SECONDARY DATA ANALYSIS REPORT

EXPLORING THE PROBLEM GAMBLING HEALTH-HARM PARADOX

Bea Taylor
National Centre for Social Research (NatCen), London, UK

Heather Wardle, PhD
School of Social and Political Sciences at the University of Glasgow, Glasgow, Scotland

Isabel Taylor, PhD
National Centre for Social Research (NatCen), London, UK

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For more information about this study, please contact analysis@natcen.ac.uk

DECLARATIONS OF INTERESTS

In the last 5 years, HW discloses grant funding for gambling-related research by the Economic and Social Research Council, National Institute for Health Research, Wellcome Trust, the Gambling Commission (including their regulatory settlement fund), Office of Health Disparities and Improvements/Public Health England; Greater London Authority; Greater Manchester Combined Authority; Blackburn with Darwen Local Authority and the Department of Digital Culture Media and Sport. In 2018/19, HW received funding from GambleAware for a project on gambling and suicide. HW declares consulting fees from the Institute of Public Health, Ireland and the National Institute for Economic and Social Research. HW declares payment for delivery of seminars from McGill University, from John Hopkins University and from the British Broadcasting Corporation. HW has been paid as an expert witness by Lambeth and Middlesborough Borough Councils; HW declares travel costs paid by Gambling Regulators European Forum, the Turkish Green Crescent Society, Alberta Gambling Research Institute; the REITOX Academy (administered through the Austrian National Public Health Institute) and the University of Helsinki. She served as Deputy Chair of the Advisory Board for Safer Gambling between 2015 and 2020, remunerated by the Gambling Commission; is a Member of the WHO panel on gambling (ongoing) and provided unpaid advice on research to GamCare for their Safer Gambling Standard (until 2021). She runs a research consultancy for public and third sector bodies only. She has not, and does not, provide consultancy services to gambling industry actors.

In researching the gambling industry and their practices, HW declares occasional attendance at events where gambling industry actors are present (including industry-sponsored conferences). As part of her work on the Gambling Survey for Great Britain, HW is required by the Gambling Commission (the funder) to participate in events disseminating research findings to their stakeholders, which includes the industry. Her attendance at events where industry is present is independently funded and does not involve collaborations or partnerships with industry.

ABSTRACT

Purpose: Previous research by NatCen identified a potential health-harm paradox for mental wellbeing and gambling, finding that those with poor mental wellbeing or a diagnosed mental health condition were more likely to experience problem gambling despite being less likely to gamble at all. This report aimed to explore this further, testing three specific hypothesis which could account for this association:

1. That people with poorer mental wellbeing who gamble do so more frequently and it is this increased frequency of gambling that drives elevated rates of gambling severity.

2. That people with poorer mental wellbeing who gamble generally take part in higher risk health behaviours (e.g., higher-risk alcohol consumption; cigarette smoking) and this drives the association.

3. That people with poorer mental wellbeing who gamble are more likely to take part in specific types of gambling that are associated with higher rates of harms.

This report explores these potential mechanisms, using data collected in recent Health surveys across England and Scotland.

Methodology: Data from the 2015-2017 Scottish Health Survey and the 2015, 2016 & 2018 Health Survey for England were combined, and bivariate analysis was conducted first to confirm that the relationships between mental health, moderate risk/problem gambling and gambling patterns did not vary significantly between survey years. With this established, binary logistic regressions using the combined data from both the Scottish and English Health Survey series were employed to investigate explanatory factors of the association between mental health and experiences of moderate risk/problem gambling. These include gambling and other health-related factors. These were first conducted on the full sample, and then separate models were estimated for men and women to provide further insights by gender.

Measures: For the exposure variable, three different established measures of mental health were used: doctor diagnosis of a mental health condition, the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS; a score of 40 or below indicating probable depression) and the General Health Questionnaire (GHQ-12; a score of 4 or more indicating significant mental distress). The outcome variable of moderate risk/problem gambling was measured by the Canadian Problem Gambling Index's Problem Gambling Severity Index (PGSI), while gambling activities and frequency were derived from multiple questions in the combined surveys. The PGSI is a measure of the riskiness of a person's gambling habits. Someone identified as a moderate risk gambler experiences a moderate level of problems with their gambling which can lead to some negative consequences. These might be spending more than they can afford, losing track of time while gambling, or feeling guilty about how much they gamble. A person identified as a problem gambler in the PGSI score will also face negative

consequences from their gambling, as well as a possible loss of control. Control variables included socio-demographic characteristics and alcohol and cigarette consumption.

Results: Our results confirm previous findings that people with poor mental wellbeing or a diagnosed mental health condition were significantly more likely to experience moderate risk or problem gambling despite being less likely to gamble at all. For example, 50% of those experiencing significant mental distress gambled in the past year compared with 54% of those not experiencing significant mental distress, yet rates of experiencing moderate risk/problem gambling respectively were 2.4% and 1.2%.

Logistic regression models showed that the associations between moderate risk and problem gambling and both 'mental distress' (measured in the GHQ) and 'probable depression' (the WEMWBS) were not fully accounted for by differences in gambling frequency, gambling activity or engagement in other risky health behaviours. Thus, these alternative explanations for the association between mental wellbeing and moderate risk or problem gambling was not supported by any of the three hypotheses tested. In the fully adjusted models, controlling for all these alternative explanations, the odds ratio of moderate risk/problem gambling were 1.86 times higher among those with probable depression and 2.56 times higher among those with significant mental distress. This relationship is not explained by those with poor mental wellbeing who gamble participating in gambling more often, engaging in higher-risk health behaviours or in specific types of gambling activity.

However, when looking at doctor-diagnosed mental health conditions and moderate risk or problem gambling, only one hypothesis was rejected – that increased gambling frequency could explain this association. When cigarette smoking and high-risk alcohol consumption were controlled for, and when engagement in specific gambling activities were taken into account, there was no evidence of an association between doctor-diagnosed mental health conditions and moderate risk/problem gambling.

Finally, gender-stratified analysis revealed that for men with poor mental wellbeing or a diagnosed mental health condition had a similar relationship to moderate risk/problem gambling as the whole population. For women, the study was underpowered to look at this in detail.

Implications: Findings from this research suggest that the relationship between poor mental wellbeing and moderate risk/problem gambling is not driven by differences in gambling or other high-risk health behaviour, particularly amongst people experiencing anxiety or depression. The association between poor mental wellbeing and experiences of moderate risk and problem gambling in this data persists when these behaviours are taken into account, though the direction of any causal (or potentially reciprocal) relationship has not been established in this cross-sectional data.

Although other factors not measured in study may explain this relationship, it is concerning that people with poor mental wellbeing are more likely to experience gambling harms, despite lower levels of gambling engagement. Therefore, gambling should be embedded within broader strategies for improving mental health (for example, as a risk factor for poor mental wellbeing; for suicidality etc.) and should be considered as both a potential cause and consequence of moderate risk and problem

gambling, to help to identify and address this. It also highlights the need for additional research into the specific doctor-diagnosed mental health conditions that increase the risk of moderate risk/problem gambling, as well as further investigations into the causal pathway between both mental distress and depression and moderate risk/problem gambling.

INTRODUCTION

Despite often being treated as distinct policy issues, problem gambling and poor mental wellbeing have a well-demonstrated association.[1] However, the mechanics of this association have received less investigation. Prior research by the National Centre for Social Research (NatCen) using the Health Surveys for England and Scotland offered two interesting insights into how mental wellbeing and problem gambling interact.[2] It found that those with poor mental wellbeing were more likely to experience problem gambling, but also that those with poor mental wellbeing were less likely to gamble at all.

Taken together, these two findings tentatively suggest the existence of a 'health-harm paradox' for problem gambling amongst those with poor mental wellbeing. The harm paradox is a public health concept that highlights how certain groups have a higher risk of harm, despite an overall lower engagement in an activity. It has, for example, been used to highlight how people from more deprived groups consume less or similar amounts of alcohol as those in less deprived groups, but are more likely to experience alcohol-related harms.[3]

While gambling harm paradoxes have been explored regarding other socio-economic or demographic groups (ethnicity, economic employment, deprivation[4,5]) there is a lack of research into a gambling and mental wellbeing-harm paradox in the British context. Previous British-based research on the association between various dimensions of poor mental wellbeing and problem gambling have simply asserted the existence of this association, and have been unable to explore gambling patterns amongst those with poor mental wellbeing due to data limitations.[1,6]

As such, the aims of this report are twofold. First, to identify further evidence of a gambling and mental wellbeing-harm paradox using recent English and Scottish data, and then to explore possible explanations for why those with poor mental wellbeing or a diagnosed mental health condition are more likely to experience moderate risk/problem gambling, despite being less likely to gamble at all. In particular, this report investigates whether the way in which individuals with poor mental health engage with gambling can explain their higher risk of moderate risk/problem gambling. Specifically, it investigates three separate hypotheses:

1. Gamblers with poor mental wellbeing or a diagnosed mental health condition are more likely than those with better mental health to gamble more frequently and are therefore at greater risk of experiencing moderate risk/problem gambling.

2. Gamblers with poor mental wellbeing or a diagnosed mental health condition are more likely than those with better mental health to engage in higher health risk behaviours generally and are therefore at greater risk of experiencing moderate risk/problem gambling.

3. Gamblers with poor mental wellbeing or a diagnosed mental health condition are more likely than those with better mental health to engage in gambling activities which are associated with moderate risk/problem gambling.

METHODOLOGY

DATA

This analysis uses data from the Health Survey for England (HSE) and the Scottish Health Survey (SHeS), which are available as combined datasets on gambling in England and Scotland for 2015 and 2016 (2015: n=13,032; 2016: n=12,334). In 2017, data on gambling was only collected in the SHeS, and in 2018 data only in the HSE. Therefore, these two individual datasets were combined to create a single dataset for England and Scotland for data collected in 2017/18. New weights were generated for this combined 2017/18 dataset to reflect the population of England and Scotland overall (n = 11,875).

Each of these three datasets (2015, 2016 and 2017/18) draws on the annual cross-sectional study from each nation, based on nationally representative samples of people in private households in England and Scotland. As an initial stage of analysis, we compared relationships between gambling activities, mental wellbeing, mental health diagnoses, health behaviours and problem gambling for each individual survey year. We found that these did not differ in a meaningful way between years. Therefore, the analysis reported here uses the combined dataset for 2015-2017/18 to allow us to investigate the mental wellbeing, doctor-diagnosed mental health conditions and moderate risk/problem gambling.

For each year's data, variables that were consistent across the English and Scottish datasets, and those that could be derived to create matching variables, were included in the annual combined dataset.

MEASURES

OUTCOMES

Moderate risk/problem gambling: Gambling severity was measured using the Canadian Problem Gambling Index's Problem Gambling Severity Index (PGSI).[7] This is made up of nine survey items asking participants if they have never (equal to a score of 0), sometimes (1), most of the time (2) or almost always (3) experienced a given behaviour over the previous 12 months. Responses can be combined to create a scale from 0 to 27, which can identify four categories of participants: non-problem gambling (0), low risk gambling (1-2), moderate risk gambling (3-7) and problem gambling (8+). Given the small number of people experiencing problem gambling in the datasets, the focus of

this analysis is participants who were classified as experiencing moderate risk or problem gambling (meaning a PGSI score of three or more). These participants are considered most likely to be experiencing negative consequences from their gambling. Therefore, a binary variable was created to identify people with a PGSI score of 3 or more (coded to 1) and those with a PGSI score between 0 and 2 (coded to 0).

EXPOSURE VARIABLES

Mental wellbeing: Mental wellbeing was measured using two different instruments: the 14-item Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) and the 12-item General Health Questionnaire (GHQ-12).

The 14 questions used to create the WEMWBS scale asked participants a series of questions about their feelings and thoughts over the previous two weeks. Responses to each question can range from 0-5. Respondents' answers to these 14 questions can be combined to create an overall scale ranging from 0-70, with lower scores reflecting a higher likelihood of experiencing depression. The established cut-off score of 40 was used as to identify participants likely experiencing probable depression[7,8] to create a new dichotomous variable (Probable depression = 1, No probable depression = 0). The WEMWBS was only available in the 2015 and 2016 datasets. The WEMWBS has been validated in multiple contexts, a summary of this research can be found here.

The 12 survey items that make up the General Health Questionnaire (GHQ-12) ask participants how often they have experienced a series of behaviours that may be a symptom of mental distress over the previous four weeks. From these, dichotomous variables can be created to show if a participant has experienced each potential symptom of mental distress. These dichotomous variables can be combined to create an overall scale reflecting the number of symptoms of mental distress (ranging from 0-12) experienced by participants, with higher values reflecting greater distress. The established cut-off score of four was used to identify participants experiencing significant mental distress[9] to create a new dichotomous variable (Significant mental distress = 1, No significant mental distress = 0). The GHQ was only available in the 2016 and 2017/18 datasets. The GHQ-12 has been subject to extensive validity and reliability assessment in different populations in a variety of contexts.[10,11]

Doctor-diagnosed mental health conditions: This was measured using a dichotomous variable (Diagnosed condition = 1, No diagnosed condition = 0). In the interview, participants are asked to name up to six different conditions that they may have. These are then coded by type and this information used to indicate whether someone has a mental health condition or not. This variable was available in every dataset used for this analysis.

ALTERNATE EXPLANATORY VARIABLES

Gambling activity: The HSE and SHeS datasets contain 19 variables capturing different forms of gambling activity, including one for 'other' gambling activities. Survey participants were asked if they had taken part in each of the activities in the last 12 months (1= participated in the last 12 months, 0 =

did not participate in the last 12 months). For this analysis six of these variables were collapsed to create three key variables capturing different types of gambling activity. The first captured whether participants had spent money on tickets for the national lottery or bought tickets for another lottery. The second captured participation in either online betting or at a betting exchange. The third variable captured participation in betting on horse races, dog races, sports events or other events, either at the bookmakers, by phone or at the venue where the event is taking place. The remaining 13 variables measuring other individual gambling activities (such as online casinos, slots, bingo at a club, etc.) were entered individually into the analysis. Where a model was run including gambling activity, all 16 indictors of different gambling activities were entered into the model. However, the smaller number of participants indicating that they took part in each of these individual gambling activities limits their use in some strands of analysis.

Gambling frequency: Gambling frequency, which contains 6 categories in HSE and SHeS (1 = 2 or more times a week, 2 = once a week, 3 = less than once a week, more than once a month, 4 = once a month, 5 = every 2-3 months, 6 = once or twice a year) was recoded in two different ways for the descriptive and regression analysis. For descriptive analysis, this variable was collapsed to capture three gambling frequencies (1 = once a week or more, 2 = less than once a week but once a month or more, 3 = less than once a month) to ensure sufficient sub-groups sizes within the data to facilitate meaningful comparisons between these groups. For logistic regressions with a dichotomous outcome, a binary variable capturing whether participants gambled less than once a week (including non-gamblers, 0) or once a week or more (1) was derived.

Alcohol and cigarette consumption: Engagement in other higher risk health behaviours was captured by alcohol and cigarette consumption. Three measures of alcohol consumption were included; participants' drinking risk category based on current guidance[12] and standardised across all years' data (recoded to 0 = Non drinker, 1 = Lower risk drinker: 14 units or less per week for men or women, 2 = Moderate risk drinker: 15-50 units for men or 15-35 units for women, 3 = Higher risk drinker: Over 50 units for men or over 35 units for women). Two measures of smoking habits were included in this analysis; participants' current smoking status (1 = Never smoked, 2 = Used to smoke occasionally, 3 = Used to smoke regularly, 4 = Current cigarette smoker), and number of cigarettes smoked (1 = Light smoker, <10, 2 = Moderate smoker, 10-20, 3 = Heavy smoker, 20+, 4 = Don't know number, 5 = Non-smoker). Following the results of descriptive analysis, only the current smoking status and not the number of cigarettes smoked was used in regression analyses.

Table 1.1: Summary of measures included in the analysis

Measure	Purpose	Summary
Problem Gambling Severity Index (PGSI)	Outcome measure	A measure of gambling severity. Analysed as a binary variable splitting moderate risk and problem gamblers from low risk and non-problem gamblers.
Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)	Exposure variable	A measure of mental wellbeing. Analysed as a binary variable identifying people with probable depression.

General Health Questionnaire (GHQ-12)	Exposure variable	A measure of mental wellbeing. Analysed as a binary variable to identify people experience significant mental distress.
Doctor-diagnosed mental health conditions	Exposure variable	Based on reported diagnoses of medical conditions. Included as a binary variable indicating whether someone has a diagnosed mental health condition.
Gambling activity	Alternate exposure variable	The different types of gambling people engage in. Measured through 16 binary indicators of participation in different types of gambling.
Gambling frequency	Alternate exposure variable	How often people gamble, measured in the logistic regressions as a binary variable showing whether people gambled less than once a week (including not at all), or once a week or more.
Alcohol and cigarette consumption	Alternate exposure variable	Alcohol consumption distinguished between non-drinkers, as well as low, medium and high-risk drinkers. Cigarette use measured current smoking status. It identifies those who never smoked, those who used to smoke occasionally, used to smoke regularly and people who currently smoke.

CONTROL VARIABLES

Socio-demographic characteristics: The following variables were included to reflect people's demographic and socio-economic characteristics: gender (recoded to male = 0, female =1), age (recoded to 16-24 = 0, 25-34 = 1, 35-44 = 2, 45-54 = 3, 55-64 = 4, 65+ = 5), geographical region (1 = South East, 2 = North West, 3 = Yorkshire and Humber, 4 = East Midlands, 5 = West Midlands, 6 = East of England, 7 = London, 8 = North East, 9 = South West, 10 = Scotland), economic activity (recoded to 1 = In employment, 2 = In full time education, 3 = Retired, 4 = unemployed [as defined by the International Labour Organisation], 5 = Other inactive) and household social class (NSSEC 5: 1 = Managerial and professional occupations, 2 = intermediate occupations, 3 = Small employers and own account workers, 4 = lower supervisory and technical occupations, 5 = Semi-routine occupations, 99 = Other).

The ethnicities of participants of the SHeS were coded as not applicable in the combined datasets for 2015 and 2016 as this data was not available for analysis. This was not an issue in the 2017 Scotland data and did not apply to the 2017/2018 combined dataset. To prevent losing these participants from all models, they were given a valid category of 'SHeS/NA' rather than coded as missing, as no accurate information was available on their ethnicity (White British/White Other = 1, Scottish / N/A=2, Black = 3, Asian = 4, Mixed/multiple heritage=5, Other = 6).

DATA ANALYSIS

Weighted bivariate analyses were conducted to explore the 'mental wellbeing-harm paradox' across England and Scotland. To investigate whether there was evidence of this in the data, and to explore the factors associated with this, descriptive analysis investigated if and how gambling activities, frequency and high-risk health behaviour outcomes varied by mental wellbeing and mental health diagnosis.

Individual logistic regression models were then built to investigate the relationship between mental wellbeing, mental health diagnoses and moderate risk/problem gambling, using the PGSI instrument. Only people who reported having engaged in any form of gambling during the previous 12 months were included in these models, given that differences in participation rates are likely to be highly correlated with moderate risk/problem gambling. All models included controls for gender, age, geographical region, ethnicity, employment status and social class as standard. Variables capturing participants' gambling frequency, engagement in specific gambling activities and high-risk health behaviors were also added in a stepwise fashion to investigate if these moderate the relationship between mental wellbeing and moderate risk/problem gambling. The full set of models are shown in Table 1.2.

Table 1.2: Summary of models

Model	Outcome	Alternate explanatory variable	Purpose
Model 1	Moderate risk or problem gambling status	None	'Baseline' model to compare to Models 2, 3, 4 and 5.
Model 2	Moderate risk or problem gambling status	Gambling frequency	To compare to Model 1 to examine gambling frequency as an alternate explanation for the mental wellbeing-harm paradox.
Model 3	Moderate risk or problem gambling status	Smoking behaviour and drinking behaviour.	To compare to Model 1 to examine health behaviours as an alternate explanation for the mental wellbeing-harm paradox.
Model 4	Moderate risk or problem gambling status	Gambling activity (16 individual activities)	To compare to Model 1 to examine gambling activity as an alternate explanation for the mental wellbeing-harm paradox.
Model 5	Moderate risk or problem gambling status	Gambling frequency, activity and smoking and drinking behaviours	Fully adjusted model to compare to Model 1 to examine gambling activity, gambling frequency and smoking and drinking behaviours as alternate explanations for the mental wellbeing-harm paradox.

As Table 1.2 describes, this report compares the results of a 'baseline' Model 1 to Models 2, 3, 4, and 5 to assess the plausibility of the three potential explanations for the gambling mental wellbeing-harm paradox. If the association identified in Model 1 between poor mental health and moderate risk/problem gambling is no longer significant when this is included, this means the mental wellbeing-harm paradox is likely explained by differences in gambling engagement (frequency or engagement in specific activities) or engagement in high health risk behaviours (cigarette smoking/alcohol consumption).

All five models were repeated using GHQ, WEMWBS and mental health condition diagnosis separately to compare the paradox across different mental health measures. The GHQ and WEMWBS were not available in every survey year, meaning the analyses across all models described in Table 1.2 using GHQ and WEMWBS relate only to the years that they were available. As a consequence these analyses will have smaller sample sizes.

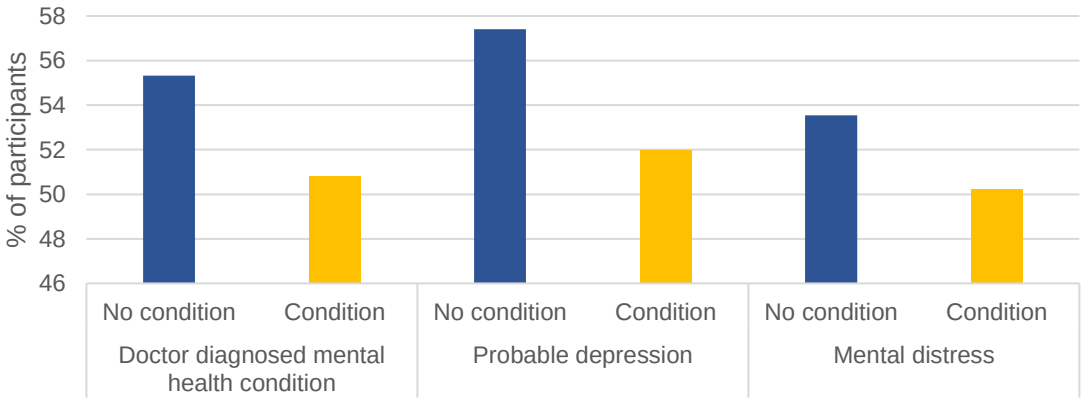
RESULTS

ESTABLISHING A GAMBLING MENTAL WELLBEING-HARM PARADOX IN ENGLAND AND SCOTLAND

The idea of a health-harm paradox, which has been used in other areas of public health, highlights how certain groups have a higher risk of harm, despite an overall lower engagement in an activity. For example, the health-harm paradox related to alcohol consumption has highlighted how people from more deprived groups consume less or similar amounts of alcohol as those in less deprived groups, but are more likely to experience alcohol-related harms.[3]

A 'health-harm paradox' appears to be reflected in the gambling behaviour of people with poor mental wellbeing or a diagnosed mental health condition. Firstly, people with poor mental wellbeing or a diagnosed mental health condition are less likely to gamble than people with better mental wellbeing. Our analysis confirmed that across all three measures of mental wellbeing, gambling rates were lower amongst those with poor mental wellbeing or a diagnosed mental health condition.

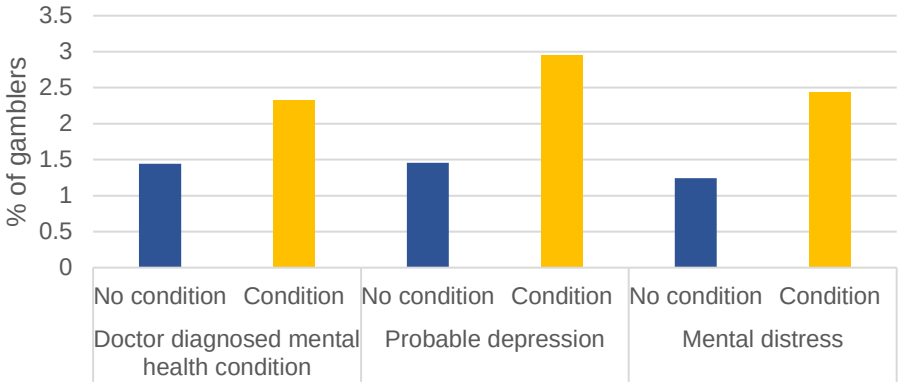
Figure 1: Past year gambling rates amongst whole population by mental wellbeing or mental health diagnosis



Past year gambling rates are lower amongst those with poor mental wellbeing or a diagnosed mental health condition than those with better mental wellbeing; 51% of people with a diagnosed mental health condition, 52% of those with probable depression and 50% of those with mental distress had gambled in the last year, compared to respectively 55%, 57% and 54% among people without these conditions. However, gamblers with poor mental wellbeing or a diagnosed mental health condition are more likely to experience moderate risk/problem gambling than gamblers with better mental wellbeing**. Figure 2** demonstrates that amongst the gambling population, people with poor mental wellbeing or a diagnosed mental health condition had higher rates of moderate risk/problem gambling.

For example, rates of moderate risk/problem gambling were 2.3% among those with a doctor diagnosed mental health condition compared to 1.4% among those without one. This was consistent across all three measures of mental wellbeing.

Figure 2: Moderate risk/problem gambling rates by mental wellbeing or mental health diagnosis



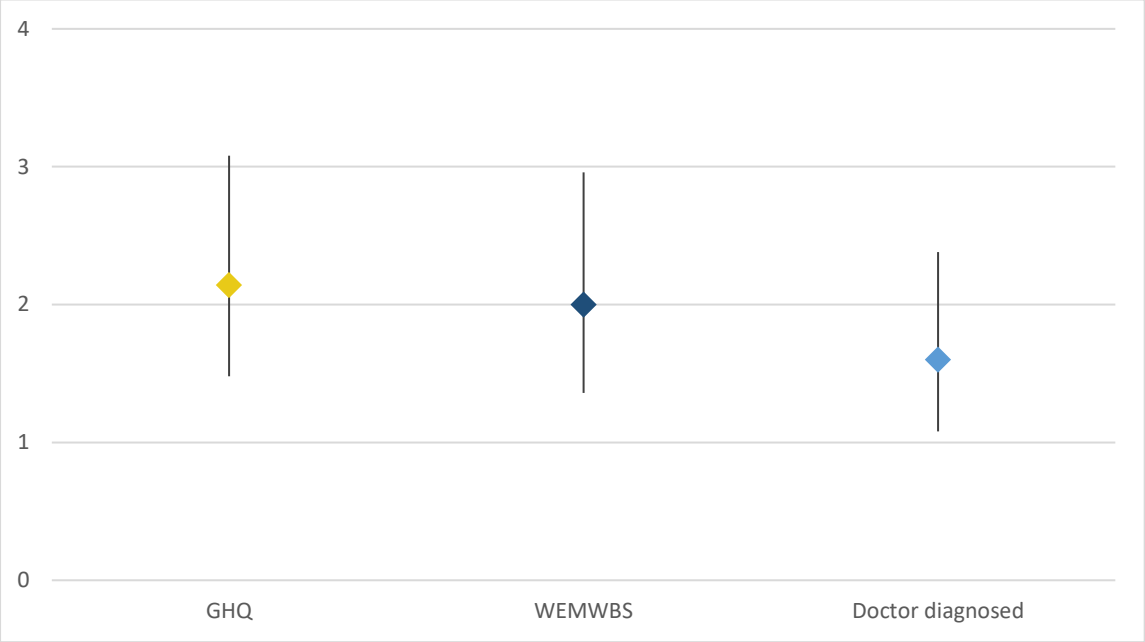
INVESTIGATING POTENTIAL EXPLANATIONS FOR THE MENTAL WELLBEING-HARM PARADOX

This analysis therefore suggests that there is evidence of a mental wellbeing-harm paradox for gambling. However, differences in gambling activities or other high-risk behaviours may explain this mental wellbeing-harm paradox. This can be investigated by constructing binary logistic regression models to see if mental health remains a significant predictor of moderate risk/problem gambling when variables relating to the alternate explanation are controlled for. This involves estimating an initial baseline model, including only demographic and socio-economic control variables, before adding one or more variables measuring gambling frequency, higher-risk health behaviours or different types of gambling activities to the model. If the association between poor mental health and moderate risk/problem gambling is no longer significant when these are included, this mental wellbeing-harm paradox is likely explained by these differences in gambling engagement and other behaviours.

Figure 3 demonstrates the association between mental wellbeing or mental health diagnosis and moderate risk/problem gambling in the baseline models that only control for demographic and socio-economic characteristics. Three separate models are estimated, one for each of the three mental health measures used in this analysis.

Gamblers experiencing mental distress (per GHQ) were 2.14 times more likely to experience moderate risk/problem gambling than those who were not. Similarly, participants with probable depression (per WEMWBS) were 2.00 times more likely to experience moderate risk/problem gambling than those who were not. Gamblers with a doctor-diagnosed mental health condition were also 1.60 times more likely to experience moderate risk/problem gambling than those who had not been diagnosed. These results will be used throughout this report as the baseline comparison point from which we assess the plausibility of the three potential explanations for the gambling mental wellbeing-harm paradox.

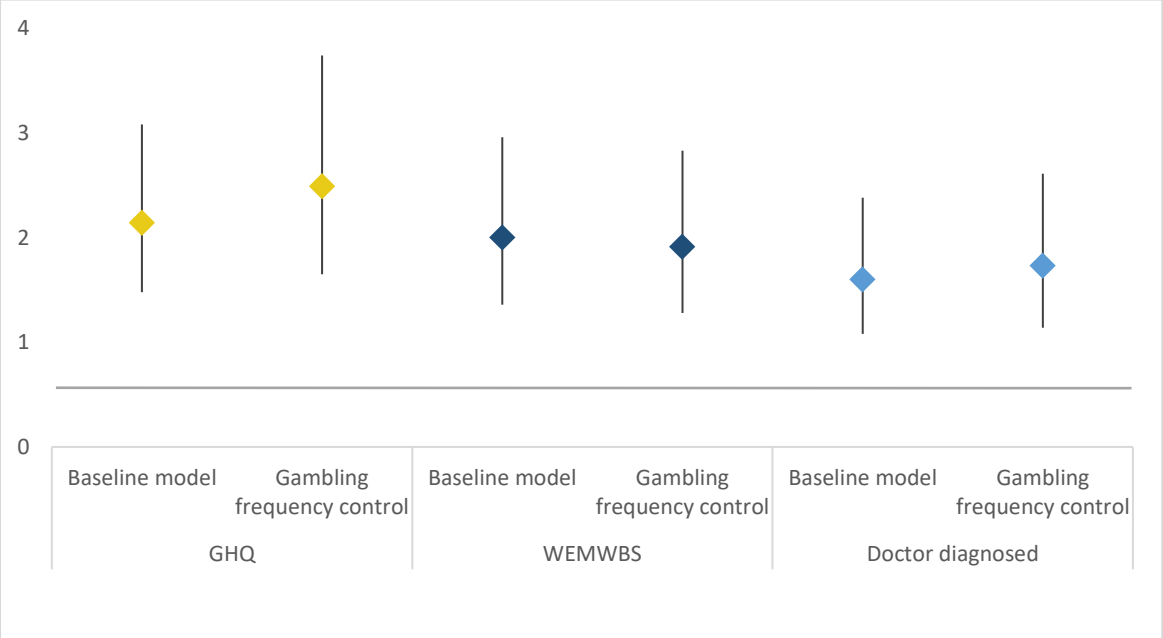
Figure 3: Odds ratios from baseline - Model 1



IS THE GAMBLING MENTAL WELLBEING-HARM PARADOX EXPLAINED BY DIFFERENCES IN GAMBLING FREQUENCY?

To explore the gambling frequency explanation for the mental wellbeing-harm paradox an additional control for gambling frequency was added to the baseline models estimated above. As **Figure 4** demonstrates, low mental wellbeing or a diagnosed mental health condition remained a significant predictor of moderate risk/problem gambling even when controlling for gambling frequency across all three measures of mental health. This indicates gambling frequency alone cannot explain why those with poor mental health are more likely to experience moderate risk/problem gambling.

Figure 4: Odds ratios from baseline models and models containing predictor variable for gambling frequency – Model 1 and Model 2



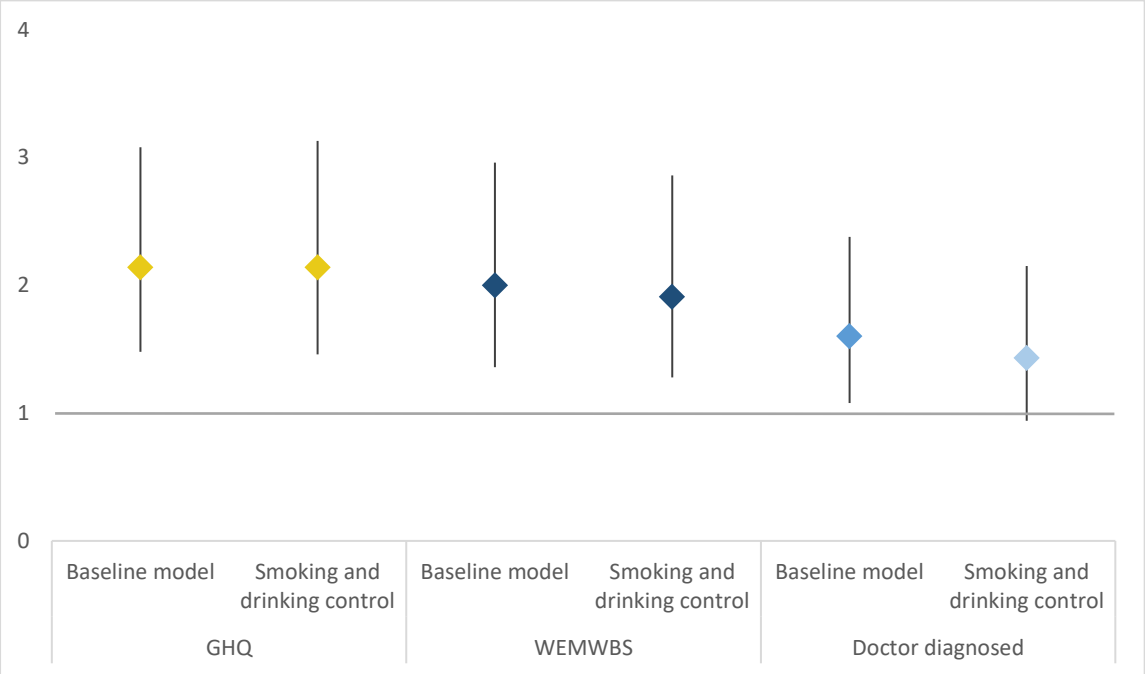
IS THE GAMBLING MENTAL WELLBEING-HARM PARADOX EXPLAINED BY DIFFERENCES IN PARTICIPATION IN HIGH RISK HEALTH BEHAVIOURS?

To explore whether the mental wellbeing-harm paradox is explained by gamblers with poor mental distress being more likely to engage in higher-risk health behaviours (alcohol and cigarette consumption), a new set of regression models was estimated that controlled for gamblers' smoking and drinking behaviour. Gamblers with significant mental distress (using the GHQ-12 instrument) or probable depression (using in the WEMWBS instrument) continued to be significantly more likely than those without to experience moderate risk or problem gambling, regardless of adjustments for smoking and drinking.

When controlling for drinking and smoking status, those with significant mental distress (GHQ) were at least 2.14 times more likely to experience moderate risk/problem gambling, and those with probable depression (WEMWBS) were at least 1.91 times more likely to experience this than those with better mental wellbeing. This suggests that engagement in higher-risk health behaviours does not explain the risk of moderate risk/problem gambling experienced by those with mental distress or probable depression specifically.

However, when measures of smoking and drinking behaviors were added to these regression models, having a doctor-diagnosed mental wellbeing condition was no longer a significant predictor of moderate risk/problem gambling. People with a diagnosed mental health condition are more likely than those without such a diagnosis to smoke and to engage in harmful levels of drinking, and this appears to moderate the relationship between having a doctor-diagnosed mental health condition and experiencing moderate risk/problem gambling in this model.

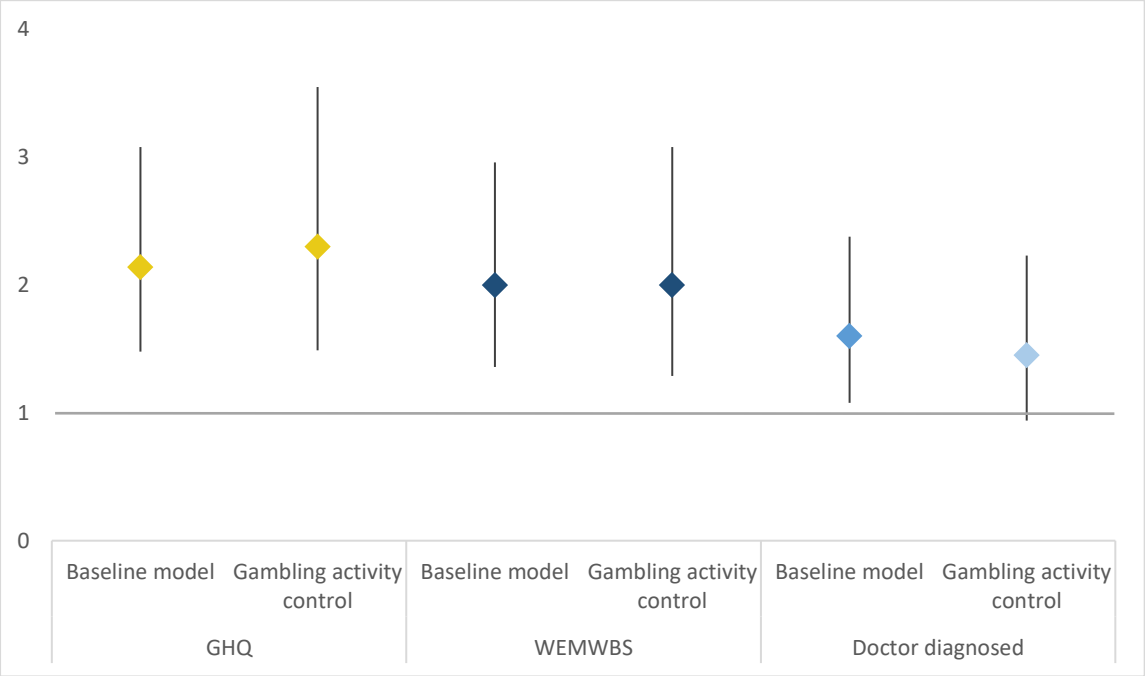
Figure 5: Odds ratios from baseline models and models containing predictor variables for smoking and drinking behaviours – Model 1 and Model 3



IS THE GAMBLING MENTAL WELLBEING-HARM PARADOX EXPLAINED BY DIFFERENCES IN GAMBLING ACTIVITIES?

The role of what type of gambling activities people engage in was explored by including 16 indicators of different ways people can gamble into the model. Examples of these included lotteries, betting on horse or dog races, gambling on sports events or other events, and other specific activities such as online casinos. When variables reflecting the types of gambling activities gamblers engaged in were added to these models, mental distress and probable depression continued to be significant predictors of moderate risk/problem gambling. However, in these models, having a doctor-diagnosed mental health condition was no longer a significant predictor, suggesting that the relationship between having a doctor-diagnosed mental health condition only and moderate risk/problem gambling is moderated by the type of gambling activity undertaken.

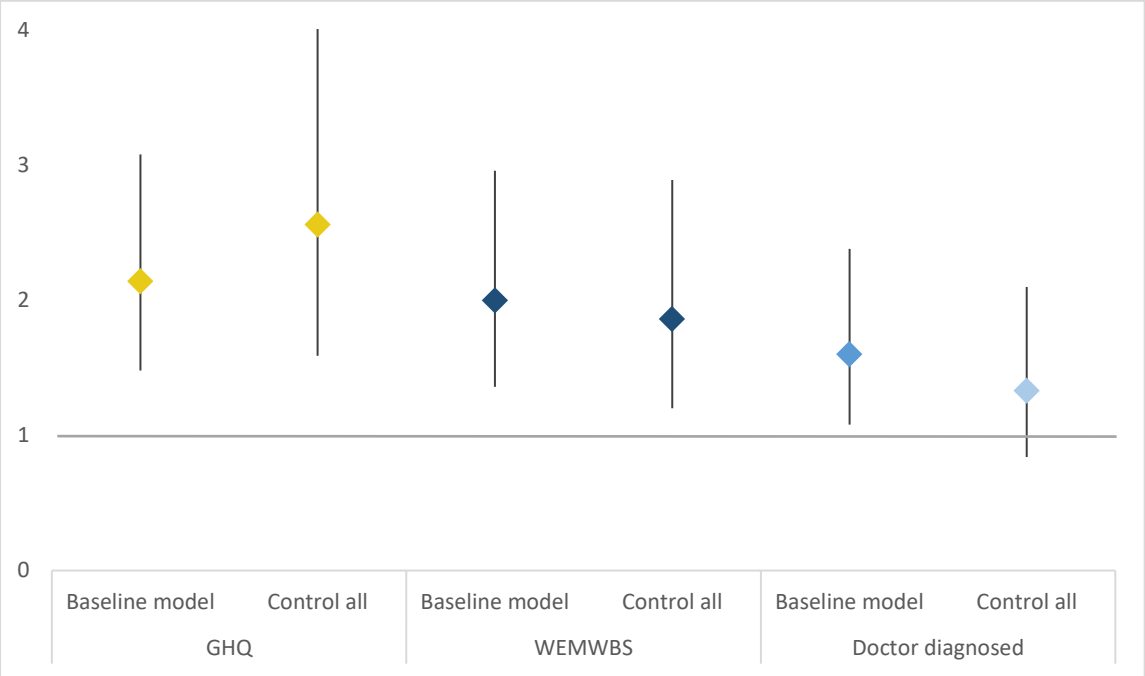
Figure 6: Odds ratios from baseline models and models containing predictor variables for gambling activity – Model 1 and Model 4



DOES THE COMBINATION OF GAMBLING FREQUENCY, HIGH RISK BEHAVIOURS AND GAMBLING ACTIVITIES BETTER EXPLAIN THE GAMBLING MENTAL WELLBEING-HARM PARADOX?

Given that gambling frequency, high risk behaviours and types of gambling may be inter-related behaviours for people who have gambled (no matter their mental wellbeing), a final set of logistic regression models were estimated that included measures of all three proposed explanations, alongside the standard socio-economic and demographic controls. Mental distress and probable depression remained a significant predictor of experiencing moderate risk/problem gambling when controlling for all three explanations together. As **Figure 7** demonstrates, having a doctor-diagnosed mental health condition was no longer a predictor of moderate risk/problem gambling status when controlling for all three explanations together.

Figure 7: Odds ratios from baseline models and models containing predictor variables for gambling frequency, smoking and drinking behaviours and gambling activities – Model 1 and Model 5



Therefore, gambling frequency, engagement in higher risk health behaviours and type of gambling activity undertaken does not fully explain the association and there is evidence of a mental wellbeing-harm paradox. For two out of the three mental health measures used in this analysis, people with poor mental wellbeing or a diagnosed mental health condition continue to be at a higher risk of moderate risk/problem gambling even though they are less likely to engage in gambling at all, no matter how often they gamble, their engagement with other higher-risk health behaviours or the types of gambling they take part in.

These combined models also provided insights into the extent to which gambling and health behaviours themselves predict moderate risk/problem gambling status. The models identified three gambling activities that were associated with a higher risk of having a PGSI score of 3 or more: any betting in a betting shop, playing fruit or slot machines, and spending money on online gambling (e.g. poker, bingo and casino games). While the specific odds ratios varied depending on the mental health measure used, those who gambled in bookmakers were at least 1.91 times more likely to experience moderate risk or problem gambling, those who played fruit or slot machines were at least 2.02 times more likely, and people who gambled online at least 3.15 times more likely. However, across all three models, drinking and smoking status was not a significant predictor of moderate risk/problem gambling status.

This report has already established that gambling frequency is not a plausible explanation for the gambling mental wellbeing-harm paradox. However, gambling frequency predicted moderate risk/problem gambling status across all three models, suggesting that gambling frequency is a key predictor of moderate risk/problem gambling, but that it influences these rates irrespective of mental health status. Compared with those who gambled twice a week or more, those who gambled less

frequently were significantly less likely to experience moderate risk/problem gambling, but the significant relationship between mental health and moderate risk/problem gambling persisted when this was included as a control variable in the model.

SUMMARY OF ALL MODELS

Table 1.3 below summarises the findings of all models, showing which alternate explanatory variables were entered into each model (the controls) and whether each exposure variable was statistically significant (indicated with a ✓).

Table 1.3: Summary of models

Exposure variables	Model 1 No controls	Model 2 Controls for gambling frequency	Model 3 Controls for smoking/ drinking	Model 4 Controls for gambling activity	Model 5 All controls
Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)	✓	✓	✓	✓	✓
General Health Questionnaire (GHQ-12)	✓	✓	✓	✓	✓
Doctor-diagnosed mental health conditions	✓	✓			

WHAT MAKES DOCTOR-DIAGNOSED MENTAL HEALTH DIFFERENT?

This analysis reveals two distinct patterns, depending on which measure of poor mental health is employed. While doctor-diagnosed mental health conditions did not predict moderate risk/problem gambling status when controlling for gambling activity and other higher-risk health behaviours, 'mental distress' and 'probable depression' remained significant predictors regardless of controls for an alternate explanation.

One plausible explanation for this is that doctor-diagnosed mental health conditions capture a broader range of conditions than those captured by WEMWBS and GHQ. By this logic, those with mental health diagnoses not captured by WEMWBS and GHQ may be prone to experiencing moderate risk/problem gambling because they are more likely to engage in risky behaviours more generally, or because they are more likely to opt for gambling activities associated with moderate risk/problem gambling. In the same vein, WEMWBS and GHQ might be able to better capture the types of poor mental health ('mental distress' or 'depression') that either lead directly moderate risk/problem gambling, or they may also be the types of poor mental health most likely to be generated by moderate risk/problem gambling.

Alternatively, the difference observed may be explained by how doctor diagnoses are measured. WEMWBS and GHQ are diagnostic instruments that everyone in the survey is able to complete. However, several social factors may play into getting a doctor-diagnosed mental health condition. Likewise, an individual may experience more severe mental health problems before seeking a diagnosis, compared with the level of distress a high WEMWBS or GHQ score may involve. As such, the difference observed between mental health measures may be explained by different social backgrounds of those with poor mental health. Untangling how these social factors interact with mental health and moderate risk/problem gambling is complex and may require further research.

INSIGHTS INTO HOW THESE RELATIONSHIPS DIFFER BY GENDER

All of the models estimated were replicated for men and women separately to investigate how patterns in gambling participation, frequency and moderate risk/problem gambling varied by sex. For men, the results followed a similar pattern to the gambling population as a whole. While doctor-diagnosed mental health conditions did not predict moderate risk/problem gambling status when controlling for gambling behaviours, 'mental distress' and 'probable depression' remained predictors even when taking alternative explanations into account.

For women, no measure of poor mental health predicted moderate risk/problem gambling consistently, regardless of controls. Women's risk profile for moderate risk/problem gambling may depart from that of the overall gambling population because they make up a smaller proportion of gamblers, and because of this small base size further research may be required on problem gambling in women. In our analysis sample approximately 300 men were identified as moderate risk or problem gamblers, while among women less than 100 were found. The cross-over of this group (moderate risk or problem gamblers) and people with mental health problems is even smaller, c.50 among men and less than 30 among women. A future study with a larger sample size of women would be valuable to explore whether the relationship between problem gambling and poor mental health exists, and whether it may be explained by the alternative explanatory variables investigated in this report.

The activities that predicted moderate risk/problem gambling also varied by gender. Betting in bookmakers only consistently predicted moderate risk/problem gambling in men, increasing the odds by at least 2.25 times. Fruit slots, on the other hand, only consistently predicted moderate risk/problem gambling in women, increasing the odds by at least 5.77 times. Online gambling remained a consistent predictor of moderate risk/problem gambling across both genders.

DISCUSSION

This report provides clear evidence of the existence of a mental wellbeing-harm gambling paradox in England and Scotland. A smaller proportion of participants with doctor-diagnosed mental health conditions, mental distress (per GHQ) and probable depression (per WEMWBS) gambled compared to their counterparts with better mental wellbeing. However, amongst those who gambled, people with poor mental wellbeing or a diagnosed mental health condition experienced moderate risk/problem gambling at far greater rates than those with better mental wellbeing. In regression models that did

not control for differences in gambling or risky health behaviours which may explain this, participants with doctor-diagnosed mental wellbeing conditions were 1.60 times more likely to experience moderate risk/problem gambling. Additionally, participants with 'mental distress' (per GHQ) were 2.14 times more likely to experience moderate risk or problem gambling, and those with 'probable depression' (per WEMWBS) were 2.00 times more likely to experience moderate risk or problem gambling.

To understand the extent to which mental wellbeing is independently associated with moderate risk/problem gambling, this report explored three potential alternative explanatory factors. The first of which was gambling frequency: that participants with poor mental wellbeing or a diagnosed mental health condition gamble more frequently. Descriptive analysis did not suggest that amongst gamblers, those with poor mental wellbeing or a diagnosed mental health condition participated at particularly greater frequencies than those with better mental wellbeing. Furthermore, regression analysis found that those with 'mental distress' (per GHQ) and 'probable depression' (per WEMWBS) were not more likely to gamble frequently than those with better mental wellbeing. Participants with doctor-diagnosed mental health conditions were, in fact, significantly less likely to gamble frequently than those without mental health conditions. Across all mental wellbeing measures, having poor mental wellbeing or a diagnosed mental health condition remained a significant predictor of moderate risk/problem gambling even when controlling for gambling frequency. Our results did not suggest that high rates of moderate risk/problem gambling amongst those with poor mental wellbeing or a diagnosed mental health condition can be explained by more frequent gambling, and therefore this is not a plausible explanation for the mental wellbeing-harm paradox.

The second exploratory factor explored was drinking and smoking behaviour. In logistic regression models, the relationship between 'mental distress' (per GHQ) and 'probable depression' (per WEMWBS) and participating in moderate risk/problem gambling remained even when controlling for smoking and drinking behaviour. The relationship between doctor-diagnosed mental wellbeing condition and moderate risk/problem gambling did not remain significant when controlling for smoking and drinking behaviour, plausibly indicating that the association between diagnosed mental wellbeing condition and moderate risk/problem gambling can be explained by a predisposition to engage in risky behaviours more generally. However, given there are social and structural factors that may make it harder for some groups of people to be diagnosed with a mental health condition by a doctor, this may also be influencing these findings which do not, nonetheless, offer consistent evidence to explain the mental wellbeing-harm paradox.

Finally, this report considered whether those with poor mental wellbeing or a diagnosed mental health condition might engage in gambling activities that might better explain their elevated association with moderate risk/problem gambling. Regression analysis found that the relationship between 'mental distress' (per GHQ) and 'probable depression' (per WEMWBS) and moderate risk/problem gambling remained even when controlling for all gambling activities. The relationship between doctor-diagnosed mental wellbeing condition and moderate risk/problem gambling did not remain significant when controlling for gambling activities, plausibly indicating that the association between diagnosed mental health conditions and moderate risk/problem gambling could also be explained by the gambling

activities that those with diagnosed mental health conditions partake in. However, they do not explain the mental wellbeing-harm paradox amongst people with mental distress or depression.

In conclusion, the association between ‘mental distress’ (per GHQ) and ‘probable depression’ (per WEMWBS) and moderate risk/problem gambling remained significant even when controlling for gambling activity, gambling frequency and risky health behaviours, suggesting that the mental wellbeing-harm paradox is not explained by any of these factors. In contrast, the relationship between doctor-diagnosed mental health conditions and moderate risk/problem gambling did not remain significant when controlling for gambling activity and health behaviors. This suggests that the relationship between diagnosed mental wellbeing conditions and moderate risk/problem gambling can be explained by engagement in certain forms of gambling activities and other risky health behaviours.

We propose two potential explanations for this. Firstly, mental health diagnoses capture a wider range of mental wellbeing problems beyond depression and anxiety, potentially including those who experience the most severe harms and whose experience of harm is uniquely explained by their behaviour. Alternatively, GHQ and WEMWBS may be more inclusive to those whose distress is not severe enough for them to seek a diagnosis, or both measures may do a better job of capturing what it is about poor mental wellbeing or a diagnosed mental health condition (i.e. depression and anxiety) that makes gamblers with poor mental health at greater risk of moderate risk/problem gambling regardless of their behaviour. Likewise, this association may also represent how the experience of moderate risk/problem gambling makes people feel; gambling at this level of severity may make people anxious and depressed. This suggests that the mental wellbeing-harm paradox persists, particularly for people experiencing mental distress or depression.

This research also emphasizes the importance of not relying on a single mental health measure, given the different findings from models looking at mental distress and depression compared with doctor-diagnosed conditions. Furthermore, it highlights a need for further research into the particular types of mental health diagnoses that may elevate risk of moderate risk/problem gambling, as well as more research into the causal pathway between mental distress, depression and moderate risk/problem gambling to offer insights into other potential explanations for the mental wellbeing-harm paradox.

These findings have a range of implications. It shows the close association between poor mental health wellbeing and elevated risk of moderate/risk and problem gambling. This association is not explained by differences in gambling frequency or gambling activity. Whilst these analyses do not indicate causation, they show a close relationship. Those working with people experiencing poor mental health, including primary care, social care and public health, should be aware of this relationship and gambling should be included, as standard, as a risk factor for poor mental health within local and national policies aiming to improve mental wellbeing. This is important regardless of whether poor mental health represents a risk factor for moderate risk/problem gambling or whether moderate risk/problem gambling is a risk factor of poor mental wellbeing. In reality, both are likely. As argued by Rogers et al, failure to include gambling within mental health improvement strategies risks undermining the success of those strategies. We strongly concur with this.

This research has some limitations that should be borne in mind. Despite combining several years of survey data, base sizes were low and analyses were performed combining those experiencing moderate risk and problem gambling. Different, or potentially stronger, relationships may have been evident if sample sizes allowed focus on greater severity of gambling harms. Relatedly, the analyses were largely underpowered to detect differences by gender. Given known differences in the experience of mental health conditions and mental wellbeing and PGSI scores by gender, different patterns may be found for men and women. The Health Survey series only measures gambling harms using the Problem Gambling Severity Index. It does not include broader measures of a wider range of consequences from gambling. It would be interesting to explore and attempt to replicate these findings with different outcome measures of gambling harms. Our measures of gambling behaviours were restricted to those questions asked within the survey. We did not have detail on how often someone gambled on each different type of activity nor how much money or time they spent gambling. These may further explain the mental wellbeing harm paradox and future research could extend this. Likewise, future research could extend analysis to those experiencing lower-level harms to see if similar patterns are evident. Finally, the data are derived from a survey of private households. Those experiencing very severe mental health conditions/poor mental wellbeing and/or the greatest severity of gambling harms may be less likely to take part, which may influence results.

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