis), although some comparisons were statistically significant ($p \leq 0.022$), effect sizes were negligible ($V \leq 0.09$), so no clinically relevant differences were observed between men and women.

3.2. Gender differences in treatment processes and outcomes as a function of years of problematic alcohol use and across groups defined by alcohol-related aggressive behaviors, family conflicts, and Cluster B diagnoses

A comparison of treatment processes and outcomes across groups (Table 2) shows that men had negligibly higher appointment adherence than women among those reporting conflicts with children. Among patients who achieved therapeutic discharge, men had longer alcohol-use histories than women. However, among those with conflicts with children, women had more readmissions than men. All observed correlations were negligible in magnitude.

Table 2

Gender differences in adherence, retention, therapeutic discharge, and readmissions by alcohol-related indicators and Cluster B diagnoses.

	Men (n = 3,608)	Women (n = 1,236)	Statistic (df)	p	Effect size
Adherence to appointments					
Years of alcohol use (r)	0.06	0.03	—	< 0.001 ^M	—
Conflicts with partner (M (SD))	0.75 (0.22)	0.74 (0.21)	$t(2,269) = 0.89$	0.370	$d = 0.04$
Conflicts with children (M (SD))	0.77 (0.21)	0.73 (0.22)	$t(962) = 2.69$	0.007	$d = 0.18$
Aggressive behaviors (M (SD))	0.74 (0.23)	0.73 (0.22)	$t(1,791) = 0.47$	0.637	$d = 0.03$
Cluster B diagnosis (M (SD))	0.72 (0.22)	0.71 (0.24)	$t(400) = 0.52$	0.607	$d = 0.05$
Retention					
Years of problematic alcohol use (r)	0.05	0.08	—	< 0.01 ^{MW}	—
Conflicts with partner (M (SD))	14.5 (14.5)	14.7 (14.3)	$t(2,269) = -0.32$	0.752	$d = 0.02$
Conflicts with children (M (SD))	14.9 (15.4)	15.5 (15.4)	$t(962) = -0.58$	0.563	$d = 0.04$
Aggressive behaviors (M (SD))	15.0 (15.7)	14.9 (15.0)	$t(1,791) = 0.12$	0.904	$d = 0.01$
Cluster B diagnosis (M (SD))	17.8 (16.7)	14.9 (16.1)	$t(400) = 1.71$	0.089	$d = 0.17$
Therapeutic discharge					
Years of alcohol use (M (SD))	19.1 (12.1)	13.4 (11.6)	$t(810) = 5.88$	< 0.001	$d = 0.47$
Conflicts with partner %	17.5	17.1	$\chi^2(1) = 0.05$	0.831	$V = 0.00$
Conflicts with children %	19.1	17.6	$\chi^2(1) = 0.33$	0.568	$V = 0.02$
Aggressive behaviors %	14.2	15.6	$\chi^2(1) = 0.51$	0.476	$V = 0.02$
Cluster B diagnosis %	11.2	8.13	$\chi^2(1) = 0.99$	0.320	$V = 0.05$
Number of readmissions					
Years of alcohol use (p)	-0.07	0.01	—	< 0.001 ^M	—
Conflicts with partner (M (SD))	0.46 (0.74)	0.46 (0.73)	$t(2,269) = -0.09$	0.929	$d = 0.00$
Conflicts with children (M (SD))	0.40 (0.67)	0.54 (0.78)	$t(754.7) = -3.08$	0.002	$d = 0.21$
Aggressive behaviors (M (SD))	0.49 (0.75)	0.46 (0.73)	$t(1,791) = 0.78$	0.438	$d = 0.04$
Cluster B diagnosis (M (SD))	0.68 (0.88)	0.66 (0.85)	$t(400) = 0.21$	0.828	$d = 0.02$

Note: M: mean; SD: standard deviation; df: degrees of freedom; d: Cohen's d; V: Cramér's V; < 0.001^M: Significant only in men; < 0.01^{MW}: Significant in men and women.

3.3. Gender-specific associations among years of problematic alcohol use, family conflicts, aggressive behaviors, and Cluster B diagnoses

When examining associations between years of problematic alcohol use, alcohol-related aggressive behaviors, family conflicts, and Cluster B diagnoses in men (Table 3), only a few significant findings emerged. Men reporting conflicts with their children had more years of problematic alcohol use than those without such conflicts. Conversely, men with partner conflicts and with aggressive behaviors reported slightly fewer years of problematic alcohol use, although effect sizes were negligible. On the other hand, in women, only one association with years of problematic alcohol use was statistically significant (Table 4): women reporting conflicts with children had more years of problematic alcohol

Table 3

Years of problematic alcohol use according to alcohol-related indicators and associations among patients presenting alcohol-related family conflicts, aggressive behaviors, and Cluster B diagnoses (men).

Variables	Years of alcohol use M (SD)	Statistic (df)	p	Effect size
Conflicts with partner				
Yes	16.9 (11.5)	$t(3,606) = 2.92$	0.004	$d = 0.09$
No	18.1 (11.8)			
Conflicts with children				
Yes	21.8 (12.3)	$t(765.2) = -9.23$	< 0.001	$d = 0.44$
No	16.7 (11.4)			
Aggressive behaviors				
Yes	16.7 (11.3)	$t(3,010) = 3.18$	0.001	$d = 0.12$
No	18.0 (11.9)			
Cluster B diagnosis				
Yes	17.4 (10.8)	$t(283.6) = 0.17$	0.867	$d = 0.01$
No	17.5 (11.8)			
Associations among patients presenting alcohol-related family conflicts, aggressive behaviors, and Cluster B diagnoses				
Conflicts with partner	72.8%	$\chi^2(1) = 323.3$	< 0.001	$V = 0.30$
Conflicts with children	27.2%			
Conflicts with partner	51.4%	$\chi^2(1) = 159.8$	< 0.001	$V = 0.21$
Aggressive behaviors	48.6%			
Conflicts with partner	94.0%	$\chi^2(1) = 2.69$	0.101	$V = 0.03$
Cluster B diagnoses	6.0%			
Conflicts with children	44.8%	$\chi^2(1) = 86.4$	< 0.001	$V = 0.16$
Aggressive behaviors	55.2%			
Conflicts with children	94.8%	$\chi^2(1) = 2.32$	0.127	$V = 0.03$
Cluster B diagnoses	5.2%			
Aggressive behaviors	91.2%	$\chi^2(1) = 14.9$	< 0.001	$V = 0.10$
Cluster B diagnoses	8.8%			

Note: M: mean; SD: standard deviation; df: degrees of freedom; d: Cohen's d; V: Cramér's V.

use, although the difference was negligible.

Pairwise associations among alcohol-related indicators showed the strongest associations in both groups between conflicts with partner and conflicts with children, and between conflicts with partner and aggressive behaviors. Conditional percentages indicated that 27.2% of men and 56.1% of women with conflicts with partner also reported conflicts with children, and 48.6% of men and 49.5% of women with conflicts with partner also reported aggressive behaviors. Conflicts with children also showed a weaker association with aggressive behaviors, with 55.2% of men and 52.8% of women reporting aggressive behaviors among those with conflicts with children. Associations involving Cluster B diagnoses were weak or negligible but included associations with aggressive behaviors in both groups and with conflicts with children in women (see Tables 3–4).

3.4. Multigroup structural equation model assessing gender-related structural differences in treatment processes and outcomes

The multigroup structural equation model showed excellent fit to the data: $\chi^2(2) = 2.918, p = 0.232$; RMSEA = 0.014 (90% CI [0.000, 0.045]), with a high probability of close fit (probability (RMSEA ≤ 0.05) = 0.976); CFI = 0.999; TLI = 0.982; SRMR = 0.005. Full model results—95% confidence intervals, statistical significance, standardized

Table 4

Years of problematic alcohol use according to alcohol-related indicators and associations among patients presenting alcohol-related family conflicts, aggressive behaviors, and Cluster B diagnoses (women).

Variables	Years of alcohol use M (SD)	Statistic (df)	p	Effect size
Conflicts with partner				
Yes	13.0 (9.88)	$t(1,208.4) = 1.42$	0.156	$d = 0.08$
No	13.9 (11.1)			
Conflicts with children				
Yes	14.4 (10.7)	$t(1,234) = -2.03$	0.043	$d = 0.12$
No	13.1 (10.5)			
Aggressive behaviors				
Yes	12.9 (9.84)	$t(944.1) = 1.33$	0.183	$d = 0.07$
No	13.8 (10.9)			
Cluster B diagnosis				
Yes	12.8 (10.4)	$t(1,234) = 0.88$	0.380	$d = 0.07$
No	13.6 (10.6)			
Associations among patients presenting alcohol-related family conflicts, aggressive behaviors, and Cluster B diagnoses				
Conflicts with partner	56.1%	$\chi^2(1) = 65.6$	< 0.001	$V = 0.23$
Conflicts with children	43.9%			
Conflicts with partner	49.5%	$\chi^2(1) = 110.0$	< 0.001	$V = 0.30$
Aggressive behaviors	50.5%			
Conflicts with partner	86.6%	$\chi^2(1) = 0.18$	0.671	$V = 0.03$
Cluster B diagnoses	13.4%			
Conflicts with children	52.8%	$\chi^2(1) = 42.3$	< 0.001	$V = 0.19$
Aggressive behaviors	47.2%			
Conflicts with children	90.6%	$\chi^2(1) = 6.26$	0.012	$V = 0.07$
Cluster B diagnoses	9.4%			
Aggressive behaviors	82.3%	$\chi^2(1) = 12.9$	< 0.001	$V = 0.10$
Cluster B diagnoses	17.7%			

Note: M: mean; SD: standard deviation; df: degrees of freedom; d: Cohen's d; V: Cramér's V.

path coefficients and explained variance (R^2) for each outcome—are presented in Table 5 separately for men and women. The model accounted for a moderate proportion of variance in discharge status, a small proportion of variance for the number of readmissions, and very small proportion of variance for retention and appointment adherence in both groups.

Several significant factors emerged in the structural model. The global moderation test (DIFFTEST) showed that constraining all parameters to equality across men and women did not significantly worsen model fit ($\chi^2_{diff} = 37.654$, $df = 25$, $p = 0.050$). This result supports global structural invariance across genders. However, exploratory follow-up Wald tests (MODEL TEST) indicated local non-invariance for the path from conflicts with children to readmissions ($\chi^2(1) = 12.882$, $p < 0.001$), with a positive explanatory capacity in women ($\beta = 0.101$, 95% CI [0.044, 0.158], $p = 0.001$) and a negative, non-significant contribution in men ($\beta = -0.029$, 95% CI [-0.066, 0.008], $p = 0.126$). In contrast, the association between appointment adherence and therapeutic discharge was statistically significant in both groups, and the between-group difference was not supported by the Wald test ($\chi^2(1) = 0.008$, $p = 0.931$).

In men, years of problematic alcohol use were positively associated with appointment adherence, whereas alcohol-related aggressive behaviors were negatively associated (Table 5). In women, Cluster B

diagnosis was negatively associated with appointment adherence. Regarding retention, years of problematic alcohol use were positively associated with this outcome in both men and women. Among men, Cluster B diagnosis was also positively associated with retention, and no other paths reached statistical significance. For therapeutic discharge, appointment adherence and retention were positively associated with the outcome in both men and women. In men, years of problematic alcohol use were also positively associated with discharge, whereas alcohol-related aggressive behaviors and Cluster B diagnosis were negatively associated. In women, Cluster B diagnosis was likewise negatively associated with discharge.

Finally, beyond the localized gender-specific association between child conflict and readmissions, other significant associations were observed. In men, years of problematic alcohol use and partner conflict were negatively associated with readmissions, whereas Cluster B diagnosis was positively associated. In women, Cluster B diagnosis was also positively associated with readmissions. In both men and women, greater retention and therapeutic discharge were negatively associated with readmissions.

To visualize the statistically significant temporally ordered direct paths in the multigroup structural model, Fig. 1 (women) and 2 (men) display only statistically significant standardized coefficients ($p < 0.05$). These figures are intended to illustrate sequential/intervening paths among treatment processes and outcomes..

3.5. Sensitivity analysis without antisocial diagnoses

Sensitivity analyses excluding patients with antisocial personality disorder ($n = 49$; 46 men and 3 women) yielded substantially similar results (Supplementary Table S1). In the filtered sample ($N = 4,795$), the overall descriptive, bivariate, and multigroup SEM pattern remained unchanged. The only notable exception was that, in men, the bivariate association between Cluster B disorders and discharge outcome was attenuated and no longer statistically significant. In the multigroup SEM, the main moderation pattern was replicated, with child conflict remaining the only robust gender-differentiated association with readmissions.

4. Discussion

We addressed four objectives to test gender-differentiated pathways in SUD treatment, modelling years of problematic alcohol use, family conflicts, alcohol-related aggressive behaviors and Cluster B disorders in relation to appointment adherence, retention, discharge and readmissions. Because androcentric bias and routine-care designs can attenuate between-gender contrasts, effects were expected to be small (Dacosta-Sánchez, Fernández-Calderón et al., 2024; Romo-Avilés et al., 2023). This reflects findings similar to those of the DATOS project, in which hostility and emotional dysregulation modestly hinder engagement and retention (Joe et al., 1999). Even small effects can accumulate into clinically meaningful outcomes (Kelly et al., 2018; Moos & Moos, 2003), informing selective screening and sex/gender-sensitive interventions.

Regarding alcohol-related indicators, women entered treatment with fewer years of problematic alcohol use than men, and within women this duration was slightly shorter among those with Cluster B disorders. This shorter alcohol-use history is consistent with the telescoping effect, whereby women may seek treatment earlier than men, and even earlier when Cluster B pathology is present (Towers et al., 2023). Therefore, the telescoping effect should not be interpreted as an isolated effect of a Cluster B diagnosis, but rather in the context of a more complex clinical profile including affective comorbidity. The literature suggests that this accelerated progression may be associated with a less favorable clinical course in women than in men (Towers et al., 2023), and this disadvantage appears to be especially pronounced in women with more complex emotional/interpersonal profiles, who show lower

Table 5

Standardized path coefficients and explained variance from the multigroup structural equation model by gender.

Variables	Men				Women			
	β	CI	SE	<i>p</i>	β	CI	SE	<i>p</i>
Adherence: R^2 Men = 0.008, p = 0.006; R^2 Women = 0.008, p = 0.091								
Years of alcohol use	0.050	0.017	0.083	0.017	0.003	-0.028	0.090	0.309
Conflicts with partner	0.017	-0.018	0.052	0.018	0.029	-0.032	0.090	0.353
Conflicts with children	0.025	-0.012	0.062	0.019	-0.047	-0.106	0.012	0.109
Aggressive behaviors	-0.059	-0.092	-0.026	0.017	-0.040	-0.099	0.019	0.183
Cluster B diagnosis	-0.031	-0.066	0.004	0.018	-0.059	-0.112	-0.006	0.027
Retention: R^2 Men = 0.007, p = 0.009; R^2 Women = 0.008, p = 0.129								
Years of alcohol use	0.055	0.020	0.090	0.018	0.080	0.023	0.137	0.006
Conflicts with partner	-0.009	-0.044	0.026	0.018	-0.004	-0.065	0.057	0.899
Conflicts with children	0.002	-0.037	0.041	0.020	0.037	-0.022	0.096	0.218
Aggressive behaviors	0.025	-0.008	0.058	0.017	0.012	-0.049	0.073	0.693
Cluster B diagnosis	0.056	0.027	0.085	0.015	0.012	-0.041	0.065	0.668
Therapeutic discharge: R^2 Men = 0.264, p < 0.001; R^2 Women = 0.242, p < 0.001								
Years of alcohol use	0.052	0.007	0.097	0.023	-0.040	-0.114	0.034	0.298
Conflicts with partner	0.039	-0.012	0.090	0.026	0.011	-0.073	0.095	0.795
Conflicts with children	0.015	-0.144	0.174	0.081	0.022	-0.062	0.106	0.612
Aggressive behaviors	-0.074	-0.123	-0.025	0.025	-0.020	-0.104	0.064	0.648
Cluster B diagnosis	-0.063	-0.116	-0.010	0.027	-0.138	-0.234	-0.042	0.005
Adherence	0.360	0.309	0.411	0.026	0.234	0.163	0.305	0.000
Retention	0.262	0.221	0.303	0.021	0.355	0.279	0.431	0.000
Readmissions: R^2 Men = 0.088, p < 0.001; R^2 Women = 0.092, p < 0.001								
Years of alcohol use	-0.059	-0.096	-0.022	0.019	0.003	-0.058	0.064	0.918
Conflicts with partner	-0.041	-0.074	-0.008	0.017	-0.016	-0.073	0.041	0.583
Conflicts with children	-0.029	-0.066	0.008	0.019	0.101	0.044	0.158	0.001
Aggressive behaviors	-0.008	-0.041	0.025	0.017	-0.025	-0.084	0.034	0.396
Cluster B diagnosis	0.062	0.033	0.091	0.015	0.095	0.046	0.144	0.000
Retention	-0.167	-0.212	-0.122	0.023	-0.191	-0.267	-0.115	0.000
Discharge	-0.163	-0.216	-0.110	0.027	-0.143	-0.227	-0.059	0.001

Note: β : Standardized regression coefficient; CI: 95% Confidence Interval; SE: standard error; R^2 : coefficient of determination, indicating the proportion of variance explained by the model.

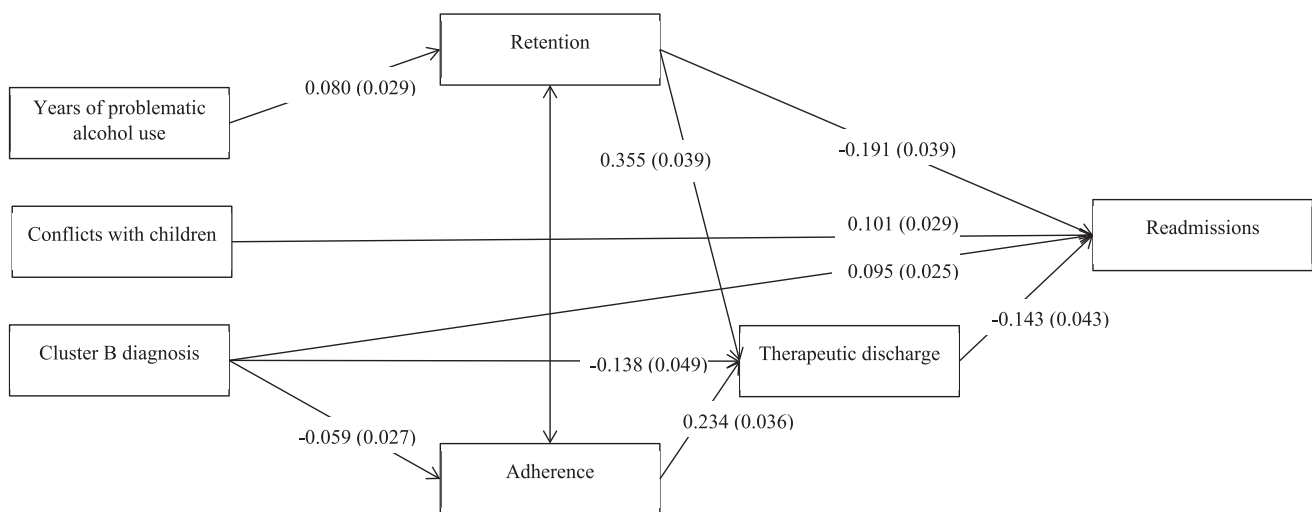


Fig. 1. Associations of years of problematic alcohol use, conflicts with children, and Cluster B diagnosis with women's treatment processes and outcomes. Arrows represent only statistically significant direct paths, including intervening paths among temporally ordered outcomes.

appointment adherence and higher readmissions across follow-ups (Dacosta-Sánchez et al., 2026). In addition, sex-related differences in alcohol metabolism, together with hormonal fluctuations that may contribute to emotional dysregulation, may increase the medical impact in women, thereby hindering therapeutic progress and recovery (Towers et al., 2023). Furthermore, conflicts with children added an additional burden for women, consistent with prior evidence that caregiving responsibilities interfere more with women's clinical progress due to traditional gender roles (Dacosta-Sánchez, Fernández-Calderón et al., 2024; Schamp et al., 2021).

Addressing the second objective, two findings emerged. First, among patients reporting conflict with children, women showed slightly lower

appointment adherence than men and had more readmissions, reinforcing the need for continuous, integrated care services (Neo et al., 2021; Johnstone et al., 2023). Second, a telescoping pattern in alcohol use history was also observed among women who achieved therapeutic discharge and was more pronounced in those with Cluster B personality disorders. Taken together, these results suggest the need to explore and evaluate women-specific, personality-informed, and family-sensitive post-discharge follow-up approaches for higher-risk subgroups of women, particularly when child-related conflict is present, to reduce the risk of early relapse and readmission (Dacosta-Sánchez et al., 2026; Petfield et al., 2015).

Within-gender associations showed consistent clustering: in both

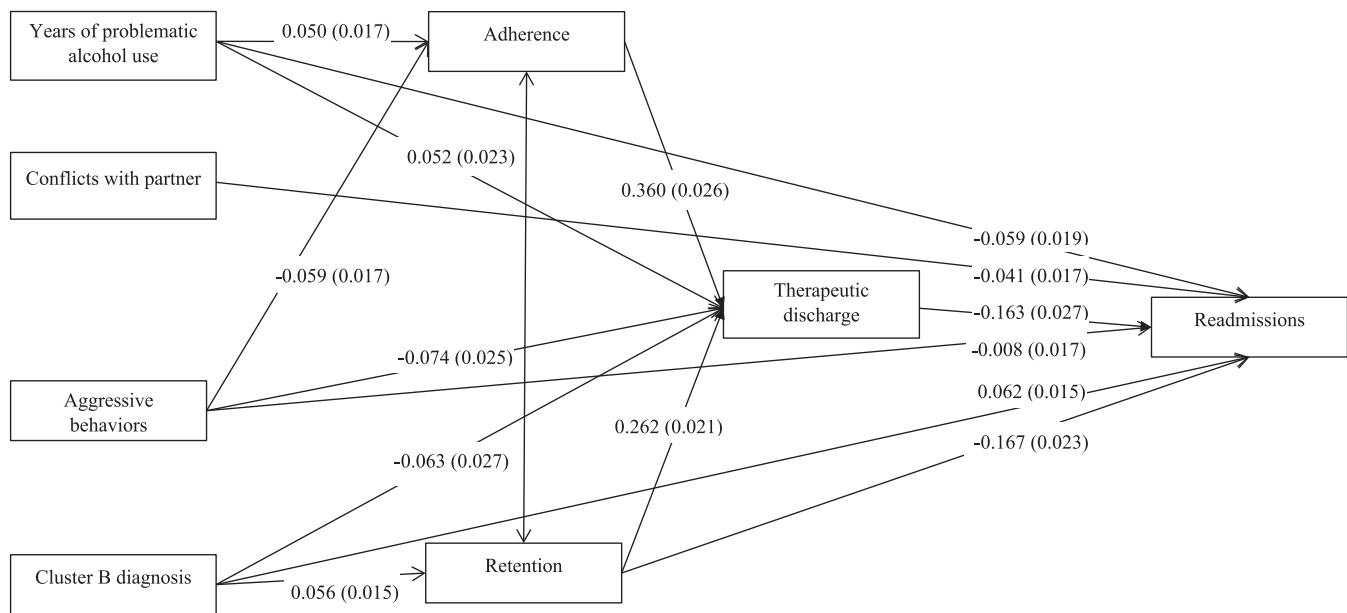


Fig. 2. Associations of years of problematic alcohol use, conflicts with partner, aggressive behaviors, and Cluster B diagnosis with men's treatment processes and outcomes. Arrows represent only statistically significant direct paths, including intervening paths among temporally ordered outcomes.

men and women, conflict with children co-occurred with partner conflict and alcohol-related aggressive behaviors, supporting routine screening and safeguarding protocols for children (Brackley et al., 2010; Dahouri et al., 2025). Partner conflict also co-occurred with alcohol-related aggressive behaviors, consistent with prior work (Foran & O'Leary, 2008) and supporting joint assessment in clinical practice. These patterns do not necessarily imply intimate partner violence but, in the context of problematic alcohol use, may signal relational strain and broader family dysfunction (Cunradi et al., 2015; Klostermann & Fals-Stewart, 2006).

Cluster B diagnoses co-occurred with alcohol-related aggressive behaviors in men and with conflict with children in women. However, these co-occurrences showed negligible effect sizes in both men and women and should therefore be interpreted cautiously. In men, this association should not be automatically interpreted as attributable to antisocial personality disorder; moreover, the sensitivity analysis showed a similar association after excluding the 49 cases with antisocial personality disorder. Overall, these findings are consistent with previous discussions on gender bias in personality disorder nosology (Kaplan, 1983a, 1983b). In women, by contrast, Cluster B diagnoses were associated with conflict with children. Taken together, our findings underscore the potential value of addressing family functioning for both men and women who report family conflict while in treatment for substance use problems, particularly when emotion dysregulation is prominent. In women, integrated parenting support plus emotion-regulation training may be worth exploring, with the aim of strengthening the mother-child bond (Dacosta-Sánchez, Michelini, et al., 2024; Petfield et al., 2015), whereas in men, integrating emotion-regulation strategies with components targeting alcohol-related aggressive behaviors may also be worth exploring (Foran & O'Leary, 2008).

Finally, the multigroup analysis suggested broad structural similarity across genders in treatment pathways, with modest localized differences in some relational and clinical processes. The clearest difference concerned conflict with children, which was associated with readmissions only in women, a pattern consistent with greater family burdens and parenting-related service needs (Neo et al., 2021). In men, by contrast, partner conflict and alcohol-related aggressive behaviors appeared more relevant to treatment disengagement and poorer clinical progress, in line with literature showing that alcohol-related aggressive behaviors can impair couple functioning and hinder treatment involvement (Foran

& O'Leary, 2008; Crane et al., 2015; Eckhardt et al., 2019; Expósito-Álvarez et al., 2021; Lila et al., 2020). Years of problematic alcohol use showed limited gender-related variation and were associated mainly with continuity of care, whereas Cluster B pathology showed partially divergent patterns in adherence and retention, but a similar overall tendency toward lower therapeutic discharge and greater readmission risk in both genders, somewhat more marked in women (Schamp et al., 2021; Towers et al., 2023; Petfield et al., 2015). In this context, appointment adherence, retention, and therapeutic discharge emerge as especially relevant process indicators across genders, suggesting that admission characteristics may help refine initial case formulation, but that treatment-process variables are likely to be more useful for guiding service planning and clinical decision-making (Dacosta-Sánchez, Fernández-Calderón et al., 2024; Hser et al., 2004; Joe et al., 1999). Thus, our data may help inform the design and evaluation of gender-responsive strategies that combine close attention to treatment engagement and continuity of care with family functioning assessment and emotion-regulation components when conflict with children or partners, alcohol-related aggressive behaviors, or Cluster B pathology are present (McCrary et al., 2016; Petfield et al., 2015).

4.1. Limitations

First, EHR constraints limited gender to assignment at birth and did not capture self-identified gender, restricting generalizability to sexual and gender-diverse populations (Kaufman et al., 2023; Marshal et al., 2008). Second, family conflict and alcohol-related aggressive behaviors were optional, dichotomous EHR fields; analyses were limited to documented cases and may reflect selective recording associated with severity, service use, or clinician practices, which can introduce selection bias and limit generalization. In addition, this dichotomous coding does not capture severity, frequency, chronicity, or within-treatment change, which likely reduced analytic sensitivity and may have attenuated associations, including potential sex/gender-related differences. Moreover, the 0 category for family-conflict variables was heterogeneous, which reduces the external validity of our results. Relatedly, the lack of direct violence indicators prevents distinguishing relational conflict from coercive violence; these fields should be interpreted as clinical warning signs rather than forensic evidence (Victor et al., 2021). Third, the low variance explained for adherence and retention likely

reflects the multifactorial nature of engagement in routine care. Thus, other clinical, social, and contextual variables not included in the present models (e.g., broader psychiatric comorbidity, social support, or treatment-related factors) may also contribute to treatment processes and outcomes and should be examined in future studies (Hser et al., 2004; Joe et al., 1999). Finally, we did not stratify by comorbid substance use (e.g., cocaine), precluding tests of synergistic associations with alcohol-related aggressive behaviors (Cafferky et al., 2018; Chermack et al., 2010).

5. Conclusions

Overall, the findings suggested broad structural similarity between men and women in SUD treatment pathways, with only modest localized differences. The clearest gender-specific result was that conflict with children was associated with readmissions only in women, whereas partner conflict and alcohol-related aggressive behaviors appeared more relevant to poorer treatment engagement and clinical progress in men. Cluster B pathology also showed a general tendency toward poorer therapeutic outcomes in both groups, somewhat more marked in women. Against this background, gender-informed clinical decisions should not be built on apparent admission differences alone. In large real-world datasets, between-gender contrasts are often attenuated and effects are modest; therefore, the critical question is not whether men and women differ in general, but whether specific pathways differ once moderation is formally tested. By combining global invariance testing with targeted follow-up comparisons, multigroup modelling provides a practical framework to separate broadly shared mechanisms from localized, clinically actionable gender-specific effects. This approach shifts the field from descriptive gender stratification to hypothesis-driven identification of the subgroups and pathways where gendered mechanisms are most likely to operate, improving precision in risk stratification and intervention planning. From a service perspective, embedding brief, validated indicators of partner- and child-related violence in electronic health records, alongside routinely captured proxies (family conflict and alcohol-related aggressive behaviors), would strengthen this moderation-based approach by improving measurement, reducing selective documentation effects, and enabling more accurate targeting of post-discharge follow-up.

CRedit authorship contribution statement

Daniel Dacosta-Sánchez: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Formal analysis, Conceptualization. **Bella M. González Ponce:** Writing – review & editing, Supervision, Methodology. **Cinta Mancheño-Velasco:** Writing – review & editing, Supervision, Data curation. **Marta Narváez-Camargo:** Writing – review & editing, Supervision. **Óscar M. Lozano:** Writing – review & editing, Supervision, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.addbeh.2026.108688>.

Data availability

Data will be made available on request.

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