

Chapter 2

Theoretical Framework and Hypothesis Structure

Teyfide Tecel Hatipoğlu* 

**Northern Cyprus Prime Minister's Anti-Drug Commission, Server Somuncuoğlu Street, No:10, Flat:1, Köşklüçiftlik / Nicosia, 9001, North Cyprus*

DOI: [10.70020/BI.20260803.2](https://doi.org/10.70020/BI.20260803.2)

2.1. Theoretical Framework

Theoretical Background for H1: According to Behavioral Theory, a child's behaviors under parental supervision are influenced by reward and punishment mechanisms. Therefore, reward and punishment systems defined by clear rules ensure that undesirable or problematic behaviors are kept under control (Meng et al., 2025). Furthermore, according to Social Control Theory (Hirschi, 1969), even if individuals possess an innate drive to engage in problematic behavior, they can abstain from rule-violating actions through various societal mechanisms, such as parental monitoring and the strength of the parent-child bond (Hu & Wang, 2022). Mahabee-Gittens et al. (2013) state that parental monitoring is an essential protective factor in preventing the initiation of tobacco use. The authors stress the importance of parents being actively involved in the lives of their children and taking steps to address the influence of smoking peers. Similarly, research by Szoko et al. (2021) found that parental monitoring serves a protective role against electronic cigarette use among adolescents. This protective effect extends beyond tobacco to other addictive substances, including alcohol and cannabis. For instance, a meta-

analysis conducted by Lac and Crano (2009) established a negative association between parental monitoring and cannabis use. Furthermore, consistent parental knowledge of a child's whereabouts and social circles serves as a primary deterrent against the transition to more complex patterns of substance use, such as binge drinking and polydrug use, by limiting opportunities for unsupervised risky behaviors. The researchers highlight that high levels of parental monitoring significantly reduce substance involvement and that these outcomes are consistent across various countries and cultures.

Theoretical Background for H2: According to the Social Development Model proposed by Hawkins and Weis (1985), emotional attachments to substance-using peers emerge as a primary cause of substance use. In accordance with the Bioecological Model of Development introduced by Bronfenbrenner in 1979, the social environment surrounding an adolescent, particularly the peer microsystem, significantly influences all behaviors including substance use. Within the social development model, peer influence contributes to adolescent substance use in both direct and indirect ways. The model treats peer influence as a socialization mechanism, aligning with Social Learning Theory by suggesting that adolescents observe and model the behaviors of their social circle. Consequently, individuals modify their attitudes and behaviors to align with those of their friends. In a study conducted by Barnett et al. (2022), it was emphasized that individuals who used cannabis in the last 30 days gravitated toward others with similar patterns of use, leading to a convergence in consumption levels over time. Ivaniushina and Titkova (2021) stated in their meta-analysis that adolescents regulate their own alcohol intake according to their drinking peers. Similarly, another meta-analysis by Watts et al. (2024) highlighted that adolescents alter their substance use behaviors under peer influence. This peer-led socialization process is a universal risk factor that extends across various substances, including tobacco and polydrug use, as peers provide the social reinforcement and the normative environment for such behaviors.

Theoretical Background for H3: The Health Belief Model utilizes perceived risk and susceptibility, self-efficacy, barriers, benefits, and cues to

action to understand behavior changes associated with substance use (Cummings et al., 1978). In this framework, the perceived risk of harm acts as a primary psychological deterrent. In a study examining substance use trends in the United States, Lipari (2013) stated that a decrease in perceived risk is associated with an increase in cannabis use. The same study notes that lower perceived risk for alcohol and cannabis among older adolescents is a factor that increases the likelihood of substance use in subsequent years. While risk perception functions as an internal barrier, perceived availability serves as a facilitator by reducing the effort required to engage in the behavior. Broman (2016) emphasizes that perceived accessibility is a significant factor in adolescent initiation of use and indicates that substances available in the home environment pose a major risk by normalizing access. Furthermore, research conducted by Warren et al. (2015) highlight that the perception of easy access to substances stands out as a critical risk factor for adolescents, illustrating how environmental availability shapes the cognitive decision-making process.

Theoretical Background for H4: Gender Socialization is an overarching concept that incorporates social learning and cognitive developmental models to understand how individuals learn and internalize gender-related expectations and norms from infancy to adulthood. For instance, Social Structure Social Learning Theory (SSSL) emphasizes that gender roles expose individuals to different levels of social learning. It highlights that while males may engage in higher substance use due to risks arising from gender roles attributed to men, peer relationships may be more prominent in substance use among females (Akers, 2017). Keogh-Clark et al. (2021) point out that male adolescents may be encouraged, either implicitly or explicitly, by family members or societal norms toward the use of cigarettes and cannabis. Such gendered expectations may also moderate the effectiveness of parental monitoring; for instance, stricter social control over females might strengthen the protective role of monitoring, whereas broader social permissions for males could diminish its impact. In contrast, societal norms for female adolescents generally are more conservative, resulting in

lower rates of substance use within this group. Furthermore, research findings on peer influence remain nuanced: while Cutrín et al. (2017) stated that peer exposure constitutes a major risk factor significantly contributing to substance use in males, others suggest a stronger socialization effect for females, justifying the need to examine gender as a moderating factor in these complex associations.

2.2. Hypothesis Structure

Four pre-specified hypotheses guide the confirmatory analyses presented in Chapters 5 through 9. These hypotheses were formulated prior to data analysis and are mapped directly to the analytical models in Section 2.3 (see table 2.1).

H1 (Parental Monitoring). Parental monitoring is inversely associated with tobacco use (*Y_VAPE30*), binge drinking (*Y_BINGE30*), cannabis use (*Y_CAN12*), and polydrug use (*Y_POLY*), reflecting the protective role of parental rule-setting and knowledge of whereabouts (Block B effect in full models).

H2 (Peer Exposure). Peer substance use is positively associated with all core outcomes, consistent with social learning and peer socialization mechanisms (Block D effect in full models).

H3 (Risk Perception and Availability). Perceived risk of substance use is inversely associated with outcomes, while perceived availability is positively associated, reflecting the dual role of perceptual factors as deterrents and facilitators of use (Block E effect in full models).

H4 (Gender Moderation). Gender moderates the associations between parental monitoring and substance use, and between peer exposure and substance use, such that these associations differ in magnitude or direction between male and female students (pre-specified interaction terms in all primary models).

2.3. Hypothesis–Model Mapping

Table 2.1. Mapping of study hypotheses to predictors, outcomes, and model blocks

Hypothesis	Predictor	Outcome(s)	Block
H1	Parental monitoring (rules score, knowledge score)	Y_VAPE30, Y_BINGE30, Y_CAN12, Y_POLY	B
H2	Peer substance use (domain-specific)	All core outcomes	D
H3	Perceived risk (domain-specific)	All core outcomes	E
H3	Perceived availability (domain-specific)	All core outcomes	E
H4	Gender $\times$ parental monitoring	Y_VAPE30, Y_BINGE30, Y_GAMB	A $\times$ B
H4	Gender $\times$ peer exposure	Y_VAPE30, Y_BINGE30, Y_GAME, Y_GAMB	A $\times$ D

Note. Y_CAN12 and Y_POLY were not estimable in the current sample due to near-zero prevalence (see Chapter 7). Models involving these outcomes were not conducted; the corresponding hypotheses (H1–H3) were therefore not testable for cannabis and polydrug outcomes.

2.4. Theoretical-Causal Integration

The theoretical perspectives addressed in Section 2.1 are more than merely descriptive frameworks; each possesses a distinct causal structure that is represented as a Directed Acyclic Graph (DAG) and is operationalized through the hierarchical block-entry model design used throughout this study. This section explicitly outlines these connections.

Social Control Theory maps directly onto Block B (Family). The theory posits that parental monitoring -conceptualized here through the Rule-setting subscale (C53a–b) and the Parental Knowledge subscale (C53c–d)- reduces adolescent substance use by constraining opportunities and reinforcing conformist norms.

Social Learning Theory aligns with Block D (Peers). The theory predicts that peer substance use influences individual use through observational modeling and differential reinforcement.

The Health Belief Model maps onto Block E (Perceptions). It is hypothesized that the perceived risk of substance use acts as a direct deterrent to use, while perceived availability serves as a facilitator.

Gender Socialization Theory guides the interaction structure of this study rather than forming an independent main effect block. The theory predicts that the protective effect of parental monitoring is stronger among female students, as parents tend to exercise more intensive supervision over daughters. Conversely, it is assumed that the risk-increasing effect of peer exposure is stronger among male students, as male peer groups are more likely to harbor members who use substances and exert greater normative pressure toward use.

2.5. Hypothesis Hierarchy

Not all analyses reported in this book carry the same evidentiary weight. In accordance with the pre-specified framework established in Chapter 1, all hypotheses and analyses are assigned to one of three hierarchical layers: primary/confirmatory, secondary, and exploratory. This stratification determines how results are reported, how multiple testing controls are implemented, and how conclusions are framed.

2.5.1. Primary (confirmatory) hypotheses

Hypotheses H1 through H4 constitute the primary layer. These hypotheses were fully formulated prior to any data access, correspond to well-grounded theoretical predictions, and are tested using pre-specified model formulations. Results for H1-H4 are reported using full inferential language (significance tests, confidence intervals, effect sizes) and are subjected to Benjamini-Hochberg False Discovery Rate (BH-FDR) correction in chapters where multiple outcome families are tested simultaneously (Chapters 8 and

9). A finding that does not survive the BH-FDR correction is reported as not significant at the family-wise adjusted threshold and is not used to support confirmatory conclusions.

2.5.2. Secondary hypotheses

Secondary hypotheses pertain to relationships that are theoretically grounded but are not at the core of the pre-specified confirmatory program. These encompass the independent effects of school-related variables - truancy and academic performance - on substance use outcomes, as well as the role of family support (as a concept distinct from parental monitoring) as a protective factor.

Secondary hypotheses are tested within the same hierarchical model framework as the primary hypotheses and reported using standard inferential statistics; however, the results are interpreted with greater caution and are not subject to the same requirement for replicability as the primary hypotheses. Notably, because the consistent non-significance of H1 (parental monitoring) -an unexpected null result- raises questions regarding the relative contributions of monitoring versus support within the family domain, these secondary findings are discussed extensively in that context.

2.5.3. Exploratory hypotheses

Exploratory analyses encompass analyses conducted in response to observed data characteristics following data access or those that were envisioned but not formally pre-specified.

Results from exploratory analyses are explicitly labeled as such; they are not used to revise the conclusions of confirmatory tests and are presented as hypothesis-generating rather than hypothesis-testing.

2.6. Competing Models

The theoretical framework presented in Section 2.1 is not the only explanation for adolescent substance use aligned with the current literature. Two pairs of competing theoretical models are of particular importance for the interpretation of the findings in this book and are reviewed here to situate the predicted and observed outcomes within a broader theoretical context.

2.6.1. The peer-dominant model versus the family-dominant model

A long-standing debate in the literature on adolescent substance use concerns whether family influences or peer influences constitute the stronger proximal determinant of use. The family-dominant approach, grounded in Social Control Theory, argues that parenting practices -specifically monitoring, rule-setting, and emotional bonding- are the primary protective mechanisms, and that peer influences are largely mediated through opportunity structures regulated by the family (Hirschi, 1969; Steinberg et al., 1994).

Conversely, the peer-dominant approach, rooted in Social Learning Theory, posits that as adolescents transition into secondary education, the transmission of peer norms becomes the primary causal mechanism, with family variables receding to the role of distal confounders (Akers, 1977; Simons-Morton & Farhat, 2010).

The hierarchical block-entry design utilized in this book allows for a direct empirical arbitration between these two perspectives.

If the family-dominant model were correct, Block B variables should provide significant improvements in model fit and produce significant coefficients in fully adjusted models.

If the peer-dominant model were correct, Block D variables would be expected to dominate, and Block B coefficients would be expected to attenuate toward zero after peer variables are introduced.

2.6.2. The gateway hypothesis versus the common liability model

The Gateway Hypothesis suggests that substance use follows a developmentally sequenced progression; according to this hypothesis, the use of legal substances (alcohol, tobacco) increases the likelihood of subsequent illicit drug use through pharmacological sensitization, the expansion of social networks, or reduced risk perception (Fergusson & Horwood, 2000; Kandel, 1975). Conversely, the Common Liability Model argues that the correlations observed among substance use behaviors reflect a shared underlying liability -whether genetic, personality-based, or socially situated- rather than a causal sequence (Vanyukov et al., 2012). Under the common liability model, polysubstance use and co-occurring behavioral risks do not progress through a gateway but instead arise from the same underlying factors.

References

- Akers, R. L. (1977). *Deviant behavior: A social learning approach* (2nd ed.). Wadsworth.
- Akers, R. L. (2017). *Social learning and social structure: A general theory of crime and deviance*. Routledge.
- Barnett, N. P., DiGiuseppi, G. T., Tesdahl, E. A., & Meisel, M. K. (2022). Peer selection and influence for marijuana use in a complete network of first-year college students. *Addictive Behaviors*, 124, 107087. <https://doi.org/10.1016/j.addbeh.2021.107087>
- Broman, C. L. (2016). The availability of substances in adolescence: Influences in emerging adulthood. *Journal of Child & Adolescent Substance Abuse*, 25(5), 487–495. <https://doi.org/10.1080/1067828X.2015.1103346>
- Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Harvard University Press.
- Cummings, K. M., Jette, A. M., & Rosenstock, I. M. (1978). Construct validation of the health belief model. *Health Education Monographs*, 6(4), 394–405. <https://doi.org/10.1177/109019817800600406>
- Cutrín, O., Gómez-Fraguela, J. A., & Sobral, J. (2017). Gender differences in youth substance use: The effects of parenting through a deviant peer group. *Journal of Child & Adolescent Substance Abuse*, 26(6), 472–781. <https://doi.org/10.1080/1067828X.2017.1369203>
- Fergusson, D. M., & Horwood, L. J. (2000). Does cannabis use encourage other forms of illicit drug use? *Addiction*, 95(4), 505–520. <https://doi.org/10.1046/j.1360-0443.2000.9545053.x>
- Hawkins, J. D., & Weis, J. G. (1985). The social development model: An integrated approach to delinquency prevention. *The Journal of Primary Prevention*, 6(2), 73–97. <https://doi.org/10.1007/BF01325432>
- Hirschi, T. (1969). *Causes of Delinquency*. University of California Press.
- Hu, Y. T., & Wang, Q. (2022). Self-control, parental monitoring, and adolescent problematic mobile phone use: Testing the interactive effect and its gender differences. *Frontiers in Psychology*, 13, 846618. <https://doi.org/10.3389/fpsyg.2022.846618>
- Ivaniushina, V., & Titkova, V. (2021). Peer influence in adolescent drinking behavior: A meta-analysis of stochastic actor-based modeling studies. *PloS One*, 16(4), e0250169. <https://doi.org/10.1371/journal.pone.0250169>
- Kandel, D. (1975). Stages in adolescent involvement in drug use. *Science*, 190(4217), 912–914. <https://doi.org/10.1126/science.1188374>
- Keogh-Clark, F., Whaley, R. C., Leventhal, A. M., & Krueger, E. A. (2021). Sex differences in the association between parental monitoring and substance use initiation among adolescents. *Addictive Behaviors*, 122, 107024. <https://doi.org/10.1016/j.addbeh.2021.107024>
- Lac, A., & Crano, W. D. (2009). Monitoring Matters: Meta-analytic review reveals the reliable linkage of parental monitoring with adolescent marijuana

- use. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 4(6), 578–586. <https://doi.org/10.1111/j.1745-6924.2009.01166.x>
- Lipari, R. N. (2013). Trends in Adolescent Substance Use and Perception of Risk from Substance Use. The CBHSQ Report. Rockville (MD): Substance Abuse and Mental Health Services Administration (US); 2013. <https://www.ncbi.nlm.nih.gov/books/NBK385059/>
- Mahabee-Gittens, E. M., Xiao, Y., Gordon, J. S., & Khoury, J. C. (2013). The dynamic role of parental influences in preventing adolescent smoking initiation. *Addictive Behaviors*, 38(4), 1905–1911. <https://doi.org/10.1016/j.addbeh.2013.01.002>
- Meng, Z., Min, K., Ma, R., Yang, J., Zhang, H., & Li, Q. (2025). The mediating effect of parental monitoring in the association between parent-child relationship harmony and smartphone addiction: findings from a nationwide youth survey in China. *BMC Public Health*, 25(1), 1184. <https://doi.org/10.1186/s12889-025-22366-3>
- Simons-Morton, B. G., & Farhat, T. (2010). Recent findings on peer group influences on adolescent smoking. *The Journal of Primary Prevention*, 31(4), 191–208. <https://doi.org/10.1007/s10935-010-0220-x>
- Steinberg, L., Fletcher, A., & Darling, N. (1994). Parental monitoring and peer influences on adolescent substance use. *Pediatrics*, 93(6), 1060–1064.
- Szoko, N., Ragavan, M. I., Khetarpal, S. K., Chu, K. H., & Culyba, A. J. (2021). Protective factors against vaping and other tobacco use. *Pediatrics*, 148(2), e2020048066. <https://doi.org/10.1542/peds.2020-048066>
- Vanyukov, M. M., Tarter, R. E., Kirillova, G. P., Kirisci, L., Reynolds, M. D., Kreek, M. J., Conway, K. P., Maher, B. S., Iacono, W. G., Bierut, L., Neale, M. C., Clark, D. B., & Ridenour, T. A. (2012). Common liability to addiction and "gateway hypothesis": theoretical, empirical and evolutionary perspective. *Drug and Alcohol Dependence*, 123 Suppl 1(Suppl 1), S3–S17. <https://doi.org/10.1016/j.drugalcdep.2011.12.018>
- Warren, J. C., Smalley, K. B., & Barefoot, K. N. (2015). Perceived ease of access to alcohol, tobacco and other substances in rural and urban US students. *Rural and Remote Health*, 15(4), 3397.
- Watts, L. L., Hamza, E. A., Bedewy, D. A., & Moustafa, A. A. (2024). A meta-analysis study on peer influence and adolescent substance use. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*, 43(5), 3866–3881. <https://doi.org/10.1007/s12144-023-04944-z>