Chapter 3

# Sampling Design, Data Cleaning and Measurement Validation

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## 3.1. Sample

Data were collected from tenth grade students attending public and private secondary schools in Northern Cyprus during November and December 2025 using the ESPAD 2019 Master Questionnaire. This sampling strategy resulted in a total population of 1,061 student participants. Twelve cases (1.1%) were excluded due to inconsistent response patterns, which were defined as reporting no lifetime use alongside recent use for the same substance, yielding a final analytical sample of n = 1,049.

Of the final sample, 581 (55.4%) were female and 468 (44.6%) were male. The majority attended state schools ($n$ = 906, 86.4%), with 143 (13.6%) attending private schools. Because school identifiers were unavailable, the pre-specified multilevel random-intercept structure could not be implemented. Standard errors may, therefore, be modestly underestimated due to residual within-school clustering. By region, the largest subgroups were Lefkoşa ($n$ = 371, 35.4%), Mağusa ($n$ = 284, 27.1%), and Girne ($n$ = 250, 23.8%), with smaller representations from Güzelyurt ($n$ = 73, 7.0%), İskele ($n$ = 53, 5.1%), and Lefke ($n$ = 18, 1.7%).

## 3.2. Missing Data Framework

Missing data in this study are best understood through four distinct categories.

Item nonresponse was absent across all 272 survey variables. The survey was administered via Google Forms with mandatory response settings, which technically prevented participants from submitting incomplete forms. No item was left blank by any of the 1,061 participants.

Structural and analytic missingness after recoding was present for perceived risk and perceived availability items. In accordance with the ESPAD 2019 Master Questionnaire codebook, “Don't know” responses were recoded as missing rather than treated as a substantive response category. This decision reflects the conceptual inappropriateness of imputing a risk perception score for respondents who indicated no knowledge of the subject. This recoding reduced the analytical sample in models involving perceived risk variables by approximately 260 observations, resulting in model-specific samples of n = 589, 689, or 789 depending on the outcome.

Model-specific reduced n resulted from listwise deletion applied separately within each analytical model. Cases with missing values on any variable included in a given model were excluded from that model only. Full-sample descriptive statistics are reported in Chapter 4 for all participants.

Multiple imputation was not applied. Multiple imputation by chained equations could be appropriate if item nonresponse was present; as no such missingness existed, imputation was neither necessary nor methodologically justifiable. Furthermore, multiple imputation by chained equations (MICE) is not applicable to “Don't know” responses, which represent a substantive answer, specifically an absence of knowledge, rather than random data loss. Imputing risk perception values for respondents who explicitly indicated uncertainty would misrepresent their actual response under a Missing Not at Random (MNAR) framework.

## 3.3. Measurement Validation

Six conceptual scales were constructed from ESPAD 2019 Master Questionnaire items for use as predictors in multivariable models: (1) Family Support (C54 a–d), (2) Parental Rule-Setting (C53 a–b), (3) Parental Knowledge (C53 c–d), (4) Perceived Risk of Alcohol Use (C35 d–f), (5) Gaming Frequency (C39a, C39b, C40), and (6) Problematic Gaming (C41 a–c). Scale validity was assessed using Kaiser-Meyer-Olkin (KMO) sampling adequacy, Bartlett's Test of Sphericity, exploratory factor analysis (EFA) with varimax rotation, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). EFA was conducted using maximum likelihood extraction with varimax rotation based on Pearson correlation matrices. Although composite reliability and average variance extracted are most commonly reported within confirmatory factor analytic frameworks, they are increasingly applied in exploratory psychometric validation studies involving brief applied scales.

CR > .70 (Hair et al., 2019) and AVE > .50 (Fornell & Larcker, 1981) were used as thresholds for acceptable reliability and convergent validity, respectively. Psychometric properties of all scales are summarized in Table 3.1.

**Table 3.1.** Summary of scale psychometric properties

| Scale | Items | KMO | α | CR | AVE | VE (%) | M | SD |
|---|---|---|---|---|---|---|---|---|
| Family Support (C54 a–d) | 4 | 0.810 | 0.892 | 0.894 | 0.680 | 68.00 | 5.19 | 1.86 |
| Parental Rule-Setting (C53 a–b) | 2 | 0.500 | 0.776 | 0.776 | 0.817 | 63.50 | 2.61 | 1.08 |
| Parental Knowledge (C53 c–d) | 2 | 0.500 | 0.882 | 0.884 | 0.896 | 79.20 | 4.58 | 0.85 |
| Perceived Risk – Alcohol (C35 d–f) | 3 | 0.745 | 0.910 | 0.913 | 0.778 | 77.80 | 3.25 | 0.95 |
| Gaming Frequency (C39a, C39b, C40) | 3 | 0.714 | 0.837 | 0.871 | 0.694 | 69.40 | 3.08 | 1.86 |
| Problematic Gaming (C41 a–c) | 3 | 0.704 | 0.812 | 0.815 | 0.596 | 59.60 | 2.38 | 1.26 |

### 3.3.1. Family support scale (C54 a–d)

The Family Support scale comprises four items derived from the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988), as adapted for the ESPAD 2019 Master Questionnaire protocol (C54 a–d). Items were rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). KMO sampling adequacy was .81, and Bartlett's Test of Sphericity was significant, $\chi^2(6) = 2528.79$, $p < .001$, confirming the suitability of the data for factor analysis. EFA with varimax rotation yielded a single factor explaining 68.0% of the variance. All factor loadings exceeded .74. Internal consistency was high (Cronbach's $\alpha = .892$), and both composite reliability (CR = .894) and average variance extracted (AVE = .680) exceeded recommended thresholds (CR > .70; AVE > .50), demonstrating acceptable reliability and convergent validity. A composite score was computed as the mean of the four items ($M = 5.19$, $SD = 1.86$).

### 3.3.2. Parental monitoring scales (C53 a–d)

Initial EFA of all four C53 items revealed a two-factor structure, consistent with Stattin and Kerr's (2000) distinction between parental rule-setting and parental knowledge of whereabouts. Accordingly, two subscales were constructed and entered as separate predictors in subsequent analyses. Items were rated on a 5-point scale and reverse-coded so that higher scores indicate greater parental monitoring.

**Rule-setting subscale (C53a, C53b).** Items assess whether parents set definite rules at home and outside the home. Bartlett's Test of Sphericity was significant, $\chi^2(1) = 539.15$, $p < .001$, confirming factorability. EFA with varimax rotation yielded a single factor with equal loadings of .80, explaining 63.5% of the variance. Internal consistency was acceptable (Cronbach's $\alpha$ = .776), and both composite reliability (CR = .776) and average variance extracted (AVE = .817) exceeded recommended thresholds (CR > .70; AVE

> .50). A composite score was computed as the mean of the two items (M = 2.61, SD = 1.08).

**Parental knowledge subscale (C53c, C53d).** Items assess whether parents know who their child is with and where they are in the evenings. Bartlett's Test of Sphericity was significant, $\chi^2(1) = 1032.16$, $p < .001$. EFA yielded a single factor with equal loadings of .89, explaining 79.2% of the variance. Internal consistency was high (Cronbach's α = .882), with CR = .884 and AVE = .896 well above recommended thresholds. A composite score was computed as the mean of the two items (M = 4.58, SD = 0.85).

Note. KMO values of .50 are expected for two-item scales and do not indicate inadequacy.

### 3.3.3. Perceived risk of alcohol use scale (C35 d–f)

Three items assessing perceived risk of alcohol use were selected from the ESPAD 2019 Master Questionnaire C35 battery: risk of having one or two drinks nearly every day (C35d), risk of having four or five drinks nearly every day (C35e), and risk of having five or more drinks on one occasion nearly each weekend (C35f), rated on a 5-point scale from 1 (no risk) to 4 (great risk), with "don't know" recoded as missing per protocol. KMO sampling adequacy was .727, and Bartlett's Test of Sphericity was significant, $\chi^2(3) = 1624.40$, $p < .001$, confirming suitability for factor analysis. EFA with varimax rotation yielded a single factor explaining 77.8% of the variance. Factor loadings ranged from .82 to .96. Internal consistency was excellent (Cronbach's α = .910), and both composite reliability (CR = .913) and average variance extracted (AVE = .778) substantially exceeded recommended thresholds (CR > .70; AVE > .50). A composite score was computed as the mean of the three items (M = 3.25, SD = 0.95).

### 3.3.4. Gaming scale (C39–C41)

Six items spanning gaming frequency (C39a, C39b, C40) and problematic gaming attitudes (C41a, C41b, C41c) were initially examined as a single scale. KMO sampling adequacy was .746, and Bartlett's Test of Sphericity was significant, $\chi^2(15) = 2826.69$, $p < .001$, confirming suitability for factor analysis. However, EFA with varimax rotation revealed a clear two-factor structure: frequency items (C39a, C39b, C40) loaded on the first factor (loadings: .74–.92) and problematic gaming attitude items (C41a, C41b, C41c) loaded on the second factor (loadings: .69–.84), with a cumulative variance explained of 64.8%. The six-item single-scale Cronbach's α was .782. Given the distinct factorial structure, two subscales were constructed and entered as separate predictors in subsequent analyses.

**Gaming frequency subscale (C39a, C39b, C40).** Items assess hours spent gaming on school days (C39a), nonschool days (C39b), and number of days gaming in the past seven days (C40). KMO = .714, and Bartlett's Test of Sphericity was significant, $\chi^2(3) = 1608.57$, $p < .001$. EFA with varimax rotation yielded a single factor explaining 69.4% of the variance. Factor loadings ranged from .74 to .92. Internal consistency was good (Cronbach's α = .837), with composite reliability (CR = .871) and average variance extracted (AVE = .694) exceeding recommended thresholds (CR > .70; AVE > .50). A composite score was computed as the mean of the three items (M = 3.08, SD = 1.86).

**Problematic gaming subscale (C41a, C41b, C41c).** Items assess self-perceived excessive gaming time (C41a), negative mood when unable to play (C41b), and parental concern about gaming (C41c), rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). KMO = .704, and Bartlett's Test of Sphericity was significant, $\chi^2(3) = 1082.69$, $p < .001$. EFA yielded a single factor explaining 59.6% of the variance. Factor loadings ranged from .69 to .84. Internal consistency was good (Cronbach's α = .812), with CR = .815 and AVE = .596 exceeding recommended thresholds. A composite score was computed as the mean of the three items (M = 2.38, SD = 1.26).

# References


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