Frequency of engagement with legal UK youth gambling products is associated with
adult disordered gambling

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Abstract:

The potential effects of exposing children aged under 18 to gambling is an area of concern for researchers and policy-makers around the world. The UK is rare in that it allows for a number of gambling products to be legally used by people under the age of 18. The present research is a retrospective cross-sectional study of 1,052 adult UK gamblers, aged 18 - 40. Five legal youth gambling products were considered: Category D fruit machines, the National Lottery, National Lottery scratchcards, coin push machines, and crane grab machines. Recalled rates of legal youth engagement were high, ranging from 53.7% for Category D fruit machines to 93.4% for coin push machines. Across each product, merely having used a legal youth gambling product in the past was not associated with adult disordered gambling, except for scratchcards. However, higher levels of recollected legal youth engagement with each of the five products was robustly associated with adult disordered gambling. These results are relevant to recent government proposals to increase the legal age on National Lottery scratchcards to 18, and are consistent with previous results on early exposure to gambling and subsequent gambling-related harm.

Keywords: underage gambling, gambling policy, gambling legislation, problem gambling, legal age

Potential effects from childhood exposure to gambling is an area of concern for researchers and policy-makers around the world (Delfabbro, King, & Derevensky, 2016; Djohari, Weston, Cassidy, Wemyss, & Thomas, 2019; Molinaro et al., 2018; Orford, 2019; Pitt, Thomas, Bestman, Daube, & Derevensky, 2017; Sharman, Murphy, Turner, & Roberts, 2019; Smith, Chambers, Abbott, & Signal, 2019; Wardle, 2019). In the UK, 14% of 11-16 year olds have spent their own money on gambling in the last week, which is higher than the 13% who have drunk alcohol, and the 4% who have smoked cigarettes, in the last week (Gambling Commission, 2018). This is concerning because earlier age of gambling initiation has been associated with an increased risk of becoming a disordered adult gambler (Kessler et al., 2008). Early exposure to gambling is also a topical issue due to the growing popularity of gambling-like activities present in video games. Video game “loot boxes” are one prominent example, which can be purchased for real money to provide some randomized in-game reward (Zendle, Meyer, Cairns, Waters, & Ballou, 2020). Loot boxes vary in the extent to which their contents can be exchanged for prizes of economic value, leading to academic and regulatory debate about whether this activity constitutes gambling or not (Brooks & Clark, 2019; Drummond & Sauer, 2018; Gambling Commission, 2017). The widespread inclusion of loot boxes in video games is relatively recent, meaning that any association between child loot box engagement and adult disordered gambling may not be known for some time, although some worrying trends among adolescents are apparent (Zendle, Meyer, & Over, 2019). By comparison, the UK has for some time allowed a number of gambling products to be used by children under the age of 18. As such, the present paper explores the extent to which a range of legal child gambling activities are associated with adult disordered gambling status.

The UK allows a class of electronic gambling machines, known as “fruit machines” to be legally playable by people of any age (Fisher, 1991). Since 2007 these machines have been

called “Category D fruit machines,” and currently come with a maximum bet of £0.10 per spin and a maximum payout of £5.00 (UK Government, 2007). By comparison, other categories of fruit machines come with higher maximum bet sizes and payouts, and can only be legally played by people aged 18 or older (UK Government, 2007). The UK also introduced a state-sponsored National Lottery in 1994 and, subsequently, National Lottery scratchcards in 1995, which can both be legally gambled on by anyone aged 16 or older. At one point in time, scratchcards of between £1 and £10 in value could be purchased; the £10 scratchcards were withdrawn from sale in September 2019 due to findings that this product was bought disproportionately more often by disordered gamblers (Gambling Commission, 2019). In 2019 it was announced that the UK government was considering raising the legal age on scratchcards to 18 (DCMS, 2019), but without any similar plans to increase the age of play for the National Lottery.

The UK allows other gambling products to be legally used at any age. “Coin push” machines involve entering coins of up to £0.10 in value into a mechanical device containing many coins and moving platforms in the hope that the new coin will “push” a number of coins off which can then be collected as winnings. Coin push machines can sometimes include other prizes such as sweets, up to a total value of £5, and can be legally used by people of any age (UK Government, 2007). “Crane grab” machines cost up to £1 to play, and involve trying to pick up a plush toy or other prize and moving it into a collection tray by operating a crane machine. The crane can be altered by the provider to drop toys before they reach the collection tray at different times or rates (Rossen & Bomnin, 2016), thereby mimicking the “near-miss” effect in slot machines (Schüll, 2012). Crane grab machines might be considered the closest analogue to loot boxes out of these products, in that they provide a chance to win prizes which come as items, rather than by directly providing monetary winnings.

Given concerns around childhood exposure to gambling-like activities, the present research was designed to explore associations between recollected legal usage of these five gambling products while being under the age of 18 and adult disordered gambling. This was implemented via the two following hypotheses:

1. Is any level of engagement with a youth gambling product (versus having never used that product) associated with increased risk of adult disordered gambling?
2. For gamblers who have used a given youth gambling product legally, are increased levels of recollected usage associated with increased risk of adult disordered gambling?

Method

Study materials, results, and the preregistered analysis plan can be accessed from <https://osf.io/kxhu9/>. Data collection occurred over the 27th February 2020.

Participants

UK resident adult gamblers were recruited from the crowdsourcing platform Prolific Academic ($n = 1,052$). Participants were paid £0.50 and took an average of 3.0 minutes to complete the task (£10/per-hour pro-rata). Participants had earlier indicated to Prolific that they had gambled online before. Participants were pre-screened to be between the ages of 18 and 40 ($M = 30.2$, $SD = 5.9$). This is because National Lottery scratchcards were introduced in 1995, so this ensured that every participant had an opportunity to legally use each product while they were under the age of 18. Restricting the maximum age range also minimized the potential for memory biases to interfere with the results.

Participant demographics are in Table 1. Overall, 9.0% of the sample was classified as a current problem gambler by the Problem Gambling Severity Index (PGSI).

Table 1. Participant demographics

Demographic	%	n
<i>Gender</i>		
Female	58.5	615
Male	40.9	431
Other/I'd prefer not to say	0.6	6
<i>Occupation</i>		
In work	74.2	781
Student	10.9	115
Unemployed	7.1	75
Homemaker	6.1	64
Retired	0.1	1
Other	1.5	16
<i>Highest level of education</i>		
Primary school	0.2	2
Secondary school	13.2	139
College/A-levels/BTEC/IB etc	34.1	359
Undergraduate degree	37.8	398
Postgraduate degree	14.6	154
<i>Problem Gambling Severity Index category</i>		
Non-problem gambler	39.2	412
Low-risk gambler	29.5	310
Moderate-risk gambler	22.3	235
Problem gambler	9.0	95

Design and materials

This was a cross-sectional survey. Participants completed three blocks, providing demographics, answering the PGSI (Ferris & Wynne, 2001), and providing their recollected usage of five legal youth gambling products. Each legal youth gambling product was presented on a separate page with a photo and between 70 - 113 words of descriptive text about the product. Figure 1 is a screenshot of this descriptive text for crane grab machines. All task instructions can be accessed from <https://osf.io/kxhu9/>.

Crane grab machines can often be found in amusement centres, seaside resorts, or travelling fairs. Crane grab machines can be legally used by persons of any age.

Crane grab machines involve prizes which must be picked up by a crane that is controlled and manipulated by the user.

Crane grab machines currently cost a maximum of £1 to use, and can contain prizes up to a maximum value of £50.

Figure 1. Example of crane grab machine description. Shown immediately below this was a relevant image, “How often do you recall using crane grab machines **while being under the age of 18**” and the dependent variable response scale.

The dependent variable for each product was the recollected legal youth usage/buying of that product, which for the lottery and scratchcards was between the ages of 16 - 17, and was under the age of 18 for the other three products. The exact wordings used were, “How often do you recall using Category D fruit machines / coin push machines / crane grab machines while being under the age of 18?”, and, “How often do you recall buying National Lottery tickets/National Lottery scratchcards while being between the ages of 16 and 17?” Note that National Lottery products engagement was only measured over the ages of 16 and 17, unlike the other products which are all legal to use at any age. The text from “while” onwards in each question was shown in bold font. A five-point scale of recollected usage was used for each product, with labels of: Never, Rarely, Occasionally, Frequently, Very frequently.

Usage was preferred over the alternative of recollected expenditure, as the products vary in terms of their cost of use, and because expenditure may be harder to report accurately. With this response scale never is qualitatively different from the other four potential responses. Therefore, it was decided to split this scale into two separate analyses, looking at the independent factors of any level of engagement versus never engaging (hypothesis 1), and increasing levels of engagement amongst those who had used a legal youth gambling product (hypothesis 2).

Procedure

Participants completed the three blocks about recollected usage of legal youth gambling products, demographics, and the problem gambling severity index in random order. The order of the five legal youth gambling products was also randomized within that block.

Data analysis

The data analysis plan was preregistered to use an alpha of .01 and to proceed via general linear models in R. The initial plan was to investigate both hypotheses in a single model for each product using orthogonal contrast codes. However, inspection of the model results led to the realization that simultaneously accounting for hypotheses 1 and 2 in a single model was affecting the sign of parameter estimates for hypothesis 1 compared to bivariate correlations, likely because the engagement and frequency components were highly correlated ($r \sim .8$ for most products) leading to concerns around multicollinearity. Therefore, it was decided to run separate models for each hypothesis in each product. This did not affect the parameter estimates or significance for the hypothesis 2 results. The only significance affected by this decision was for scratchcards in the case of hypothesis 1. Analysis output scripts for both approaches are provided in the online supplemental materials <https://osf.io/kxhu9/>.

Results

Coin push and crane grab machines were used the most frequently, at 93.4% and 93.3% respectively. The National Lottery and National Lottery scratchcards were also used frequently, at 68.5% and 66.4% respectively. Category D fruit machines were used the least frequently, but still used by 53.7% of the sample. A full breakdown of responses is in Table 2.

Table 2: Frequency of engagement in each of five forms of youth gambling products.

Frequency	Coin push	Crane grab	Category D fruit machine	National Lottery	Scratchcards
Never	6.6%	6.7%	46.3%	31.5%	33.6%
Rarely	15.7%	28.8%	31.0%	33.8%	30.2%
Occasionally	40.7%	41.7%	17.4%	24.9%	25.1%
Frequently	24.5%	16.7%	3.9%	8.2%	8.6%
Very frequently	12.5%	6.1%	1.4%	1.6%	2.6%

A log correction was applied to PGSI due to positive skewness. Engagement versus non-engagement was not significantly associated with PGSI for any product apart from scratchcards, where underage engagement was positively associated with increased risk of adult disordered gambling. The p -value for Category D fruit machines was exactly .010, the alpha level set for the study. As can be seen in Table 3, p -values for the other three forms range between .103 and .991.

Table 3: Regression models predicting (log+1) PGSI scores by engagement (no/yes) and frequency of engagement on each of five youth gambling products, 99% confidence intervals.

Variable	Statistic	Coin push	Crane grab	Category D fruit machine	National lottery	Scratchcards
Engagement (ref = no)	Coeff	0.174	0.127	0.136	0.001	0.172
	99% CI	(-0.101, 0.448)	(-0.146, 0.399)	(-0.001, 0.272)	(-0.146, 0.147)	(0.029, 0.315)
	<i>t</i>	1.63	1.20	2.58	0.01	3.09
	<i>p</i>	.103	.231	.010	.991	.002
	<i>n</i>	1,052	1,052	1,052	1,052	1,052
Frequency	Coeff	0.118	0.194	0.216	0.110	0.185
	99% CI	(0.041, 0.195)	(0.114, 0.274)	(0.094, 0.339)	(0.003, 0.217)	(0.085, 0.286)
	<i>t</i>	3.93	6.25	4.54	2.64	4.75
	<i>p</i>	<.001	<.001	<.001	.008	<.001
	<i>n</i>	983	982	565	721	699

Note: Dependent variable is PGSI scores (log+1). An alpha of .01 was used throughout, hence the 99% confidence intervals. Bold text indicates statistically significant coefficients.

Results for frequency of engagement indicate that increased frequency of engagement with each product was associated with an increased risk of adult disordered gambling, with each *p*-value being below .01. Coefficients on frequency of engagement were highest for Category D fruit machines (0.216), crane grab machines (0.194), and scratchcards (0.185), and were lowest for coin push (0.118), and the National Lottery (0.110).

Discussion

The present research found high levels of engagement with legal youth gambling products, with at least 50% of over 1,000 adult gamblers reporting legal engagement with each product. Merely having used a product legally while under 18 was not generally associated with disordered adult gambling. However, more frequent use of each of the five products was associated with an increased risk of disordered adult gambling. This suggests that government proposals to increase the minimum age on National Lottery scratchcards to 18

might want to consider restricting the availability of a wider range of legal youth gambling products (DCMS, 2019). The present results may also be relevant to the debate around whether video game loot boxes constitute gambling (Drummond & Sauer, 2018; Gambling Commission, 2017). Crane grabs are the most analogous product studied here, and frequency of recalled childhood engagement with crane grab machines was robustly associated with adult disordered gambling.

The present research does come with a number of limitations. The present results are merely correlational associations and should not be considered as causal effects. It is based on crowdsourced data, which are a popular and widely-considered robust data collection method in psychology (Crump, McDonnell, & Gureckis, 2013), but which are less commonly used in other disciplines. It is unknown how participants may have interpreted the verbal descriptors of frequency used as independent variables. Like a large amount of gambling research, these data are based on retrospective self-reports, which may be limited due to memory biases. The maximum age to take part in the study was capped at 40, partly to reduce the potential impact of memory biases, but this also meant that older cohorts were excluded, where different associations might plausibly occur. The present research also does not address the topic of illegal youth gambling (Pugh & Webley, 2000). In our view, a primary aim of policy makers is to set appropriate legal ages for gambling products, with enforcement of those legal ages being a secondary issue.

The present results add to a growing evidence base around the associations between childhood gambling and adult disordered gambling (Delfabbro et al., 2016; Djohari et al., 2019; Molinaro et al., 2018; Orford, 2019; Pitt et al., 2017; Sharman et al., 2019; Smith et al., 2019; Wardle, 2019).

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