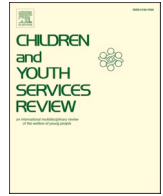




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Predictors of adolescent truancy: The importance of cyberbullying, peer behavior, and parenting style

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ABSTRACT

This study extends the truancy literature by exploring correlates of both committing truancy and the numbers of days truant among Spanish secondary school students. The study incorporates cyberbullying, peer truancy and parenting style as key predictors. Several count data regression models are estimated using a nationally representative survey of Spanish students ($N = 37,476$; Mage = 15.73; 50.9 % females). The results suggest that cyberbullying and parenting style play a significant role in a student's decision to commit truancy, while peer truancy plays a significant role in both the decision of whether or not to commit truancy (OR = 1.61) and the number of days truant (IRR = 1.41). These results suggest that reducing cyberbullying and promoting specific parenting styles may serve to reduce truancy, and that this direct effect or reduction could be further increased indirectly via peer or social multipliers.

1. Introduction

Spain experiences one of the higher prevalence rates of truancy among OECD countries, a fact that has remained stable over time. In 2000, Spain had the highest prevalence of truancy (34 %) among 28 OECD countries, with an average prevalence of 20.0 % (Willms, 2003). A more recent comparative analysis of the 28 OECD countries, based on truancy during the two preceding weeks, (Keppens & Spruyt, 2018), revealed that Spain had the third highest prevalence rate (32.34 %), only led by Italy (34.53 %) and Greece (42.04 %). In addition, Greece and Spain had the highest percentage of students skipping five or more classes in the preceding two weeks, while Spain reported the highest percentage of school dropouts (Keppens & Spruyt, 2018).

Student truancy, which ranges from arriving late to classes to unauthorized non-attendance of classes, is considered an educational and social problem. First, truancy is a clear predictor of school dropout (Balfanz et al., 2007; Keppens & Spruyt, 2018). The latter study found that truant pupils are 34.7 % more likely to leave school compared to peers who attended school regularly. Second, it is a strong predictor of unfavorable educational and social outcomes; Truancy, even at low

levels, is positively associated with poor examination scores, later unemployment and poorer levels of well-being (Attwood & Croll, 2015). In addition, truancy has been linked with marital and work-related problems, violence, and delinquent behavior (Baker et al., 2001). Finally, it is also a predictor of tobacco, alcohol and cannabis use (Henry & Huizinga, 2007) as well as suicidal ideation (Kearney, 2008b; Pengpid & Peltzer, 2019).

Poor educational outcomes are associated with health outcomes such as depression (Kearney, 2008a, 2008b; Pengpid & Peltzer, 2019; Vaughn et al., 2013), however the direction of causality is not established. Thus, students who experience academic or social difficulties at school may develop negative attitudes toward school and feel detached from school. Such attitudes could lead to reduced effort in school, which increases the risk of skipping classes (Sälzer et al., 2012). On the other hand, depression stemming from other sources, like cyberbullying or family characteristics (Polanczyk et al., 2015; Waasdorp & Bradshaw, 2015), can first lead to skipping classes and later to dropping out of school (Kowalski et al., 2014).

While feeling unable to keep up with school work can lead to feeling discouraged, which can in turn drive truancy (Sälzer et al., 2012), others

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have pointed out that not being adequately challenged is another key predictor of poor motivation in school and, consequently, truancy (Krannich et al., 2019). Indeed, maintaining deviant peer relations is a strong and consistent predictor of a variety of different types of offenses and transgressions committed by youth (Holloway et al., 2022). Thus, students' perceptions of classroom characteristics and truancy committed by peers could be important. In this sense, peer's behavior can be a key element in the formation of students' perceptions about school characteristics and the cost-benefit ratio of school engagement.

The literature presented thus far suggests that reducing truancy would serve to improve educational and social outcomes. Yet to reduce truancy, requires a deeper understanding of its predictors. In addressing this goal, this study contributes to the literature in the following ways. First, this is the first study that examines cyberbullying, truancy behavior of peers and parenting style as key predictors. Second, it extends similar prior studies on truancy behaviors by considering the predictors' effect, not only on the probability of being truant or not, but also the effect on the numbers of days truant. Finally, this study uses a nationally representative sample of Spanish students aged 14 to 18 years. Studies about truancy using a representative sample of Spanish students are scarce (Duarte & Escario, 2006), consequently, this study contributes to our understanding of truancy behavior in this under researched population.

2. Hypotheses and literature review.

Given that truancy is a predominantly problem among adolescents that occurs in the school context, the social ecological model (Bronfenbrenner, 1986) can serve as a guide for this research. The social ecological model assumes that adolescent development and, therefore, behavior, is influenced by different social and ecological environments including family, friends, school, social and legal system. In general, it is assumed that more proximal environments exert more influence on the adolescent. It is argued that as children approach adolescence, they spend less time with their parents and more time with their peers, who become, for many adolescents, the most important reference group during those years (Deković et al., 2004). An important corollary of the social ecological model is the implication that some predictors will be correlated, as it is assumed that the observed behavior of adolescents will be influenced by a complex interplay between these environments, which are interconnected and influenced by each other.

The key variables of interest in this analysis include peer relationships, cyberbullying, truancy among peers, and parenting style. New technologies provide opportunities for adolescents to commit cyberbullying. This kind of bullying can manifest in different forms including verbal aggression, denigration, harassment, outing, etc. (Makri-Botsari & Karagianni, 2014). Compared with traditional bullying at school, cyberbullying has some very negative characteristics. Whereas the first type can only take place when students are not watched over, cyberbullying can be persistent and permanent. Thus, verbal aggressions or embarrassing photos and videos remain public and can be uploaded at any time until they are deleted (Willard, 2007), which is not easy due to their easy dissemination on different servers and among many people. Moreover, the use of new technologies implies that this type of bullying reaches a wider audience. Some research has found that victims of traditional bullying are more likely to suffer cyberbullying (Waasdorp & Bradshaw, 2015).

Cyberbullying, like others forms of bullying, can yield bad feelings like depression, anxiety and emotional problems (Kowalski et al., 2014). These feelings also are related to truant behavior (Kearney, 2008b; Pengpid & Peltzer, 2019; Vaughn et al., 2013). Indeed victims of cyberbullying report significantly higher levels of stress, sleep problems and truancy (Morin et al., 2018). Taking this into account, the following hypothesis is proposed:

H1: Experiencing cyberbullying is positively associated with truancy.

Although the literature on peer influence has grown significantly in

recent years, and peer influence is considered an important predictor in educational outcomes and risk behaviors, such as tobacco or alcohol use (Blume et al., 2011; Duarte et al., 2014; Fang & Wan, 2020; Sinkkonen et al., 2014; Talluri et al., 2014), to date peer truancy, measured as a mean or proportion of the dependent variable among peers, has not been considered in truancy research. The peer influence literature suggests that the utility of an individual's activity depends on the behavior of the peers around the same activity. Three hypotheses are assumed to rationalize peer social interactions (Manski, 1993, 2003). First, the probability of an individual to engage in a behavior is influenced by the behavior of peers. Accordingly, some students commit truancy because it is a common activity among peers, perhaps as a means of being accepted in the group. Under this hypothesis, changes in peer group behavior influence individual behavior, these effects are referred to as "endogenous peer effect" by Manski. Consequently, policies that reduce truancy will have a peer multiplier effect as they will also reduce truancy indirectly via this peer effect.

The association between individual behavior and peer behavior could be due to two other reasons or effects. The probability of an individual to engage in a behavior depends on the exogenous characteristics of the peer group; Manski called these interactions "contextual peer effects". These effects can take place, for example, when adolescents observe that most of their friends do not spend time studying, and conclude that studying and going to class is not required by their friend's parents, and therefore is not important. Most empirical studies presume that these effects are not very important and assume that they are negligible. Finally, individuals could act similarly because group members share similar unobserved characteristics. For example, students in a class share the same teachers, and it is clear that the quality of these teachers will affect the class attendance of that group. Associations due to this hypothesis are called "correlated effects". In the truancy context, a high peer truancy measure in a class could reflect negative aspects of school climate (e.g., teacher quality, class climate, etc.).

In most of the literature to date, it is difficult to discern the influence of the three effects on behavior. The present study will analyze the overall association between peer truancy behavior and individual truancy, assuming that the endogenous peer effect and contextual effects hypotheses represent the majority of the association. Consequently, a significant association will be taken as evidence that part of the association is due to the endogenous peer effects (Manski, 1993) and, therefore as evidence for the presence of peer multipliers. Given the ideas above, the following hypothesis is postulated:

H2: Truancy is positively associated with peer truancy.

Several studies have found a significant association between truancy and the family environment. For example, Pengpid & Peltzer (2019) reported a significant and negative association between truancy and several aspects as parent support, while others have reported negative associations with parental involvement (Gubbels et al., 2019; Vaughn et al., 2013). Similarly, truancy is associated with family structure, with higher levels of truancy reported among youth from nonnuclear or one-parent families (Duarte & Escario, 2006; Gubbels et al., 2019).

Regarding the family environment, parents play key roles in the overall well-being and education of their children. Parenting style has been classified according to two dimensions: control/firmness and affection/warmness (Maccoby & Martin, 1983; Spera, 2005). Most research has found that parental affection is an important protective factor against several deviant behaviors such as smoking, alcohol, drug use, delinquency, school misbehavior and online gambling (Escario & Wilkinson, 2020; Piko & Balázs, 2012; Rajesh et al., 2015; Laurance Steinberg et al., 2006). The role of parental control is less clear, as research has identified parental control as a protective factor and as an insignificant factor (Casaló & Escario, 2019; Piko & Balázs, 2012). While parental rules can set limits on adolescent's behavior (Madsen, 2008), a high number of rules can be counter-productive as an authoritarian parenting style is often associated with adolescent misbehavior (Laurance Steinberg, 2001). Given the last results, the following two

hypotheses are proposed:

H3: Truancy is negatively associated with parental affection.

H4: Truancy is negatively associated with parental control.

Finally, this study includes several potential confounders of truancy, consequently, their inclusion will help to better determine the association between truancy and the key explanatory variables. These confounders include gender status, age, immigrant status, grade retention, parental educational attainment, and disposable income.

3. Material and methods

For this study, data were drawn from the 2014 Survey on Drug Use in Secondary Education in Spain¹ (Encuesta sobre el Uso de Drogas en Enseñanzas Secundarias en España). This survey was carried out by the Government Delegation for the National Plan on Drugs, an agency under the Ministry of Health, Social Services and Equality. A total of 37,486 students from 14 to 18 years old were interviewed from November 14, 2014, to April 8, 2015. This survey constitutes a nationally representative sample of Spanish students aged 14–18 years old. A sampling stratification procedure was followed. First by region, in order to guarantee a minimum number of schools per region. Afterwards, schools first and classes later, were randomly selected. The maximum sample error for a confidence level of 95.5 % is 0.6 %. All responses were confidential and protected by human subjects protocols.

3.1. Dependent variable.

The dependent variable, *Truancy*, measures the student's response to the following question: "In the last 30 days, how many complete days have you missed class for not feeling like going to class?" The dependent variable is a count of the number of days truant, which in the logistic regression is dichotomized as zero versus one. A function in R, used to estimate the hurdle models, makes the necessary transformation.

3.2. Covariates

The survey makes it possible to define an ordinal variable, *Cyberbullying*, that measures the frequency the students experience of cyberbullying in response to this question: "How often have you felt harassed, threatened or have you believed that you have bullied on the Internet?" Response options include: *Never* (coded as 0); *Rarely* (coded as 1); *Sometimes* (coded as 2); *Often* (coded as 3); and *Very Frequently* (coded as 4). Five dummy variables (*Never*, *Rarely*, *Sometimes*, *Often*, and *Very Frequently*), taking values 1 or 0, indicate the students selected option. The dichotomous variable related to *Never* acts as the reference category.

The peer truancy measure, *Peer truancy*, is calculated for each adolescent, and reflects the mean of the dependent variable for all other peers in the class. Eliminating the adolescent from the calculation of the peer measure could have a minor effect in large classes, but it is important to do so in classes with few students. For example, consider a class with three students, who commit truancy on 0, 6, and 12 days, respectively. Not excluding the adolescent would imply a peer mean measure of 6 days $([0 + 6 + 12]/3)$ for all three students. However, the real mean for the rest of the class for each student is 9 $([6 + 12]/2)$, 6 $([0 + 12]/2)$, or 3 $([0 + 6]/2)$, respectively.

Parents' affection was assessed by the following question: "How often can you easily receive love and care from your mother and/or your father?" There are five possible answers (4 = *Almost always*; 3 = *Often*; 2 = *Sometimes*; 1 = *Rarely*; and 0 = *Almost never*) and the numeric values are used to define the variable *Parental Affection*.

¹ Although there are two subsequent surveys corresponding to years 2016 and 2018, they do not provide information to obtain the dependent variable used in this study.

Two similar questions with the same response scale are used to define two measures of parental control. Thus, the response to the question "How often do your parents set clear rules about what can you do away from home?" is used to compute the variable *Parental Rules*. Likewise, the response to the question "How often do your parents know who you are with when you go out at night?" is used to compute the variable *Parental Knowledge*.

The estimates include several possible confounders. First, the variable *Age* measures if the adolescent is 14, 15, 16, 17, or 18 years old, respectively. A dichotomous variable measures immigrant status: *Immigrant* (1 = yes, 0 = no). Four more dichotomous variables indicate (1 = yes, 0 = no) whether or not: i) the adolescent has repeated course once (*Repeat 1*); ii) the adolescent has repeated a course twice or more (*Repeat 2*); iii) the adolescent has a mother with a university degree (*Maternal Educational Attainment*); and, iv) the adolescent has a father with a university degree (*Paternal Educational Attainment*). Finally, the variable *Income* measures the disposable income per week of the adolescent in euros.

3.3. Statistical analysis.

In order to analyze the truancy behavior, six count data regressions models were considered: Poisson, Negative Binomial, Zero Inflated Poisson, Zero inflated Negative Binomial, Two-Hurdle Poisson, and Two-Hurdle Negative Binomial. The first two models are single index models, the mean of the dependent variable is modeled with the single index $x\beta$ as $\mu = E(y|x) = \exp(x\beta)$, where x is a row vector including all predictors considered and β is a vector of coefficients, one for each predictor. The last four regressions models add another index ($z\gamma$, where z is a row vector including all predictors considered and γ is a vector of coefficients, normally $z = x$), to the model regression in order to model the binary process, usually, as a logistic process. It is assumed that readers are familiar with count data regression models and the interpretation of the estimated coefficients (Colin & Pravin, 2013; Hilbe, 2014). All analyses were carried out using R statistical software (version 3.4.3).

4. Results

Fig. 1 provides the distribution of the dependent variable and Table 1 some descriptive statistics for all variables. The overall mean, as shown in Table 1, for the entire sample is 0.256 missed days of school. Among the 9.6 % of students who committed truancy on at least one day during the month preceding the survey, the mean is almost 3 days (2.675). The number of days truant reported by students in the last month ranged from one to twenty-five days. Overall, 80.7 % did not report cyberbullying victimization, 9.8 % reported cyberbullying victimization rarely, 5.7 % sometimes, 2 % often, and 1.7 % very frequently. The peer truancy measure ranged from 0 days to 15 days. Regarding parenting style, the mean for *Parental Affection* was the highest, while the mean for *Parental Rules* was the lowest. Regarding sociodemographic indicators, 49.1 % of the respondents are males, the proportion of immigrants is around 10.5 %, almost 20 % (19.9 %) declared they had repeated a grade once and 6.5 % twice or more. Finally, the average disposable income is 15.33€.

Table 2 reports the log-likelihood, the Akaike Information Criterion (AIC) and the aggregated prediction error of each count model. According to the results in Table 2, the best models are the Zero Inflated Negative Binomial and the Two-Hurdle Negative Binomial. The first has a lower AIC, 0.5 % lower, and the second has a lower aggregated error, 19.1 % lower. Fig. 2 comprises one graph for each model where the observed number of students for each count is compared with the predicted number of observations for each count, on a squared root scale. The red line represents the square root of the number of students predicted by the regression model for each count and the bars represent the square root of the number of students that reported each truancy count. Consequently, the closer the bars are to the x-axis, the better the fit of the

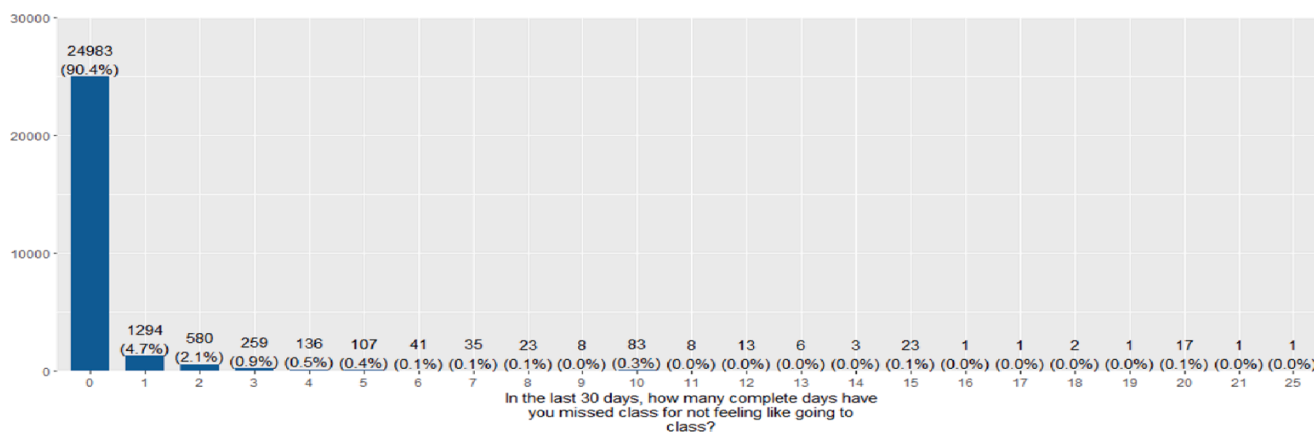


Fig. 1. Distribution of the dependent variable.

Table 1
Descriptive analysis.

Statistic	Mean	St. Dev.	Min	Max	N
Truancy	0.256	1.228	0	25	27,626
- Truancy (yes/no)	0.096	0.294	0	1	27,626
- Truancy (positive)	2.675	3.047	1	25	2,643
Cyberbullying					
- Never (Reference category)	0.807	0.395	0	1	35,332
- Rarely	0.098	0.297	0	1	35,332
- Sometimes	0.057	0.232	0	1	35,332
- Often	0.020	0.141	0	1	35,332
- Very Frequently	0.017	0.131	0	1	35,332
Peer truancy	0.256	0.439	0	15	27,608
Parental Affection	3.434	1.131	0	4	36,661
Parental Rules	2.025	1.613	0	4	36,684
Parental Knowledge	2.988	1.426	0	4	36,450
Male	0.491	0.500	0	1	37,486
Age	15.726	1.227	14	18	37,486
Age18	0.074	0.262	0	1	37,486
Immigrant	0.105	0.307	0	1	37,446
Repeat1	0.199	0.399	0	1	37,446
Repeat2	0.065	0.247	0	1	37,446
Maternal Educational Attainment	0.328	0.469	0	1	30,867
Maternal Educational Attainment	0.306	0.461	0	1	29,086
Income	15.331	18.116	0	190	34,274

Table 2
Model diagnostic.

Modelo	Log-Likelihood	AIC	Aggregated Error
Poisson	-12267.42	24568.84	4004
Negative Binomial	-8061.71	16159.41	315
Zero Inflated Poisson (ZIP)	-8654.25	17376.50	823
Zero Inflated Negative Binomial (ZINB)	-7879.56	15829.11	237
Two-Hurdle Poisson (THP)	-8660.18	17388.36	827
Two-Hurdle Negative Binomial (THNB)	-7919.92	15909.85	199

Note: AIC means Akaike Information Criterion.

regression model. The fit improves from left to right (the Poisson distribution is changed by the Negative Binomial distribution) and from above to below (the zero inflation and the hurdle are added). Both the results in Table 2 and the graphs in Fig. 2 indicate that the Two-Hurdle Negative Binomial model provides the best fit to the data and, consequently, it is considered as the best or preferred model. Henceforth, the rest of the paper focuses only on the preferred model, for which the estimates appear in Table 3.

The estimates show that the odds ratios (OR) are higher than one for students who reported being a victim of cyberbullying in relation to

those who have not experienced cyberbullying, being similar for the first two categories (1.52 and 1.50) and increasing for the next two categories (1.71 and 2.96). Thus, the OR for truancy among students who reported being cyberbullied very frequently is almost three times the OR of those that reported never being cyberbullied. In relation to the number of days that students commit truancy, the incidence rate ratios (IRR) are higher than one for those who reported having been cyberbullied, however, they are not significant. Consequently, cyberbullying intensity, although insignificant in frequency, does increase the likelihood of truancy and the results provide support for H1.

In contrast, the variable that measures the proportion of peers that commit truancy appears as statistically significant in both the decision to commit truancy and the number of days truant. Both the OR and the IRR are higher than one indicating that the frequency by which peers commit truancy is positively associated with the probability of committing truancy and with the number of days of truancy. This provides evidence in support of H2.

Regarding Parental Affection, Parental Rules and Parental Knowledge, the results indicate that these explanatory variables are statistically significant in the decision of whether or not to commit truancy but they appear as insignificant in the number of days truant. The OR for Parental Affection, Parental Rules and Parental Knowledge are lower than one, indicating a negative association with the OR for committing truancy. These results support H3 and H4.

Regarding demographics, being an immigrant is positively associated with the probability of committing truancy (the OR for committing truancy is higher than one). Being male is positively associated with the frequency of truancy but it is not with the probability of committing truancy. Finally, both the probability of committing truancy and the numbers of days truant are positively associated with both repeating a grade and disposable income.

Finally, we have considered possible moderation effects between gender and the key predictors, this is to say, cyberbullying, peer truancy and parenting style. The estimates are reported in Table 4. The moderation effects are only significant for Parental Affection and Parental Rules and only in the logistic regression. In both cases, the estimated coefficient of the interaction is positive but lower in absolute value than the negative estimated coefficient of the corresponding parental characteristic (see note at the end of Table 4 for a quantitative explanation). Thus, both Parental Affection and Parental Rules are associated with lower probability of committing truancy and this negative association is more intense for females than for males.

5. Discussion.

This paper uses a nationally representative survey to analyze potential correlates of truancy, specifically both the probability of committing truancy and the number of days truant. To that end, several

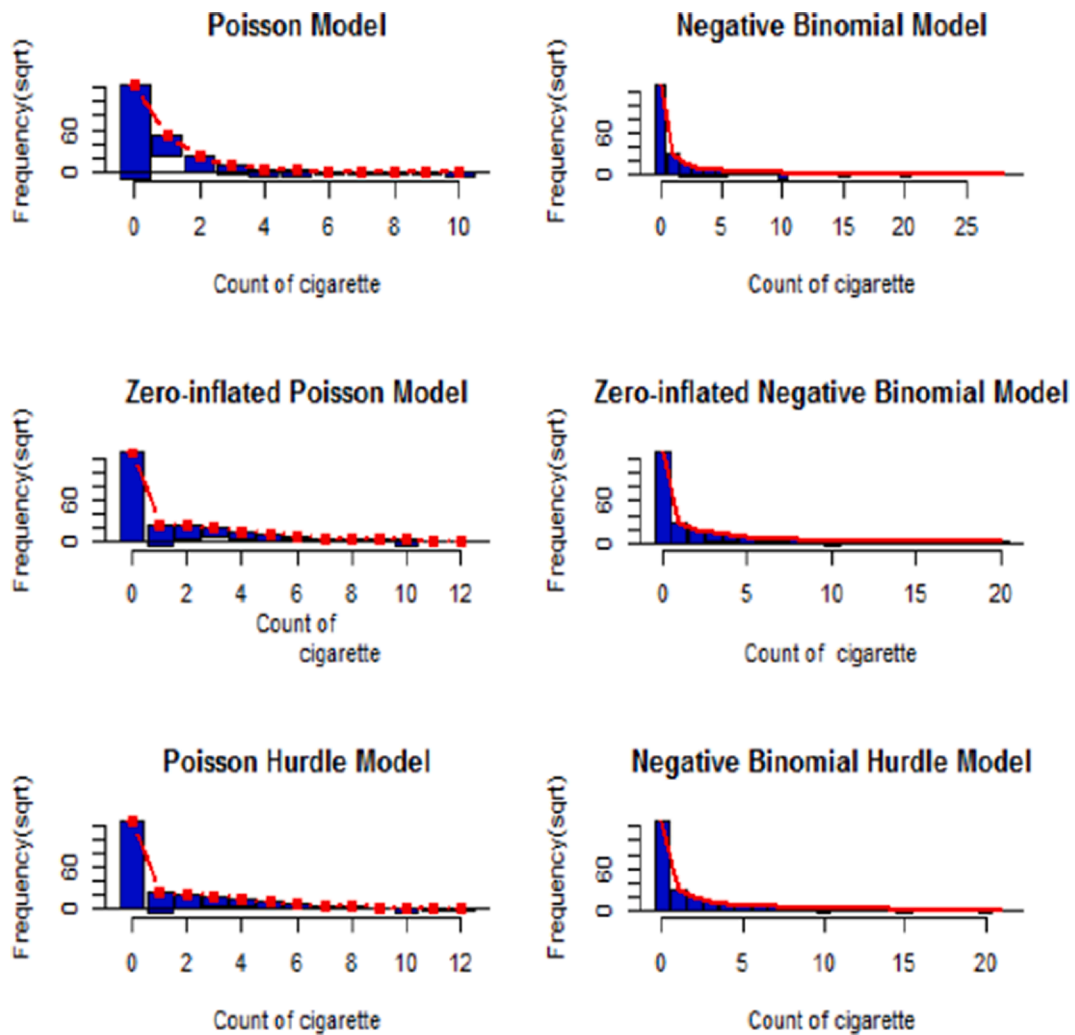


Fig. 2. Rootgrams for regression models.

Table 3
Estimates for the Two-Hurdle Negative Binomial regression model.

NBH Predictors	Logistic regression			Count Regression		
	OR	CI	p	IRR	CI	p
Intercept	0.00	0.00 – 0.00	<0.001	0.06	0.01 – 0.65	0.020
CyberBullying: "Never" is the omitted category.						
- Rarely	1.52	1.30 – 1.78	<0.001	1.07	0.82 – 1.41	0.615
- Sometimes	1.50	1.23 – 1.82	<0.001	1.29	0.92 – 1.79	0.137
- Often	1.71	1.26 – 2.31	0.001	1.08	0.65 – 1.78	0.766
- Very Frequently	2.96	2.16 – 4.07	<0.001	1.32	0.80 – 2.18	0.280
Peer truancy	1.61	1.45 – 1.79	<0.001	1.41	1.18 – 1.69	<0.001
Parental Affection	0.89	0.85 – 0.92	<0.001	0.98	0.92 – 1.05	0.644
Parental Rules	0.89	0.86 – 0.92	<0.001	0.98	0.93 – 1.05	0.595
Parental Knowledge	0.83	0.80 – 0.86	<0.001	0.98	0.93 – 1.04	0.579
Male	0.90	0.81 – 1.00	0.058	1.21	1.01 – 1.47	0.043
Age	1.36	1.29 – 1.42	<0.001	1.03	0.95 – 1.13	0.459
Immigrant	1.36	1.16 – 1.59	<0.001	1.24	0.95 – 1.63	0.113
Repeat1	1.94	1.71 – 2.20	<0.001	1.51	1.22 – 1.87	<0.001
Repeat2	1.91	1.57 – 2.34	<0.001	2.00	1.44 – 2.80	<0.001
Maternal Educational Attainment	0.98	0.86 – 1.12	0.804	0.92	0.73 – 1.17	0.513
Paternal Educational Attainment	0.84	0.73 – 0.97	0.015	1.01	0.79 – 1.29	0.922
Income	1.01	1.01 – 1.01	<0.001	1.01	1.01 – 1.01	<0.001
Log(theta)				-2.87		0.004
Observations	18,240			18,240		

Table 4
Estimates for the Two-Hurdle Negative Binomial regression model with gender moderations.

NBH Predictors	Logistic regression			Count Regression		
	OR	CI	p	IRR	CI	p
Intercept	0.00	0.00 – 0.00	<0.001	0.07	0.01 – 0.64	0.018
CyberBullying: “Never” is the omitted category						1.20
- Rarely	1.63	1.30 – 2.04	<0.001	1.20	0.81 – 1.78	0.358
- Sometimes	1.41	1.06 – 1.87	0.019	1.43	0.89 – 2.32	0.142
- Often	1.85	1.15 – 2.97	0.011	1.51	0.68 – 3.36	0.311
- Very Frequently	3.49	2.21 – 5.49	<0.001	1.34	0.67 – 2.68	0.409
Peer truancy	1.79	1.53 – 2.09	<0.001	1.31	0.98 – 1.74	0.071
Parental Affection	0.84	0.79 – 0.89	<0.001	0.99	0.90 – 1.10	0.910
Parental Rules	0.86	0.82 – 0.90	<0.001	0.99	0.91 – 1.07	0.751
Parental Knowledge	0.83	0.79 – 0.87	<0.001	0.94	0.86 – 1.02	0.144
Male	0.64	0.47 – 0.89	0.007	1.07	0.62 – 1.84	0.820
Age	1.36	1.29 – 1.43	<0.001	1.04	0.95 – 1.14	0.392
Immigrant	1.36	1.16 – 1.59	<0.001	1.25	0.95 – 1.64	0.109
Repeat1	1.94	1.71 – 2.21	<0.001	1.53	1.24 – 1.89	<0.001
Repeat2	1.92	1.57 – 2.34	<0.001	2.01	1.44 – 2.81	<0.001
Maternal Educational Attainment	0.98	0.86 – 1.12	0.796	0.91	0.72 – 1.15	0.434
Paternal Educational Attainment	0.85	0.74 – 0.97	0.017	1.04	0.81 – 1.33	0.783
Income	1.01	1.01 – 1.01	<0.001	1.01	1.00 – 1.01	<0.001
CyberBullying: “Never” is the omitted category						
- Rarely: Male	0.88	0.64 – 1.20	0.408	0.78	0.45 – 1.34	0.369
- Sometimes: Male	1.13	0.76 – 1.67	0.540	0.80	0.42 – 1.55	0.515
- Often: Male	0.88	0.47 – 1.62	0.674	0.54	0.19 – 1.50	0.237
- Very Frequently: Male	0.71	0.38 – 1.35	0.295	0.97	0.36 – 2.62	0.953
Peer truancy: Male	0.84	0.69 – 1.03	0.088	1.15	0.79 – 1.69	0.457
Parental Affection: Male	1.10	1.01 – 1.20	0.024	0.97	0.85 – 1.12	0.721
Parental Rules: Male	1.08	1.01 – 1.16	0.026	1.00	0.89 – 1.12	0.965
Parental Knowledge: Male	0.99	0.93 – 1.07	0.873	1.09	0.97 – 1.24	0.143
Log(theta)				-2.79		0.003
Observations	18,240			18,240		

Note: Both *Parental Affection* and *Parental Rules* are associated with lower probability of committing truancy and this negative association is more intense for females than for males. For example, for *Parental Affection* the estimated coefficient is -0.171786 [$OR = \exp(-0.171786) = 0.84$] and the coefficient of the interaction is 0.096364 [$OR = \exp(0.096364) = 1.10$]. This mean that the coefficient of *Parental Affection* for males is -0.075422 [$-0.171786 + 0.096364$]. Thus, it is negative but lower in absolute value than the coefficient for females (-0.171786).

regression methods appropriate for use with count data were estimated to assess the roles of cyberbullying, peer truancy and parenting style as key predictors of truancy behavior. A descriptive analysis shows that 9.6 % of the sample reported being truant for one or more full days in the past month.

According to our estimates, adolescents who experience cyberbullying are more prone to commit truancy. This result is consistent with previous literature, which reports that being bullied and physically attacked are positively associated with truancy (Pengpid & Peltzer, 2019). Cyberbullying generates stress, anxiety and negative attitudes toward school, which also are three predictors of truancy (Attwood & Croll, 2006; Gubbels et al., 2019; Pengpid & Peltzer, 2019). Moreover, experiencing cyberbullying has been found to overlap with experiencing traditional bullying (Morin et al., 2018), both experiences can reinforce the victimization process in adolescents and thereby increase truancy behavior. Consequently, reducing cyberbullying may help to reduce truancy, but equally importantly, it also may improve several aspects of the adolescents’ lives, including reducing sleep problems, anxiety, depression, and even suicide ideation and attempts (Kowalski et al., 2014).

Our estimates also indicate that the truancy behavior of an adolescent is correlated with the truancy behavior of his or her peers. The higher the mean days truant among peers, the higher the probability that the adolescent will commit truancy and the higher the number of days truant. This result is consistent with similar peer effects found for tobacco use (Borderías et al., 2015; Lundborg, 2006), binge drinking and illicit drugs (Lundborg, 2006), educational outcomes (Fang & Wan, 2020), and attitudes toward the environment (Duarte et al., 2017). In all of these reports, individual behavior is positively associated with the peer measures of the same behavior. The strong association between peer truancy and students’ truancy can be explained by the ecological

theory and the social control theory (Veenstra et al., 2010). According to these theories, people accept social norms of relevant others and try to conform to their expectations. Consequently, these theories support the assumption that at least a part of this association could reflect a causal effect and, consequently, the effects of any policy program to reduce truancy will be amplified by peer or social interaction multipliers.

The results indicate that both parenting styles we examined are associated with a lower probability of committing truancy. This is consistent with previous research in which both parental support (Pengpid & Peltzer, 2019) and parental involvement (Baker et al., 2001; Gubbels et al., 2019) are associated with lower truancy. Our results underscore the possibility that although during adolescence many start to give more importance to peers and less to parents, parents still exert important influences on their children’s behavior (Wilkinson et al., 2008). Thus, children with affectionate parents and those whose parents set clear rules, are less likely to commit truancy than children who experience limited affection and with limited rule setting at home. This result is consistent with the notion that children who receive attention from their parents may be more interested in conforming to their parents’ expectations than other children. In addition, the association of parents’ affection and parents’ rules can reduce truant behavior indirectly via cyberbullying, thus, some authors have found that parenting mediation is negatively associated with cyberbullying (Mesch, 2016; Navarro et al., 2013).

Regarding sociodemographic characteristics, our estimates are in line with most prior research that has found that truancy is higher among males (Duarte & Escario, 2006; Sälzer et al., 2012). A possible explanation of this result is that males hold more negative attitudes than females do towards school (Logan & Johnston, 2009). Similarly, some authors have stated that there are some gender differences in motives for truancy (Gubbels et al., 2019). However, there are exceptions to this

tendency and some authors also have found an insignificant association between gender and truancy (Pengpid & Peltzer, 2019; Vaughn et al., 2013) or even a positive association between being female and truancy (Maynard et al., 2017).

The present study provides more evidence to support previous research that has found that truancy is higher among older adolescents (Gubbels et al., 2019; Vaughn et al., 2013), immigrants or minorities (Maynard et al., 2017; Vaughn et al., 2013), students who repeat a grade (Sälzer et al., 2012), and those with higher levels of disposable income. In this context, higher levels of disposable income could be due to lower socioeconomic status as these adolescents could be forced to help their families financially and, as a result, have jobs. Working is positively associated with truancy (Duarte & Escario, 2006). On the other hand, repeating a grade or more could reduce the adolescent's self-academic-concept and reinforce the school disengagement process, and thereby lead to truancy (Keppens & Spruyt, 2018; Krannich et al., 2019).

The results of this study have important implications for truancy reduction. Both school- and community-based interventions are required to combat truancy, as both school climate and parental involvement are distinct features that are amenable to intervention. First, school-based interventions designed to reduce cyberbullying are important because they will not only reduce truancy, but will have other benefits for adolescent health by reducing the effects of cyberbullying (anxiety, depression, low self-esteem, etc.). Community-based interventions can increase awareness among parents about the importance of parenting styles, in order to reduce truancy. In particular, decades of research reveal that functional family therapy has proven to be an effective intervention for reducing truancy among youth (Robbins et al., 2016; Vardanian et al., 2020). Finally, campaigns that reduce truancy by reducing cyberbullying and changing parenting styles, also will have indirect effects via peer multipliers. Any initial reduction in truancy levels may consequently serve to change norms for all students, and thereby the social lower pressure and/or desire to commit truancy.

6. Limitations and strengths

The study uses cross-sectional data that preclude the possibility of finding causal effects and only makes it possible to find associations. The truancy behavior data are self-reported by the students and describe behavior over the previous month, as such they may be biased and underreported. Moreover, the truancy behavior could be underestimated as some adolescents did not participate in survey, possibly because they were truant from school on the day the data were gathered. Finally, we used several single item measures that have not been previously validated to assess truancy and covariates. Of importance, our results are consistent with previous literature, which extends support to the validity of these measures. Moreover, single item measures can be used in surveillance systems, as scales are more time consuming and prone to missing data.

Despite the above limitations, the study has several strengths. It uses a nationally representative and very large survey in an under researched country. It considers the roles of cyberbullying, peer effects, and several dimensions of parenting style as key predictors. Finally, it uses several regressions models for count data that enable more flexibility than traditional methods, as they permit the analysis of associations with both the decision of whether or not commit truancy and the number of days truant, separately. This flexibility is important because, as the results reveal, some predictors are significant in one decision but not in the other.

7. Conclusions

This paper contributes to our understanding of the etiology of truancy by jointly considering influences from cyberbullying, truancy among peers, and parenting style as key correlates. It also extends previous studies by considering the probability of committing or not

truancy as well as the number of days truant. The results indicate that school- and community-based programs that reduce cyberbullying and involve parents could be effective in reducing truancy. This initial reduction will have indirect effects via the indirect influence of peer multipliers.

Future research should examine whether or not the results yielded are similar in other cultural contexts and with other measures of truancy, cyberbullying victimization and parenting style. Similarly, other survey data providing validated scales for individual or familiar traits would be valuable. Finally, future research could address the potential endogeneity of peer truancy with careful experiments that assign newer students randomly to classes with different but known peer truancy levels.

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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.

Data availability

The authors do not have permission to share data.

References

- Attwood, G., & Croll, P. (2006). Truancy in secondary school pupils: Prevalence, trajectories and pupil perspectives. *Research Papers in Education*, 21(4), 467–484. <https://doi.org/10.1080/02671520600942446>
- Attwood, G., & Croll, P. (2015). Truancy and well-being among secondary school pupils in England. *Educational Studies*, 41(1–2), 14–28. <https://doi.org/10.1080/03055698.2014.955725>
- Baker, M., Sigmon, J., & Nugent, E. M. (2001). Truancy Reduction: Keeping Students in School. *Juvenile Justice Bulletin- Office of Justice Program, September*. <https://www.ncjrs.gov/pdffiles1/ojjdp/188947.pdf>.
- Balfanz, R., Herzog, L., & Mac Iver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist*, 42(4), 223–235. <https://doi.org/10.1080/00461520701621079>
- Blume, L. E., Brock, W. A., Durlauf, S. N., & Ioannides, Y. M. (2011). Identification of social interactions. *Handbook of Social. Economics*, 1(1 B), 853–964. <https://doi.org/10.1016/B978-0-444-53707-2.00001-3>
- Borderías, L., Duarte, R., Escario, J. J., & Molina, J. A. (2015). Addiction and other reasons adolescent smokers give to justify smoking. *Substance Use and Misuse*, 50(12), 1552–1559. <https://doi.org/10.3109/10826084.2015.1023453>
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development. *Developmental Psychology*, 22(6), 723–742.
- Casaló, L. V., & Escario, J.-J. (2019). Predictors of excessive internet use among adolescents in Spain: The relevance of the relationship between parents and their children. *Computers in Human Behavior*, 92(March 2019), 344–351. <https://doi.org/10.1016/j.chb.2018.11.042>.
- Colin, C. A., & Pravin, T. (2013). Regression analysis of count data, Second edition. In *Regression Analysis of Count Data, Second Edition*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139013567>.
- Deković, M., Wissink, I. B., & Meijer, A. M. (2004). The role of family and peer relations in adolescent antisocial behaviour: Comparison of four ethnic groups. *Journal of Adolescence*, 27(5), 497–514. <https://doi.org/10.1016/j.adolescence.2004.06.010>
- Duarte, R., & Escario, J. J. (2006). Alcohol abuse and truancy among Spanish adolescents: A count-data approach. *Economics of Education Review*, 25(2), 179–187. <https://doi.org/10.1016/j.econedurev.2005.01.007>
- Duarte, R., Escario, J. J., & Molina, J. A. (2014). Are estimated peer effects on smoking robust? Evidence from adolescent students in Spain. *Empirical Economics*, 46(3), 1167–1179. <https://doi.org/10.1007/s00181-013-0704-7>
- Duarte, R., Escario, J. J., & Sanagustín, M. V. (2017). The influence of the family, the school, and the group on the environmental attitudes of European students. *Environmental Education Research*, 23(1), 23–42. <https://doi.org/10.1080/13504622.2015.1074660>
- Escario, J.-J., & Wilkinson, A. V. (2020). Exploring predictors of online gambling in a nationally representative sample of Spanish adolescents. *Computers in Human Behavior*, 102(2020), 287–292. <https://doi.org/10.1016/j.chb.2019.09.002>
- Fang, G., & Wan, S. (2020). Peer effects among graduate students: Evidence from China. *China Economic Review*, 60(July 2019), 101406. <https://doi.org/10.1016/j.chieco.2020.101406>.

- Gubbels, J., van der Put, C. E., & Assink, M. (2019). Risk Factors for School Absenteeism and Dropout: A Meta-Analytic Review. *Journal of Youth and Adolescence*, 48(9), 1637–1667. <https://doi.org/10.1007/s10964-019-01072-5>
- Henry, K. L., & Huizinga, D. H. (2007). Truancy's Effect on the Onset of Drug Use among Urban Adolescents Placed at Risk. *Journal of Adolescent Health*, 40(4), 358.e9–358.e17. <https://doi.org/10.1016/j.jadohealth.2006.11.138>
- Hilbe, J. M. (2014). *Modeling count data*. In *Modeling Count Data*: Cambridge University Press.
- Holloway, E. D., Folk, J. B., Ordorica, C., & Tolou-Shams, M. (2022). Peer, substance use, and race-related factors associated with recidivism among first-time justice-involved youth. In *Law and Human Behavior* (Vol. 46, Issue 2, pp. 140–153). Educational Publishing Foundation. <https://doi.org/10.1037/lhb0000471>
- Kearney, C. A. (2008a). An interdisciplinary model of school absenteeism in youth to inform professional practice and public policy. *Educational Psychology Review*, 20(3), 257–282. <https://doi.org/10.1007/s10648-008-9078-3>
- Kearney, C. A. (2008b). School absenteeism and school refusal behavior in youth: A contemporary review. *Clinical Psychology Review*, 28(3), 451–471. <https://doi.org/10.1016/j.cpr.2007.07.012>
- Keppens, G., & Spruyt, B. (2018). Truancy in Europe: Does the type of educational system matter? *European Journal of Education*, 53(3), 414–426. <https://doi.org/10.1111/ejed.12282>
- Kowalski, R. M., Giumetti, G. W., Schroeder, A. N., & Lattanner, M. R. (2014). Bullying in the digital age: A critical review and meta-analysis of cyberbullying research among youth. In *Psychological Bulletin* (Vol. 140, Issue 4, pp. 1073–1137). American Psychological Association. <https://doi.org/10.1037/a0035618>
- Krannich, M., Goetz, T., Lipnevich, A. A., Bieg, M., Roos, A. L., Becker, E. S., & Morger, V. (2019). Being over- or underchallenged in class: Effects on students' career aspirations via academic self-concept and boredom. *Learning and Individual Differences*, 69(100014), 206–218. <https://doi.org/10.1016/j.lindif.2018.10.004>
- Logan, S., & Johnston, R. (2009). Gender differences in reading ability and attitudes: Examining where these differences lie. *Journal of Research in Reading*, 32(2), 199–214. <https://doi.org/10.1111/j.1467-9817.2008.01389.x>
- Lundborg, P. (2006). Having the wrong friends? Peer effects in adolescent substance use. *Journal of Health Economics*, 25(2), 214–233. <https://doi.org/10.1016/j.jhealeco.2005.02.001>
- Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In Palul Henry Mussen (Series Ed.) & Eileen Mavis Hetherington (Vol. Ed.) (Eds.), *Handbook of child psychology: Vol. 4: Socialization, personality and social development*; E. Mavis Hetherington, volume editor (4th ed, pp. 1–101). Wiley.
- Madsen, S. D. (2008). Parents' management of adolescents' romantic relationships through dating rules: Gender variations and correlates of relationship qualities. *Journal of Youth and Adolescence*, 37(9), 1044–1058. <https://doi.org/10.1007/s10964-008-9313-8>
- Makri-Botsari, E., & Karagianni, G. (2014). Cyberbullying in Greek Adolescents: The Role of Parents. *Procedia - Social and Behavioral Sciences*, 116, 3241–3253. <https://doi.org/10.1016/j.sbspro.2014.01.742>
- Manski, C. F. (1993). Identification of endogenous social effects the reflection problem. *Review of Economic Studies*, 60(3), 531–542. <https://doi.org/10.2307/2298123>
- Manski, C. F. (2003). Identification Problems in the Social Sciences and Everyday Life. *Southern Economic Journal*, 70(1), 11. <https://doi.org/10.2307/1061629>
- Maynard, B. R., Vaughn, M. G., Nelson, E. J., Salas-Wright, C. P., Heyne, D. A., & Kremer, K. P. (2017). Truancy in the United States: Examining temporal trends and correlates by race, age, and gender. *Children and Youth Services Review*, 81(August), 188–196. <https://doi.org/10.1016/j.childyouth.2017.08.008>
- Mesch, G. S. (2016). Parent-Child Connections on Social Networking Sites and Cyberbullying. *Youth & Society*, 50(8), 1145–1162. <https://doi.org/10.1177/0044118X16659685>
- Morin, H. K., Bradshaw, C. P., & Kush, J. M. (2018). Adjustment outcomes of victims of cyberbullying: The role of personal and contextual factors. *Journal of School Psychology*, 70(April), 74–88. <https://doi.org/10.1016/j.jsp.2018.07.002>
- Navarro, R., Serna, C., Martínez, V., & Ruiz-Oliva, R. (2013). The role of Internet use and parental mediation on cyberbullying victimization among Spanish children from rural public schools. *European Journal of Psychology of Education*, 28(3), 725–745. <https://doi.org/10.1007/s10212-012-0137-2>
- Pengpid, S., & Peltzer, K. (2019). Prevalence of truancy in a national sample of school going adolescents in Laos is associated with potential risk and protective factors. *Children and Youth Services Review*, 107(September), Article 104521. <https://doi.org/10.1016/j.childyouth.2019.104521>
- Piko, B. F., & Balázs, M.Á. (2012). Authoritative parenting style and adolescent smoking and drinking. *Addictive Behaviors*, 37(3), 353–356. <https://doi.org/10.1016/j.addbeh.2011.11.022>
- Polanczyk, G. V., Salum, G. A., Sugaya, L. S., Caye, A., & Rohde, L. A. (2015). Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 56(3), 345–365. <https://doi.org/10.1111/jcpp.12381>
- Rajesh, V., Diamond, P. M., Spitz, M. R., & Wilkinson, A. V. (2015). Smoking Initiation Among Mexican Heritage Youth and the Roles of Family Cohesion and Conflict. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*, 57(1), 24–30. <https://doi.org/10.1016/j.jadohealth.2015.01.021>
- Robbins, M. S., Alexander, J. F., Turner, C. W., & Hollimon, A. (2016). Evolution of Functional Family Therapy as an Evidence-Based Practice for Adolescents with Disruptive Behavior Problems. *Family Process*, 55(3), 543–557. <https://doi.org/10.1111/famp.12230>
- Sälzer, C., Trautwein, U., Lüdtke, O., & Stamm, M. (2012). Predicting adolescent truancy: The importance of distinguishing between different aspects of instructional quality. *Learning and Instruction*, 22(5), 311–319. <https://doi.org/10.1016/j.learninstruc.2011.12.001>
- Sinkkonen, H., Puhakka, H., & Meriläinen, M. (2014). Internet use and addiction among Finnish Adolescents (15–19 years). *Journal of Adolescence*, 37(2), 123–131. <https://doi.org/10.1016/j.adolescence.2013.11.008>
- Spera, C. (2005). A review of the relationship among parenting practices, parenting styles, and adolescent school achievement. *Educational Psychology Review*, 17(2), 125–146. <https://doi.org/10.1007/s10648-005-3950-1>
- Steinberg, L., Blatt-Eisengart, I., & Cauffman, E. (2006). Patterns of competence and adjustment among adolescents from authoritative, authoritarian, indulgent, and neglectful homes: A replication in a sample of serious juvenile offenders. *Journal of Research on Adolescence*, 16(1), 47–58. <https://doi.org/10.1111/j.1532-7795.2006.00119.x>
- Steinberg, L. (2001). We Know Some Things: Parent-Adolescent Relationships in Retrospect and Prospect. *Journal of Research on Adolescence*, 11(1), 1–19. <https://doi.org/10.1111/1532-7795.00001>
- Talluri, R., Wilkinson, A. V., Spitz, M. R., & Shete, S. (2014). A risk prediction model for smoking experimentation in Mexican American youth. *Cancer Epidemiology Biomarkers and Prevention*, 23(10), 2165–2174. <https://doi.org/10.1158/1055-9965.EPI-14-0467>
- Vardanian, M. M., Scavenius, C., Granski, M., & Chacko, A. (2020). An International Examination of the Effectiveness of Functional Family Therapy (FFT) in a Danish Community Sample. *Journal of Marital and Family Therapy*, 46(2), 289–303. <https://doi.org/10.1111/jmft.12405>
- Vaughn, M. G., Maynard, B. R., Salas-Wright, C. P., Perron, B. E., & Abdon, A. (2013). Prevalence and correlates of truancy in the US: Results from a national sample. *Journal of Adolescence*, 36(4), 767–776. <https://doi.org/10.1016/j.adolescence.2013.03.015>
- Veenstra, R., Lindenberg, S., Tinga, F., & Ormel, J. (2010). Truancy in late elementary and early secondary education: The influence of social bonds and self-control—the TRAILS study. *International Journal of Behavioral Development*, 34(4), 302–310. <https://doi.org/10.1177/0165025409347987>
- Waasdorp, T. E., & Bradshaw, C. P. (2015). The overlap between cyberbullying and traditional bullying. *Journal of Adolescent Health*, 56(5), 483–488. <https://doi.org/10.1016/j.jadohealth.2014.12.002>
- Wilkinson, A. V., Shete, S., & Prokhorov, A. V. (2008). The moderating role of parental smoking on their children's attitudes toward smoking among a predominantly minority sample: A cross-sectional analysis. *Substance Abuse Treatment, Prevention, and Policy*, 3(1), 18. <https://doi.org/10.1186/1747-597X-3-18>
- Willard, N. (2007). Effectively Managing Internet Use Risks in Schools. *Social Influence*, 1–18. https://www.cforks.org/Downloads/cyber_bullying.pdf
- Willms, J. D. (2003). Student engagement at school: A sense of belonging and participation. *OECD Retrieved from Www Pisa Oecd Org on March*, 1–84. <https://doi.org/10.1787/19963777>