

Chapter 6

Alcohol Use, Intoxication and Binge Drinking

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6.1. Introduction

Adolescence is a pivotal developmental period characterized by profound socio-emotional and cognitive transformations, the onset of autonomy from parents, and the acquisition of new experiential life worlds. Concurrently, adolescence emerges as a critical phase marked by an escalation in risk-taking behaviors and the manifestation of various maladaptive outcomes, most notably substance use (Duell et al., 2018; Willoughby et al., 2021). The developmental literature emphasizes that risk taking behaviors follow a nonlinear chronological trajectory that remains low in childhood, gains momentum at the onset of adolescence, reaches its peak in late adolescence, and shifts into a downward trend during adulthood (Romer et al., 2017). Consequently, adolescents exhibit a significantly higher propensity than children and adults to engage in risk taking and negative behavioral orientations, including smoking, substance abuse, and both violent and nonviolent delinquent acts (Defoe et al., 2015; Steinberg, 2008). Within this developmental spectrum, one of the most critical unhealthy risk behaviors that can delay adolescent development or cause permanent damage to health is

binge drinking. Most generally, binge drinking is defined as the consumption of excessive amounts of alcohol within a short period of time. This uncontrolled, heavy consumption of alcohol, particularly among minors, leads to a variety of acute and chronic health problems that pose direct, immediate threats to life, such as alcohol poisoning, motor vehicle accidents, and fatal injuries (Hingson & White, 2014). Conversely, while adolescents' motivation to engage in these health threatening activities is markedly higher than that of adults, their subjective risk perceptions regarding the inherent dangers of such behaviors are observed to be remarkably low (Cohn et al., 1995). The specific risk perception an adolescent develops regarding substance or alcohol use operates as one of the most crucial cognitive determinants of whether they will execute the behavior (Lipari, 2013). In addition to risk perception, multilayered dynamics including parental monitoring, peer influence, perceived accessibility of the substance, and detachment from school simultaneously drive adolescent orientation toward or protection from unhealthy risk behaviors like binge drinking.

Parental monitoring is recognized as a critical protective factor in supporting overall well-being, preserving current health status, and preventing maladaptive or risky behaviors during adolescence. Examining the historical evolution of the concept in the literature reveals that it was initially defined within a narrow criminological focus on direct physical supervision or delegating the care of a child to another adult (Glueck & Glueck, 1950). Progressing forward, Patterson and Stouthamer-Loeber (1984) expanded this framework, emphasizing that monitoring must encompass domestic rules, parental awareness of where and what children are doing, and nonjudgmental, regular information sharing. In contemporary literature, the concept was conceptualized through interrelated components of parenting behaviors (Dishion & McMahon, 1998) and the active parental knowledge regarding the adolescent's social relationships and activities (Stattin & Kerr, 2000). Other researchers in the scientific literature also conceptualized parental monitoring through alternative definitions (Borawski et al., 2003; Gabriels, 2016; Gentile et al., 2012; Racz & McMahon, 2011). Synthesizing

the common denominators across these variations, Pelham et al. (2024) define parental monitoring as the totality of behavioral processes exhibited by caregivers to acquire information regarding the adolescent's lifeworld, relationships, and activities. This monitoring mechanism is operationalized through five fundamental information gathering methods: direct questioning, rule setting for informational purposes, using objective records, direct observation, and soliciting monitoring assistance from third parties (Pelham et al., 2024).

The mechanisms through which parental monitoring deters maladaptive behaviors and enhances the parent child bond are strongly supported by contemporary theoretical frameworks. According to the theoretical architecture proposed by Pelham et al. (2025), strategic parenting behaviors, including the management of punishments and punishment expectations, focusing on peer relationships, tracking media consumption, and fostering spontaneous adolescent disclosure through strengthened attachment, play a key role in preventing the recurrence of risky actions. Indeed, looking at empirical outcomes such as adolescent substance and alcohol use, low levels of parental monitoring are directly linked to increased risk (Hoeve et al., 2009). Insufficient monitoring makes it difficult for adolescents to open up to parents and erodes family closeness, thereby establishing a foundation for risky behaviors. Conversely, high quality and intensive parental monitoring are reported to protect adolescents from sensation seeking tendencies that push them toward dangerous experimentation, while a supportive, affectionate, and communicative family environment acts as a protective shield by increasing the adolescent's life satisfaction (Inguglia et al., 2021). Meta-analyses conducted in the scientific literature clearly underscore the decisive power of parental monitoring over adolescent risk-taking behaviors. For instance, the extensive meta-analysis by Hoeve et al. (2009) confirms that low parental monitoring is among the most powerful contributors to delinquency and maladaptive behaviors in youth. Specifically focusing on adolescent alcohol use, a meta-analysis of longitudinal designs by Yap et al. (2017) examined parenting factors across two distinct

dimensions. First, alcohol specific negative parenting behaviors, such as permitting adolescent access to alcohol or parental provision of alcohol, exert large effects that permanently feed heavy consumption and alcohol related problems in subsequent years. Second, and more importantly, general parental monitoring stands out as the most robust protective factor reported in the literature against adolescent alcohol abuse and binge drinking behaviors (Yap et al., 2017).

The transition from childhood to adolescence is a dynamic phase in social life where parental influence gradually recedes and peer relationships assume a central position. Peer influence during this developmental period is defined as an active process resulting in the internalization of attitudes, thoughts, and behaviors that an individual would not normally exhibit under ordinary circumstances, driven by shared experiences within their immediate friend circle (Laursen, 2018). Epidemiological data show that adolescents focus on peers with similar attitudes and behaviors during friendship selection, and once a bond is established, these similarities are mutually reinforced through a bidirectional interaction (Sumter et al., 2009). Thus, throughout adolescence, peer influence emerges as an unavoidable and dominant factor in shaping risky and maladaptive behaviors. International literature strongly emphasizes that adolescent peer groups do not exhibit a completely homogeneous structure. When examining group dynamics, there are individuals who exhibit resistance to normative pressure and do not display dominant behaviors, alongside adolescents who smoothly conform to the group's general and pervasive behavioral patterns. Researchers state that tendencies to comply with or deviate from peer norms are related to the adolescent's status within the group, bringing variables such as popularity (Laursen & Veenstra, 2021; Sentse et al., 2014) and likeability (Lansford et al., 2007; Nieuwenhuis & Veenema, 2025) to the forefront.

Although strong and high quality peer bonds play a key role in healthy socioemotional development (Allen & Loeb, 2015), the convergence of peer pressure with adolescent specific socio-emotional and cognitive transformations and a heightened propensity for risk taking can set a stage for

serious maladaptive actions. In particular, nonnormative behaviors exhibited by peer groups and the normative structures developed within these networks function as powerful longitudinal risk factors for subsequent alcohol and substance use among youth (Price et al., 2019). The literature indicates that the transition period from middle school to high school constitutes the most precarious developmental window for integration into substance using peer groups and exposure to their consumption norms (Van Ryzin et al., 2012). The decisive power of peer dynamics over adolescent alcohol and substance use is heavily supported by large scale meta-analytic evidence. A recent meta-analysis by Watts et al. (2024) confirms that peer influence exerts a significantly positive and high effect size on adolescent substance and alcohol use. According to this meta-analytic finding, adolescents' alcohol consumption patterns shift concurrently with the consumption levels and normative expectations of their peer group. At this point, peer alcohol norms are not restricted merely to the actual consumption quantities of friends, but also encompass the subjective attitudes and degrees of approval peers develop toward alcohol use. The study by Marziali et al. (2022) on peer perceptions and approval mechanisms revealed that the attitudes of immediate social networks toward alcohol consumption exert a direct impact. When meta-analytic and empirical evidence are evaluated holistically, a peer group's normative approval of alcohol consumption represents one of the most powerful driving forces directing an adolescent toward binge drinking, whereas the presence of peer networks that disapprove of substance use operates as an effective protective barrier that significantly helps adolescents terminate their current consumption or avoid this risky path entirely.

Subjective risk perception regarding the dangers of unsafe activities functions as a proximal cognitive determinant in whether adolescents orient toward or are protected from unhealthy risk behaviors like binge drinking and substance use. Risk perception represents a subjective evaluation of a threat or danger level, filtered through various factors such as individual past experiences, age, gender, and cultural background (American Psychological Association, 2018). Although individuals generally tend to minimize the

likelihood of negative life events happening to themselves, this cognitive bias is substantially more radical and pronounced during adolescence. While adolescents' motivation to orient toward health threatening activities is significantly higher compared to adults, their perceptions regarding the acute harms of high risk behaviors, such as driving under the influence or uncontrolled alcohol consumption, are remarkably low (Cohn et al., 1995). Indeed, a comprehensive meta-analysis examining age differences in risky decision-making mechanisms (Defoe et al., 2015) empirically confirms that adolescents exhibit much riskier decisions than both children and adults in experimental settings and real life conditions. In this context, an adolescent's level of risk perception becomes a direct and powerful predictor of substance or alcohol use behavior. Adolescents who perceive high levels of harm risk show significantly lower rates of substance orientation than peers carrying low risk perceptions (Lipari, 2013). An increasing public or individual perception of risk toward alcohol, cannabis, and other illicit drugs exerts a direct reducing effect on the frequency and prevalence of these substances among youth.

In addition to risk perception, another cognitive schema shaping adolescent alcohol trajectories is the concept of perceived accessibility. Perceived accessibility represents the subjective beliefs and perceptions an adolescent develops regarding how easily, quickly, and unobstructed they can obtain alcohol or a targeted substance. This cognitive evaluation plays a central role in the initiation and maintenance of alcohol consumption, and its progression over time into an uncontrolled problem or a pattern of short term heavy consumption. Pioneering empirical findings in the literature reveal that an increase in the perceived accessibility of alcohol displays a direct correlation with elevated consumption and the emergence of clinical alcohol related problems (Jones-Webb et al., 1997; Kuntsche et al., 2008). To the extent that an adolescent perceives alcohol to be physically and socially available, they exhibit much less cognitive resistance to translating the urge for binge drinking into action. The sources of perceived accessibility and their reinforcing effects on adolescent behavior differentiate according to the environmental context, dividing into the home environment and the external

social environment. Exposure to alcohol or substances within the household and the availability of these products inside domestic boundaries not only raise the risk of early onset alcohol initiation but also longitudinally affect substance abuse behaviors during subsequent emerging adulthood years (Broman, 2016). When environmental opportunity structures are examined, it is reported that adolescents typically initiate alcohol use in external social spaces, but once consumption reaches a certain frequency, accessibility within the home environment permanently consolidates and chronicizes the behavior (Bouchard et al., 2018). Consequently, both low overall risk perception and a high subjective belief in substance accessibility emerge as the most dynamic cognitive and environmental mechanisms facilitating uncontrolled and heavy alcohol consumption among adolescents.

The quality of the bond established with the school environment plays a central role in predicting adolescent maladaptive actions and developmental deviations. School detachment is broadly defined as an adolescent's inability to bond with the school environment, a lack of institutional connectedness, or alienation from the institutional climate. This psychosocial detachment can manifest behaviorally through disruptive actions like suspension, school truancy, or excessive withdrawal from academic and social activities (Bravender, 2009). Systematic evidence from large samples reveals that detached students face a much larger risk regarding general behavioral health problems and frequently perceive their overall health status to be more negative or inadequate compared to peers with high school connectedness. Accordingly, low levels of school engagement and belonging construct a chronic problem area in the adolescent lifespan, and this academic alienation process establishes a developmental foundation directly linked to various nonnormative issues (Freidenfelt Liljeberg et al., 2011). Foremost among these nonnormative issues and behavioral outcomes threatening adolescent health are problematic alcohol use and uncontrolled consumption patterns (Li et al., 2011). In the empirical literature, Henry et al. (2012) state that school detachment dynamics are longitudinally and significantly associated with problematic alcohol use and binge drinking propensities in adolescents.

Conversely, an adolescent's feeling of belonging to the school climate and exhibiting high levels of engagement function as a protective barrier against problematic alcohol choices and risky consumption habits during youth (Dever et al., 2012; Henry et al., 2009; Simons-Morton et al., 1999). Longitudinal research examining this developmental mechanism and how school detachment operates as a risk pathway confirms a circular and cumulative effect between variables. For instance, Roebroek and Koning (2016) expressed that high school connectedness exhibited by adolescents at ages twelve and fourteen significantly predicted lower alcohol use levels at a one year follow up. The researchers additionally emphasized that heavy alcohol consumption at ages twelve and fourteen longitudinally predicted lower school connectedness scores one year later, while high school connectedness at age thirteen similarly predicted less alcohol consumption and lower binge drinking motivations at age fourteen (Roebroek & Koning, 2016). Evaluated holistically, these pieces of evidence demonstrate that school detachment creates a bidirectional developmental trajectory, depriving the adolescent of normative supervision and drawing them into heavy alcohol consumption, while alcohol consumption further degrades the academic bond, trapping the individual within a cyclical trajectory of risk.

6.2. Methodology

6.2.1. Overview and protocol deviations

The pre-specified protocol identified five alcohol outcomes for Chapter 6: 30-day alcohol use (Y_{ALC30}), 30-day intoxication (Y_{INT30}), 30-day binge drinking ($Y_{BINGE30}$), binge frequency (Y_{BFREQ}), and alcohol days ($Y_{ALCDAYS}$). All binary outcomes were estimable from the available data. Y_{BFREQ} was modelled as an ordered categorical outcome using cumulative logistic regression. $Y_{ALCDAYS}$ was not estimable as a count variable, as the survey instrument captured frequency categories rather than exact day counts; this outcome was therefore excluded.

As individual school identifiers were unavailable, the pre-specified multilevel random-intercept structure ($1|school$) could not be implemented. All models were estimated as fixed-effects logistic regression. School type (state vs. private) was included as a covariate in Block A. Bayesian logistic regression was implemented for $Y_BINGE30$ as a sensitivity analysis using the *brms* package with weakly informative priors. Model fit was assessed using AIC/BIC (frequentist) and LOO-IC (Bayesian).

Multiple testing correction (BH-FDR) was not applied in this chapter, as a single pre-specified outcome family is modelled with one primary confirmatory model. BH-FDR is applied in Chapters 8 and 9, where multiple independent outcome families are tested simultaneously.

6.2.2. Hierarchical block structure

Five hierarchical models were estimated for $Y_BINGE30$, each adding one predictor block:

- Model 6.1 (Block A): gender, school type, region, family wealth
- Model 6.2 (Block A+B): + family support, parental rule-setting
- Model 6.3 (Block A+B+C): + truancy (skipping), absence (other reasons)
- Model 6.4 (Block A+B+C+D): + peer alcohol use
- Model 6.5 (Block A+B+C+D+E): + perceived risk of occasional alcohol use, perceived risk of binge drinking, alcohol accessibility

The same covariate structure was applied to Y_INT30 and Y_ALC30 as full models. Two pre-specified interaction terms were tested in the full binge drinking model: gender $\times$ peer alcohol use and gender $\times$ parental monitoring (*rules_score*). The pre-specified mediation model (SEM 6.5) examined peer alcohol use as exposure, binge drinking as mediator, and truancy as outcome, estimated with 1,000 bootstrap replications.

6.3. Results

6.3.1. Hierarchical model comparison — binge drinking (Y_BINGE30)

A series of hierarchical logistic regression models was estimated to examine predictors of 30-day binge drinking. Sequential block entry produced consistent improvements in model fit. The demographic block alone (Model 6.1; AIC = 1066.34) provided a limited baseline. The addition of family variables (Block B; Model 6.2; AIC = 1067.87) produced negligible improvement. School-related variables (Block C; Model 6.3; AIC = 1040.00) and peer alcohol use (Block D; Model 6.4; AIC = 929.62) each produced progressive improvements, with the peer block contributing the largest single increment (Δ AIC = -110.37). The full model (Model 6.5; AIC = 610.60) incorporating perceived risk and alcohol accessibility demonstrated the best overall fit, with the addition of Block E producing the largest improvement across all steps (Δ AIC = -319.02).

Table 6.1. Hierarchical logistic regression model comparison for 30-day binge drinking (Y_BINGE30; $N = 689$)

Model	Block added	AIC	BIC	Δ AIC	AUC
M6.1	A: Demographic	1066.34	1090.77	—	—
M6.2	B: Family	1067.87	1096.76	+1.53	—
M6.3	C: School engagement	1040.00	1073.34	-27.87	—
M6.4	D: Peer alcohol use	929.62	966.87	-110.37	—
M6.5	E: Risk perception & accessibility	610.60	656.11	-319.02	0.814

Note. AIC = Akaike information criterion; BIC = Bayesian information criterion; Δ AIC = change in AIC relative to preceding model; AUC = area under the receiver operating characteristic curve; — = not reported for intermediate models. Block A: gender, school type, region, family wealth. Block B adds family support and parental rule-setting. Block C adds truancy and other-reason absence. Block D adds peer alcohol use. Block E adds perceived risk of occasional alcohol use, perceived risk of binge drinking, and alcohol accessibility.

6.3.2. Full model results

Y_BINGE30 (30-day binge drinking; $n = 689$). Two predictors demonstrated statistically significant independent associations. Peer alcohol use was the strongest predictor ($\beta = 0.514$, $SE = 0.096$, $p < .001$), indicating that students with more alcohol-using peers were substantially more likely to report binge drinking. Alcohol accessibility was similarly strong ($\beta = 0.538$, $SE = 0.097$, $p < .001$), reflecting that perceived ease of obtaining alcohol independently predicts binge drinking. Perceived risk of occasional alcohol use showed a significant protective association ($\beta = -0.312$, $SE = 0.131$, $p = .017$). Gender, school type, region, family wealth, family support, parental monitoring, truancy, other-reason absence, and binge-specific risk perception did not reach statistical significance (all $p > .05$).

Y_INT30 (30-day intoxication; $n = 689$). Peer alcohol use ($\beta = 0.510$, $SE = 0.134$, $p < .001$), alcohol accessibility ($\beta = 0.441$, $SE = 0.146$, $p = .002$), and perceived risk of occasional alcohol use ($\beta = -0.473$, $SE = 0.183$, $p = .010$) were significant predictors, consistent with the binge drinking model. Other-reason absence showed a marginal positive association ($\beta = 0.220$, $SE = 0.118$, $p = .062$) that did not reach conventional significance.

Y_ALC30 (30-day alcohol use; $n = 689$). Peer alcohol use ($\beta = 0.714$, $SE = 0.096$, $p < .001$), alcohol accessibility ($\beta = 0.478$, $SE = 0.088$, $p < .001$), truancy ($\beta = 0.218$, $SE = 0.091$, $p = .016$), and perceived risk of occasional alcohol use ($\beta = -0.394$, $SE = 0.130$, $p = .002$) were all significant predictors. The alcohol use model demonstrated the strongest discriminative performance across the three outcomes ($AUC = 0.848$).

Table 6.2. Full model frequentist logistic regression coefficients for three alcohol outcomes (N = 689)

Predictor	Y_BINGE30			Y_INT30			Y_ALC30		
	β	SE	p	β	SE	p	β	SE	p
Block A: Demographic									
Gender (female)	−0.155	0.171	.366	−0.079	0.214	.711	−0.062	0.159	.697
School type (private)	0.157	0.192	.413	0.041	0.238	.864	0.213	0.178	.231
Region	−0.004	0.109	.968	0.005	0.136	.970	0.026	0.101	.797
Family wealth	0.009	0.082	.912	0.008	0.102	.940	0.038	0.076	.617
Block B: Family									
Family support	−0.048	0.074	.519	−0.052	0.092	.571	−0.071	0.069	.303
Parental rule-setting	0.016	0.073	.825	0.040	0.091	.661	−0.023	0.068	.730
Block C: School engagement									
Truancy	0.092	0.075	.218	0.087	0.093	.350	0.218	0.091	.016
Absence (other)	0.090	0.069	.191	0.220	0.118	.062	0.081	0.065	.213
Block D: Peer influence									
Peer alcohol use	0.514	0.096	< .001	0.510	0.134	< .001	0.714	0.096	< .001
Block E: Perception & accessibility									
Perceived risk (occasional use)	−0.312	0.131	.017	−0.473	0.183	.010	−0.394	0.130	.002
Perceived risk (binge/heavy use)	−0.164	0.114	.148	−0.112	0.150	.454	−0.098	0.107	.358
Alcohol accessibility	0.538	0.097	< .001	0.441	0.146	.002	0.478	0.088	< .001

6.3.3. Ordinal model — binge frequency (Y_BFREQ)

A cumulative logistic regression model was estimated for binge frequency as an ordered outcome (1 = never to 6 = 10 or more times). Results were consistent with the binary model. Peer alcohol use ($b = 0.542$, $t = 5.76$), alcohol accessibility ($b = 0.589$, $t = 5.97$), and perceived risk of occasional alcohol use ($b = -0.367$, $t = -2.92$) showed strong associations across the frequency spectrum. Other-reason absence ($b = 0.170$, $t = 1.99$) and truancy ($b = 0.150$, $t = 1.79$) showed marginal associations.

The proportional odds assumption was evaluated using the `poTest` procedure. The overall test was not significant ($\chi^2(64) = -30.35$, $p = 1.000$). Examination of individual predictors indicated violations for `regionLefke` ($p < .001$), `famsup_score` ($p = .015$), and `absent_other_n` ($p = .037$). Given that these violations are likely attributable to sparse data in the upper frequency categories rather than genuine nonproportionality, and that the primary predictors of interest (peer alcohol use, accessibility, perceived risk) showed no evidence of violation (all $p > .09$), the ordinal model is retained with this limitation noted.

6.3.4. Model diagnostics

All three binary outcome models demonstrated strong discriminative performance. The `Y_ALC30` model achieved the highest AUC (0.848, 95% CI [0.818, 0.877]), followed by `Y_INT30` (AUC = 0.825, 95% CI [0.778, 0.872]) and `Y_BINGE30` (AUC = 0.814, 95% CI [0.778, 0.849]). Variance inflation factors for all predictors in the full binge model were below 2.0 (maximum $\text{GVIF}^{\wedge}(1/2\text{Df}) = 1.32$ for perceived risk items), confirming the absence of problematic multicollinearity.

Calibration of the full binge drinking model was excellent. The logistic calibration curve closely followed the ideal diagonal (Slope = 1.00, Intercept ≈ 0.00), with a maximum calibration error of $E_{\text{max}} = 0.047$ and a mean calibration error of $E_{\text{avg}} = 0.013$. The Spiegelhalter calibration test was not

significant ($S:z = 0.202$, $p = .840$), confirming adequate calibration across the full range of predicted probabilities.

Influence diagnostics were assessed using Cook's distance. While 49 observations exceeded the $4/n$ threshold (0.006), maximum Cook's distance was 0.041, indicating no substantively influential cases.

6.3.5. Interaction models

Two pre-specified interaction terms were tested in the binge drinking model: gender $\times$ peer alcohol use and gender $\times$ parental monitoring. Neither interaction reached statistical significance (gender $\times$ peer: $\beta = 0.209$, $p = .236$; gender $\times$ rules: $\beta = 0.055$, $p = .779$). Both interaction models produced higher AIC values relative to the main-effects-only full model (M6.5 AIC = 610.60; M6.6 AIC = 611.19; M6.7 AIC = 612.52; M6.8 AIC = 613.02), providing no support for gender moderation of either pathway.

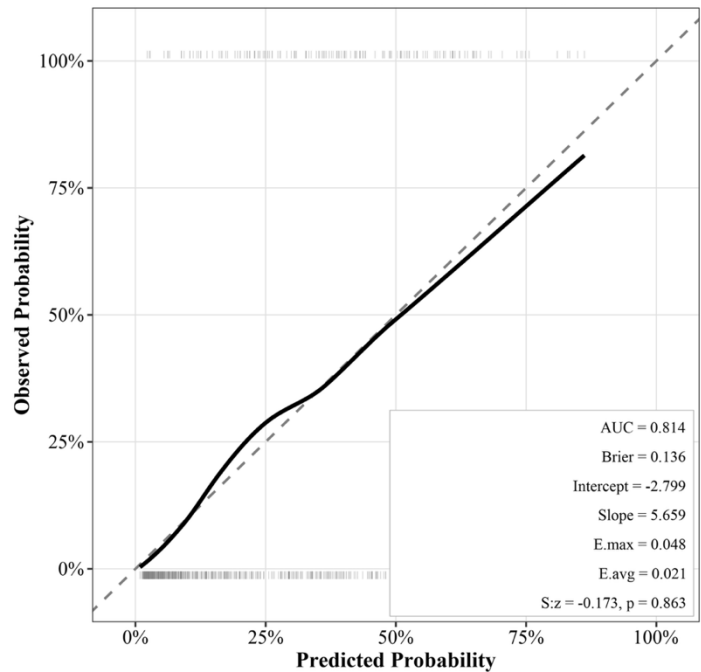


Figure 6.1. Calibration plot – binge drinking 30 days (M6.5)

6.3.6. Bayesian replication

The full binge drinking model was replicated using Bayesian logistic regression with weakly informative priors ($\beta \sim \text{Normal}(0, 2.5)$; Intercept $\sim \text{Normal}(0, 5)$). All chains converged satisfactorily (Rhat = 1.00 for all parameters; Bulk ESS > 3,738; Tail ESS > 2,792). Bayesian estimates were fully consistent with frequentist results. Peer alcohol use (posterior mean = 0.53, 95% CrI [0.34, 0.72]) and alcohol accessibility (0.55, 95% CrI [0.37, 0.74]) showed credible positive associations, while perceived risk of occasional alcohol use demonstrated a credible negative association (-0.32 , 95% CrI [-0.58 , -0.05]). All other predictors had credible intervals spanning zero. All Pareto-k estimates were good ($k < 0.7$), and LOO-IC was 612.9, closely matching the frequentist AIC.

6.3.7. Mediation analysis

A path model was estimated to examine whether binge drinking mediates the association between peer alcohol use and truancy, with 1,000 bootstrap replications. The indirect effect of peer alcohol use on truancy via binge drinking was small but statistically significant (indirect effect = 0.012, SE = 0.005, 95% bootstrap CI [0.003, 0.023], $p = .012$). The direct effect of peer alcohol use on truancy remained significant after accounting for the mediator (direct effect = 0.062, 95% CI [0.036, 0.087], $p < .001$), indicating partial mediation. The total effect was 0.074 (95% CI [0.050, 0.099], $p < .001$).

Table 6.3. Path model: binge drinking as mediator of peer alcohol use on truancy (N = 689; bootstrap = 1,000)

Effect	Estimate	SE	95% Bootstrap CI	p
Total effect (peer alcohol use $\rightarrow$ truancy)	0.074	0.013	[0.050, 0.099]	< .001
Direct effect (peer alcohol use $\rightarrow$ truancy)	0.062	0.013	[0.036, 0.087]	< .001

Effect	Estimate	SE	95% Bootstrap CI	p
Indirect effect via binge drinking	0.012	0.005	[0.003, 0.023]	.012

Note. Estimates represent unstandardized path coefficients. Indirect effect = product of path a (peer alcohol use → binge drinking) × path b (binge drinking → truancy). The significant indirect effect alongside a retained direct effect indicates partial mediation. Peer alcohol use = exposure; Y_BINGE30 (30-day binge drinking) = mediator; truancy = outcome.

6.3.8. Average marginal effects

Average marginal effects (AME) were computed for all three binary alcohol outcomes. For *Y_BINGE30*, alcohol accessibility showed the largest marginal effect (AME = 0.073, SE = 0.012, $p < .001$), followed by peer alcohol use (AME = 0.069, SE = 0.012, $p < .001$) and perceived risk of occasional alcohol use (AME = -0.042, SE = 0.017, $p = .016$). For *Y_INT30*, peer alcohol use (AME = 0.035, SE = 0.009, $p < .001$), alcohol accessibility (AME = 0.031, SE = 0.010, $p = .003$), and perceived risk (AME = -0.033, SE = 0.013, $p = .010$) showed significant marginal effects. For *Y_ALC30*, peer alcohol use showed the largest effect (AME = 0.102, SE = 0.011, $p < .001$), followed by alcohol accessibility (AME = 0.068, SE = 0.012, $p < .001$), perceived risk (AME = -0.056, SE = 0.018, $p = .002$), and truancy (AME = 0.031, SE = 0.013, $p = .014$).

6.4. Discussion

The findings of this study indicate that the family and peer environments can exhibit varying levels of influence in contextualizing adolescent binge drinking and general alcohol consumption behaviors. At the inception of this research, it was hypothesized that as parents' level of knowledge regarding their children's activities and social circles increased, the propensity for alcohol use would systematically decline. However, the analyses demonstrate that when other psychosocial factors and peer dynamics are simultaneously accounted for, the direct protective effect of parental monitoring may attenuate, and it may not play a decisive role on its own.

Accordingly, the expectation regarding the directly inhibitory role of parental monitoring was not fully supported. Given the widespread studies in the literature suggesting that parental monitoring acts as a powerful shield against adolescent alcohol risks and maladaptive behaviors (Hoeve et al., 2009; Yap et al., 2017), the marginalization of this direct effect might initially appear contradictory. Yet, this situation can be explained through the direct or indirect operating modalities of protective mechanisms. Relevant theoretical approaches argue that rather than establishing a directly prohibitive mechanism, family supervision may exert its influence through the ability to manage the adolescent's friend circle and restrict risky actions during unstructured time periods (Pelham et al., 2025).

The loss of visibility of the family influence on the direct pathway when peer dynamics and cognitive perceptions are evaluated in the current study suggests that parental monitoring might actually be providing an indirect protection through mediating mechanisms. In other words, rather than directly preventing adolescent alcohol consumption, domestic rule-setting and tracking processes construct an indirect barrier by lowering the probability of exposure to substance-using friend groups or by sharpening awareness against risks (Pelham et al., 2025). In contrast to this indirect and more distally emerging effect of the family, the alcohol consumption status of the peer environment stands out as a highly dominant risk factor on binge drinking and general alcohol orientations, even after controlling for all other environmental and individual elements (Price et al., 2019; Van Ryzin et al., 2012). The pronounced explanatory power obtained by examining peer dynamics strongly supports the assumption regarding the transformative impact of the friend circle. This finding is substantially aligned with large-scale meta-analytic studies stating that the peer environment holds a remarkable weight over substance and alcohol orientations during the adolescent period (Watts et al., 2024). Within the context of social learning and peer socialization processes, adolescence is a dynamic stage where an individual's need to adapt to the friend group and the search for social approval can intensify (Laursen, 2018; Sumter et al., 2009). It is evaluated that an adolescent who has alcohol-

consuming friends in their immediate circle can internalize both the visible behavioral patterns of the group and their implicit approval of alcohol use over time (Marziali et al., 2022). In this process, the act of binge drinking offers a tool for gaining acceptance, integration, or socialization within the friend group. It appears that peer norms can emerge as a more proximal and guiding risk factor in adolescent alcohol trajectories compared to the direct effect of parental protectiveness.

Another important dimension addressed in the research is the role played by cognitive processes and mental schemas that adolescents develop toward alcohol and substance use. It is widely known in the literature that individuals generally tend to minimize the likelihood of negative events happening to themselves, but this cognitive bias can become much more pronounced and dramatic during adolescence (Cohn et al., 1995). The findings indicate that as the subjective risk perception regarding the dangers of alcohol increases, adolescents' binge drinking and consumption propensities may decline. This situation supports the views in the literature that subjective evaluations developed by an individual against the potential harms of substances can function as a protective barrier and a deterrent element (Lipari, 2013). In contrast to this deterrent aspect of cognitive schemas, perceived accessibility, which is an adolescent's subjective belief regarding how easily, quickly, and unobstructed they can reach alcohol, emerges as a powerful risk factor and a facilitating ground for binge drinking and alcohol consumption. As emphasized in the literature, an increase in the perception of accessibility toward a substance shapes the alcohol consumption trajectories of adolescents, and can trigger the transition from the initiation stage to uncontrolled heavy consumption patterns (Jones-Webb et al., 1997; Kuntsche et al., 2008). Furthermore, being exposed to substances within the home environment or the availability of these substances in the external social environment may set a stage for permanently consolidating consumption behaviors and transferring them into subsequent developmental stages (Bouchard et al., 2018; Broman, 2016). Therefore, it can be argued that both low overall risk perception and a high subjective belief in substance

accessibility operate as dynamic mechanisms facilitating adolescents' orientation toward heavy alcohol consumption patterns. These outputs support the assumptions regarding the dual deterrent and facilitating role of perceptual factors.

When the moderating role of gender in these processes is examined, it is understood that the effects of parental monitoring and peer exposure on alcohol use do not show a distinct difference between female and male students. Although it was initially predicted that the magnitude or direction of these psychosocial relationships might change according to gender, the obtained results do not support this expectation. This situation suggests that the operating mechanisms of family protectiveness and peer pressure in the adolescent world may possess a gender-invariant and more universal nature. It is known that propensity to orient toward risk-taking and maladaptive behaviors generally rises along with socio-affective and cognitive changes during the adolescent period (Duell et al., 2018; Willoughby et al., 2021), and that adolescents can exhibit riskier decisions than both children and adults in experimental settings and real-life conditions (Defoe et al., 2015). The current findings indicate that these developmental risk and protection dynamics may be shaped through highly similar psychosocial processes instead of diverging pathways for female and male adolescents.

The quality of the bond established with the school ecosystem plays a central role in contextualizing adolescent maladaptive actions and developmental deviations. School detachment is broadly defined as an adolescent's inability to bond with the school environment, a lack of institutional connectedness, or alienation from the institutional climate, and this situation can manifest behaviorally through disruptive actions like suspension, school truancy, or withdrawal from academic and social activities (Bravender, 2009). It is known in the literature that detached students can face a larger risk regarding general behavioral health problems, and this academic alienation process can establish a foundation for various nonnormative issues (Freidenfelt Liljeberg et al., 2011). Foremost among these behavioral problems are problematic alcohol use and uncontrolled

consumption patterns (Li et al., 2011). One of the most original empirical contributions of this study is demonstrating that the act of binge drinking plays a significant mediating role between the peer environment's alcohol consumption and school truancy, which serves as an indicator of school detachment. Accordingly, it is understood that a portion of the effect of peer exposure on truancy is transmitted through binge drinking behavior. This developmental mechanism shifts the longitudinal relationships between school detachment and problematic substance use emphasized by Henry et al. (2012) into a more dynamic framework. The obtained outputs substantially overlap with the longitudinal findings put forward by Roebroek and Koning (2016) that highlight the reciprocal, cyclical relationship between school connectedness and alcohol consumption. An adolescent's feeling of belonging to the school climate and exhibiting high levels of engagement function as a powerful protective barrier against risky consumption habits and problematic alcohol decisions during youth (Dever et al., 2012; Henry et al., 2009; Simons-Morton et al., 1999). However, when this bond is unraveled, peer pressure drifts the adolescent into heavy alcohol consumption, while alcohol consumption further collapses the academic connection, increasing absenteeism and trapping the individual within a mutually reinforcing trajectory of risk. In summary, it is suggested that school detachment is not merely an antecedent or a consequence of alcohol, but on the contrary, it can create a cumulative behavioral cascade effect interacting with peer and environmental dynamics.

When the results obtained from the current research are evaluated alongside historical ESPAD data, they exhibit meaningful developments. Although longitudinal reports at the continental level show that a general downward trend dominated the prevalence of adolescent alcohol consumption over the past three decades, chronic risk areas such as early age alcohol initiation and intoxication experiences preserve their presence (ESPAD Group, 2025). On the other hand, the perceived accessibility dimension, which stands out as one of the powerful factors triggering binge drinking in the current study, also clearly aligns with continental findings. The fact that a large

majority of students across Europe find it highly easy to obtain alcoholic beverages, and that this belief of availability occasionally runs even higher among female students, demonstrates how powerfully environmental opportunity structures occupy a place in adolescents' mental schemas. The binge drinking pattern, which is the primary focus of the current research, continues to be a serious public health issue by recording a much slower and more resistant decline over time compared to general alcohol consumption. When the historical progression of the gender factor is examined, it is striking that while binge drinking propensities, which peaked among male adolescents in past years, show a distinct decrease, the decline among female adolescents remained highly limited over the last thirty-year period, presenting an almost stationary course. This historical convergence and the closing gender gap also support the finding reached in our study that gender does not play a moderating role within a historical context. The results explicitly suggest that peer pressure, social approval mechanisms, and the perception of accessibility now construct a gender-invariant, universal corridor of risk in modern youth culture.

6.5. Conclusion and Policy Recommendations

This chapter details a comprehensive exploration of the socioecological and perceptual mechanisms underlying adolescent alcohol use, intoxication, and binge drinking. The empirical outcomes generated from frequentist hierarchical structures and Bayesian replication confirm that peer alcohol use and high perceived availability represent the most dominant, proximal facilitators driving heavy episodic drinking among youth. While parental monitoring loses its direct statistical significance in fully adjusted models, it operates as an essential distal anchor that shapes peer selection and cognitive risk boundaries. Furthermore, path analysis establishes a crucial behavioral cascade where binge drinking partially mediates the link between peer exposure and school truancy. These tightly coupled dynamics underscore that adolescent alcohol engagement is an institutional and socio-environmental challenge rather than a collection of isolated behaviors.

The findings suggest that effective alcohol prevention policies in Northern Cyprus should target peer influence, school engagement, and alcohol accessibility.

First, schools should implement peer-led prevention programs and social norm campaigns that promote healthy behaviors and correct misperceptions regarding adolescent drinking prevalence.

Second, routine attendance monitoring and early intervention mechanisms should be used to identify and support students showing early signs of disengagement or alcohol-related risk behaviors.

Finally, enforcement of age-restriction laws and compliance inspections around school areas should be strengthened to reduce perceived and actual access to alcohol among adolescents.

6.6. Bias and Limitations

Several limitations should be considered when interpreting the findings. First, the cross-sectional design prevents causal inference and limits conclusions regarding the temporal ordering of the identified associations. Unmeasured factors, such as family history of substance use or psychological characteristics, may also have introduced residual confounding.

Second, the absence of school-level identifiers prevented multilevel modeling and restricted the analyses to fixed-effects approaches, potentially leading to modest underestimation of standard errors due to within-school clustering.

Third, limitations in the survey instrument required modifications to the original analytical plan. Alcohol consumption frequency could not be modeled as a true count outcome, and sparse observations in higher consumption categories created minor estimation challenges in ordinal analyses.

Finally, all measures were based on self-reported data and are therefore subject to recall and social desirability biases. In addition, external validation was not feasible, meaning that the reported performance metrics reflect internal model fit rather than demonstrated generalizability to other populations.

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