

Supplementary Information: The Relationship Between Perceived Parental Knowledge and Adolescent Gambling

Alice Guerra^{a,*} Selahattin Tolga Er^b Sabrina Molinaro^c Rodolfo Cotichini^c Elisa Benedetti^c

^a Department of Economics, University of Bologna, Bologna, Italy. ORCID: 0000-0003-1956-0270.

^b Institute of Law and Economics, University of Hamburg, Hamburg, Germany.

^c Institute of Clinical Physiology, National Research Council, Pisa, Italy.

* Corresponding author. Piazza Scaravilli 2, Department of Economics, University of Bologna, 40128 Bologna, Italy. Email: alice.guerra3@unibo.it

Supplementary Table S1. Distribution of adolescent gambling categories by gender and legal gambling status (ESPAD® Italia 2022–2023)

	Non-gamblers	Occasional gamblers	Monthly gamblers	Frequent gamblers	Total
N (%)	8705 (44.12)	7209 (36.54)	2551 (12.93)	1265 (6.41)	19730
Males	3518 (37.33)	3279 (34.79)	1636 (17.36)	991 (10.52)	9424
Females	4969 (50.27)	3833 (38.78)	855 (8.65)	227 (2.30)	9884
Underage (15–17)	5751 (45.82)	4542 (36.19)	1560 (12.43)	697 (5.55)	12550
Legally Eligible (18–19)	2954 (41.14)	2667 (37.14)	991 (13.80)	568 (7.91)	7180

Notes: Row percentages in parentheses. Totals reflect the distribution of the gambler types alone. The numbers differ from those reported in Section “Sample” of the main paper because the model is estimated using full information maximum likelihood, which incorporates cases with missing data.

Supplementary Table S2. Descriptive statistics and bivariate correlations among study variables (ESPAD® Italia 2022–2023)

Variable	(1)	(2)	(3)	(4)	(5)	Mean (Std. Dev.)
(1) Perceived Parental Knowledge (PPK)	-					0.007 (0.910)
(2) Perceived Harmfulness of Gambling (PHG)	0.07***	-				-0.001 (0.974)
(3) Perceived Peer Gambling (PPG)	-0.12***	-0.17***	-			1.617 (0.905)
(4) Awareness of Legal Gambling Age Limits (ALG)	0.05***	0.04***	0.09***	-		-0.067 (0.702)
(5) Gambling Frequency (GF)	-0.15***	-0.20***	0.32***	-0.03***	-	0.141 (0.726)

* p<.05 ** p<.01 *** p<.001

Supplementary Table S3. Multi-group structural equation model by gender

		Females			Males		
Direct effects	Indirect effects	Full Sample	Partition 2 (Calibration)	Partition 3 (Validation)	Full Sample	Partition 2 (Calibration)	Partition 3 (Validation)
PPK -> PPG		-0.151*** (0.015)	-0.200*** (0.020)	-0.144*** (0.036)	-0.078*** (0.020)	-0.106** (0.031)	-0.102** (0.032)
PPK -> PHG		0.056** (0.020)	0.093** (0.031)	0.084* (0.034)	0.067*** (0.018)	0.136** (0.039)	0.043 (0.032)
PPK -> ALG		0.075*** (0.015)	0.078*** (0.020)	0.044 (0.030)	0.050** (0.018)	0.016 (0.032)	0.063 (0.032)
PPK -> GF		-0.105*** (0.019)	-0.098*** (0.028)	-0.107** (0.039)	-0.090*** (0.015)	-0.070* (0.027)	-0.112*** (0.024)
	PPG	-0.030*** (0.004)	-0.035*** (0.007)	-0.027** (0.009)	-0.029*** (0.007)	-0.036** (0.011)	-0.037** (0.011)
	PHG	-0.003 (0.002)	-0.009 (0.005)	-0.002 (0.003)	-0.009*** (0.003)	-0.023** (0.009)	-0.005 (0.004)
	ALG	-0.005** (0.002)	-0.009** (0.003)	-0.002 (0.002)	-0.003 (0.002)	-0.001 (0.002)	-0.004 (0.003)
	Total Ind.	-0.038*** (0.005)	-0.052*** (0.008)	-0.031** (0.009)	-0.041*** (0.008)	-0.060*** (0.014)	-0.046*** (0.012)
	Total Eff.	-0.143*** (0.018)	-0.150*** (0.026)	-0.138*** (0.039)	-0.131*** (0.017)	-0.130*** (0.031)	-0.158*** (0.027)
PPG -> GF		0.197*** (0.019)	0.173*** (0.024)	0.185*** (0.040)	0.366*** (0.017)	0.336*** (0.029)	0.363*** (0.027)
PHG -> GF		-0.057* (0.024)	-0.096* (0.043)	-0.025 (0.032)	-0.140*** (0.020)	-0.171*** (0.034)	-0.109** (0.035)
ALG -> GF		-0.067** (0.020)	-0.113*** (0.028)	-0.042 (0.030)	-0.063** (0.023)	-0.063* (0.032)	-0.067 (0.037)
R ² PPG		0.052	0.079	0.049	0.067	0.066	0.079
R ² PHG		0.009	0.015	0.025	0.013	0.044	0.013
R ² ALG		0.046	0.036	0.069	0.030	0.029	0.033
R ² GF		0.079	0.089	0.067	0.208	0.207	0.209
Observations		12,360	4,119	4,117	11,709	3,903	3,900

Notes: We report the standardized coefficients. PPK=Perceived Parental Knowledge; PHG=Perceived Harmfulness of Gambling; ALG=Awareness of Legal Gambling Age Limits; PPG=Perceived Peer Gambling; GF=Gambling Frequency. * p<.05 ** p<.01 *** p<.001

Supplementary Table S4. Multi-group structural equation model by legal gambling status

		Underage Adolescents (15–17)			Legally Eligible Adolescents (18–19)		
Direct effects	Indirect effects	Full Sample	Partition 2 (Calibration)	Partition 3 (Validation)	Full Sample	Partition 2 (Calibration)	Partition 3 (Validation)
PPK -> PPG		-0.123*** (0.014)	-0.160*** (0.024)	-0.131*** (0.030)	-0.098*** (0.022)	-0.141*** (0.034)	-0.110** (0.038)
PPK -> PHG		0.043** (0.016)	0.071* (0.029)	0.032 (0.028)	0.087*** (0.022)	0.165*** (0.035)	0.097* (0.038)
PPK -> ALG		0.069*** (0.018)	0.070** (0.026)	0.057* (0.027)	0.059** (0.018)	0.007 (0.033)	0.056 (0.035)
PPK -> GF		-0.102*** (0.016)	-0.096*** (0.024)	-0.116*** (0.028)	-0.077*** (0.018)	-0.068 (0.036)	-0.085** (0.027)
	PPG	-0.033*** (0.004)	-0.040*** (0.008)	-0.033*** (0.009)	-0.032*** (0.007)	-0.040*** (0.010)	-0.038** (0.013)
	PHG	-0.004* (0.002)	-0.013* (0.006)	-0.001 (0.001)	-0.011** (0.003)	-0.016* (0.008)	-0.011 (0.006)
	ALG	-0.006** (0.002)	-0.007** (0.002)	-0.006 (0.003)	-0.001 (0.001)	0.000 (0.002)	0.001 (0.003)
	Total Ind.	-0.044*** (0.006)	-0.059*** (0.012)	-0.041*** (0.009)	-0.043*** (0.009)	-0.057*** (0.012)	-0.048** (0.016)
	Total Eff.	-0.146*** (0.016)	-0.155*** (0.022)	-0.157*** (0.028)	-0.120*** (0.021)	-0.125** (0.038)	-0.134*** (0.032)
PPG -> GF		0.271*** (0.017)	0.248*** (0.034)	0.256*** (0.029)	0.322*** (0.018)	0.284*** (0.029)	0.343*** (0.031)
PHG -> GF		-0.094*** (0.017)	-0.178*** (0.027)	-0.044 (0.032)	-0.121*** (0.020)	-0.098* (0.042)	-0.116** (0.037)
ALG -> GF		-0.091*** (0.014)	-0.094*** (0.027)	-0.102*** (0.025)	-0.014 (0.025)	-0.059 (0.033)	0.017 (0.042)
R ² PPG		0.063	0.073	0.074	0.070	0.066	0.079
R ² PHG		0.019	0.024	0.032	0.031	0.060	0.057
R ² ALG		0.041	0.036	0.067	0.034	0.030	0.036
R ² GF		0.153	0.165	0.146	0.234	0.193	0.265
Observations		15,851	5,282	5,278	8,780	2,926	2,924

Notes: We report the standardized coefficients. PPK=Perceived Parental Knowledge; PHG=Perceived Harmfulness of Gambling; ALG=Awareness of Legal Gambling Age Limits; PPG=Perceived Peer Gambling; GF=Gambling Frequency. * p<.05 ** p<.01 *** p<.001.

Supplementary Table S5. Structural equation model for online gambling frequency

		Online Gambling Frequency		
Direct eff.	Indirect eff.	Full Sample	Partition 2 (Calibration)	Partition 3 (Validation)
PPK -> PPG		-0.114*** (0.013)	-0.152*** (0.019)	-0.124*** (0.024)
PPK -> PHG		0.067*** (0.014)	0.117*** (0.023)	0.065** (0.024)
PPK -> ALG		0.065*** (0.014)	0.085** (0.025)	0.067** (0.020)
PPK -> OGF		-0.059*** (0.011)	-0.030 (0.018)	-0.082** (0.029)
	PPG	-0.026*** (0.004)	-0.040*** (0.006)	-0.024*** (0.006)
	PHG	-0.006** (0.002)	-0.008 (0.004)	-0.007* (0.003)
	ALG	0.000 (0.001)	0.000 (0.001)	-0.001 (0.002)
	Total Ind.	-0.032*** (0.005)	-0.048*** (0.006)	-0.031*** (0.007)
	Total Eff.	-0.091*** (0.011)	-0.078*** (0.021)	-0.113*** (0.028)
PPG -> OGF		0.225*** (0.018)	0.264*** (0.025)	0.190*** (0.025)
PHG -> GF		-0.086*** (0.021)	-0.066* (0.032)	-0.102* (0.032)
ALG -> OGF		-0.004 (0.011)	-0.003 (0.016)	-0.019 (0.021)
R ² PPG		0.080	0.084	0.088
R ² PHG		0.020	0.034	0.033
R ² ALG		0.023	0.023	0.026
R ² OGF		0.111	0.129	0.103
Observations		24,631	8,208	8,202

Notes: We report the standardized coefficients. PPK=Perceived Parental Knowledge; PHG=Perceived Harmfulness of Gambling; ALG=Awareness of Legal Gambling Age Limits; PPG=Perceived Peer Gambling; OGF = Online Gambling Frequency. * p<.05 ** p<.01 *** p<.001

Supplementary Table S6. Transcript of Survey Questions (ESPAD®Italia 2012, 2022, 2023)

Notes: For full questionnaires and methodological notes, see <https://www.epid.ifc.cnr.it/project/espas-it/> (last accessed: November 18, 2025).

Panel S6.1. ESPAD Italia 2022

Variable	Question	Possible answers
<i>Perceived Parental Knowledge</i>	“Do your parents know where you spend Saturday nights?”	1=Usually don’t know; 2=Sometimes know; 3=Often know; 4=Always know
	“My father and/or mother know where I am and who I am with in the evening.”	1=Almost never; 2=Rarely; 3=Sometimes; 4=Often; 5=Almost always
<i>Perception of the Harmfulness of Gambling</i>	“How much do you think people risk harming themselves (physically or in other ways) if they gamble: (a) less than once a week, (b) once a week or more?”	1=No risk; 2=Slight risk; 3=Moderate risk; 4=Great risk
<i>Perceived Descriptive Norms</i>	“How many of your friends do you think gamble?”	1=None; 2=A few; 3=Some; 4=Most; 5=All
<i>Awareness of Legal Gambling Age Limits</i>	“Which of the following gambling games do you think are prohibited for minors under 18? (Check all that apply.)” Games listed (8 Items): 1. Scratch-and-win tickets / 10 e lotto / Win for life; 2. Lotto / Superenalotto; 3. Totocalcio / Totogol / Sports Betting; 4. Virtual Betting / Other event betting; 5. Bingo; 6. Slot machine / Video lottery; 7. Texas Hold’em Poker / other card games (poker and bridge); 8. Other games (Roulette, dice, betting exchange, Playsix, ...)	Coded as 1=Yes, Prohibited for minors under 18; 0=No
<i>Awareness of Legal Online Gambling Age Limits</i>	“In your opinion, online gambling in Italy is prohibited for: minors under 14; minors under 16; minors under 18; not prohibited; don’t know.”	Coded as 1=Minors under 18; 0=Otherwise
<i>Gambling Frequency (12 months)</i>	“In the last 12 months, on how many occasions have you engaged in gambling on the following types of games?” Games listed (13 items): 1. Scratch-and-win tickets; 2. Lotto; 3. Superenalotto; 4. 10 e Lotto / Win for Life / Eurojackpot; 5. Bingo; 6. Slot machines / video lottery terminals; 7. Soccer betting (Totocalcio, Totogol, ...); 8. Other sports betting (horse racing, tennis, big race); 9. Other event betting; 10. Virtual betting; 11. Texas Hold’em poker; 12. Other games (poker, burraco, roulette, dice, ...); 13. Other remote/online games (betting exchange, Playsix, ...).	1=Never; 2=Once a month or less; 3=2–4 times a month; 4=2–3 times a week; 5=4–5 times a week; 6=6 or more times a week
<i>Online Gambling Frequency (12 months)</i>	“In the last 12 months, on how many occasions, if any, did you participate in online gambling?”	1=0; 2=1–2; 3=3–9; 4=10–19; 5=20 or more
<i>Gender</i>	“Are you male or female?”	1=Male; 2=Female
<i>Age</i>	“How old are you?”	Open-ended response

Panel S6.1. ESPAD Italia 2022 (continued)

Variable	Question	Possible answers
<i>Income</i>	“How would you rate your family’s economic situation compared to other Italian families?”	1= Far below; 2=Much below; 3=Below; 4=About the same; 5=Above; 6=Much above; 7=Far above
<i>Paternal education</i>	“What is the highest level of education attained by your father?”	1=No formal education or primary school education; 2= Lower secondary school education (or vocational track); 3= Upper secondary school education; 4=Tertiary education or other post-secondary qualification
<i>Maternal education</i>	“What is the highest level of education attained by your mother?”	Same as paternal education
<i>Region</i>	Recoded region variable that indicates the geographical location of each school	1=North-West Italy; North-East Italy; 3=Central Italy; 4=Southern Italy; 5=Islands

Panel S6.2. ESPAD Italia 2023

Variable	Question	Possible answers
<i>Perceived Parental Knowledge</i>	“Do your parents know where you spend Saturday nights?”	1=Usually don’t know; 2=Sometimes know; 3=Often know; 4=Always know
	“My father and/or mother know where I am and who I am with in the evening.”	1=Almost never; 2=Rarely; 3=Sometimes; 4=Often; 5=Almost always
<i>Perception of the Harmfulness of Gambling</i>	“How much do you think people risk harming themselves (physically or in other ways) if they gamble: (a) less than once a week, (b) once a week or more?”	1=No risk; 2=Slight risk; 3=Moderate risk; 4=Great risk
<i>Perceived Descriptive Norms</i>	“How many of your friends do you think gamble?”	1=None; 2=A few; 3=Some; 4=Most; 5=All
<i>Awareness of Legal Gambling Age Limits</i>	“Which of the following gambling games do you think are prohibited for minors under 18? (Check all that apply.)” Games listed (same as 2022).	Coded as 1=Yes, Prohibited for minors under 18; 0=No
<i>Awareness of Legal Online Gambling Age Limits</i>	“In your opinion, online gambling in Italy is prohibited for: minors under 14; minors under 16; minors under 18; not prohibited; don’t know.”	Coded as 1=Minors under 18; 0=Otherwise
<i>Gambling Frequency (12 months)</i>	“In the last 12 months, on how many occasions have you played the following gambling games?” Games listed (same as 2022).	1=Never; 2=Once a month or less; 3=2–4 times a month; 4=2–3 times a week; 5=4–5 times a week; 6=6 or more times a week
<i>Online Gambling Frequency (12 months)</i>	“In the last 12 months, on how many occasions, if any, did you participate in online gambling?”	1=0; 2=1–2; 3=3–9; 4=10–19; 5=20 or more
<i>Gender</i>	“Are you male or female?”	1=Male; 2=Female
<i>Age</i>	“How old are you?”	Open-ended response
<i>Income</i>	“How would you rate your family’s economic situation compared to other Italian families?”	1= Far below; 2=Much below; 3=Below; 4=About the same; 5=Above; 6=Much above; 7=Far above
<i>Paternal education</i>	“What is the highest level of education attained by your father?”	1=No formal education or primary school education; 2= Lower secondary school education (or vocational track); 3= Upper secondary school education; 4=Tertiary education or other post-secondary qualification
<i>Maternal education</i>	“What is the highest level of education attained by your mother?”	Same as paternal education
<i>Region</i>	Recoded region variable that indicates the geographical location of each school	1=North-West Italy; North-East Italy; 3=Central Italy; 4=Southern Italy; 5=Islands

Panel S6.3. ESPAD Italia 2012 (used in Canale et al., 2016)

Variable	Question	Possible answers
<i>Perceived Parental Knowledge</i>	“In general, do your parents know where you spend Saturday evenings?”	1=Always; 2=Quite often; 3=Sometimes; 4=They don’t usually know
	“My father and/or mother know who I am with in the evening.”	1=Almost always; 2=Often; 3=Sometimes; 4=Rarely; 5=Never
	“My father and/or mother know where I am in the evening.”	1=Almost always; 2=Often; 3=Sometimes; 4=Rarely; 5=Never
<i>Perception of the Harmfulness of Gambling</i>	“How much do you think people risk harming themselves (physically or in other ways) if they gamble (a) less than once a week, (b) once a week or more?”	1=No risk; 2=Slight risk; 3=Moderate risk; 4=Great risk
<i>Perceived Descriptive Norms</i>	“How many of your friends would you estimate gamble?”	1=None; 2=A few; 3=Some; 4=Most; 5=All
<i>Self-Disapproval</i>	“Do you disapprove of people gambling (a) less than once a week, (b) once a week or more?”	1=Don’t disapprove; 2=Disapprove somewhat; 3=Strongly disapprove; 4=Don’t know
<i>Gambling Frequency (12 months)</i>	“In the last 12 months, on how many occasions have you engaged in gambling on the following types of games?”	1=Never; 2=Less than once a month; 3=Once a month; 4=2–3 times a month; 5=1–2 times a week; 6=3–6 times a week; 7=Every day
	Games listed (8 items): 1. Scratch-and-win / instant lottery; 2. Lotto / Superenalotto; 3. Totocalcio / Totip; 4. New slot machines / videopoker; 5. Sports betting; 6. Other event betting; 7. Texas Hold’em poker; 8. Other card games (poker, burraco, bridge).	—
<i>Gender</i>	“Are you male or female?”	1=Male; 2=Female
<i>Age</i>	“How old are you?”	Open-ended response