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FULL-LENGTH REPORT

Unemployment as a risk factor for gambling disorder: A longitudinal study based on national registry data

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ABSTRACT

Background and aims: Unemployment rates are elevated among individuals with disordered gambling, yet the directionality of the relationship remains unclear. The present study investigated paid and unpaid unemployment as risk factors for future gambling disorder (GD). *Methods:* The study employed a case-control design, including all adult Norwegians receiving a GD diagnosis within specialist health services from January 2008 to December 2018 (n = 5,131). These individuals were compared with age- and sex-matched controls from the general population (n = 30,164), as well as controls with somatic and psychiatric diagnoses (n = 30,476). *Results:* Logistic regressions showed that those in the highest quartile of unpaid unemployment days had more than double the odds (odds ratio [OR] 2.23 (95% CI [1.96, 2.52]) of developing GD compared to those with no unpaid unemployment days. Similarly, higher levels of paid unemployment were also found to increase the odds for GD, with those in the highest quartile having an OR of 1.86 (95% CI [1.50, 2.28]) compared to those with no paid unemployment days. Moreover, an interaction analysis indicated that the association between paid unemployment days and GD was significantly stronger among men compared to women. *Conclusions:* The present study suggests that both paid and unpaid unemployment constitute risk factors for GD. Programs aiming at obtaining and sustaining work have been found to improve health and future studies should examine if the risk for GD can be similarly mitigated.

KEYWORDS

problem gambling, registry data, work, job, labor

INTRODUCTION

Employment is a well-studied social determinant of physical and mental health, including the propensity for addictive behaviors such as drug use, alcohol use, and gambling (Hergenrather et al., 2015a, 2015b; Latvala, Lintonen, Browne, Rockloff, & Salonen, 2021). Previous research has also contributed to the understanding of causality in the relationship between mental health or substance use and unemployment, assisted in part by longitudinal studies that

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delineate temporal relationships (Henkel, 2011). However, there is a dearth of longitudinal studies examining unemployment and disordered gambling, including studies on gambling disorder (GD; American Psychiatric Association, 2013; Shaffer & Martin, 2011). Identifying risk factors for future disordered gambling, such as unemployment, can provide important information for targeted prevention measures.

According to Jahoda's (1982) latent deprivation model, employment serves several functions beyond providing income, such as time structure, social contact, collective purpose, identity/status and activity. In line with this, longitudinal studies investigating the association between (un)employment and mental health suggest mental health benefits from employment and mental health detriment from unemployment and job loss (Hergenrather et al., 2015a). Employment is associated with subsequent improvements in mood and quality of life, and reductions in anxiety, depression, and overall psychological distress (Prause & Dooley, 2001; Rueda et al., 2012; Shamir, 1986; Thomas, Benzeval, & Stansfeld, 2007; Winefield & Tiggemann, 1990). Conversely, unemployment is associated with subsequent lower life satisfaction, increased depression, increased anxiety, and overall psychological distress (Cassidy & Wright, 2008; Donovan, Oddy, Pardeo, & Ades, 1986; Friedland & Price, 2003; Zabkiewicz, 2010).

Unemployment has been found to impact the propensity for addictive behaviors such as those involving drug and alcohol use (Henkel, 2011; Hergenrather et al., 2015a). For instance, unemployment predisposes cannabis and alcohol dependence (Boden, Lee, Horwood, Grest, & McLeod, 2017; Dooley, Catalano, & Hough, 1992). Short- and long-term unemployment also predicts later alcohol-related morbidity (Thern, Ramstedt, & Svensson, 2020). Unemployment has also been examined in the context of gambling. Gambling may harm work performance and cause work absence, potentially contributing to unemployment (Langham et al., 2016). Gambling expenditure also predicts higher risk for future unemployment (Muggleton et al., 2021). Moreover, individuals with disordered gambling have been found to have higher unemployment compared to those without disordered gambling (Carrà, Crocamo, & Bebbington, 2017; Castrén et al., 2013; Latvala et al., 2021; Nower, Eyrich-Garg, Pollio, & North, 2015). However, these aforementioned studies have not investigated (un)employment and disordered gambling over time. Consequently, we still lack knowledge regarding the temporal relationships between these variables. Moreover, there have been no studies examining the relationship between (un)employment and GD, which represents a condition with excessive gambling, loss of control and inability to stop gambling despite several negative consequences (APA, 2013).

Therefore, the present study investigated the longitudinal associations between unemployment and GD across 11 years using registry data. The study was limited to unemployment as a risk factor for GD and not unemployment following GD (Kraemer, 1997). Additionally, the study was limited to unemployment and GD among adults (18 years and older). The relationship between disordered gambling and (un)employment might differ among youth and adults, as being employed has been associated with increased gambling among youth (Canale, Scacchi, & Griffiths, 2016; Goldstein, Walton, Cunningham, Resko, & Duan, 2009). Possible explanations include that employed youth having more money for gambling, employed youth are being exposed to older youth and adults gambling through work, and/or working youth constituting a vulnerable group (e.g., being less likely to attend school, working to support the family economy, etc.; Canale et al., 2016; Goldstein et al., 2009). The differential relationship between unemployment and disordered gambling for youth versus adults suggests that the relationship between unemployment and disordered gambling might also similarly vary for different demographic groups, such as age and sex groups among adults. The relationship between unemployment and risk for GD might also depend on whether the individual receives financial benefits while unemployed. Individuals failing to qualify for unemployment benefit might be disadvantaged in several additional ways that also predispose them to GD, such as neighborhood disadvantage, housing instability, low income prior to unemployment, poverty, and impulsivity (Hahmann, Hamilton-Wright, Ziegler, & Matheson, 2021). The present study also sought to account for the previously identified associations between unemployment and mental and physical ill health by including a control group of individuals with diagnoses of somatic and mental illnesses apart from GD (Hergenrather et al., 2015a, 2015b).

The present study used Norwegian registry data from January 2008 to December 2018. During this period, the lowest unemployment rate in Norway defined as the proportion (being unemployed, job-seeking and otherwise ready to work) was 2.6% (January 2008) and the highest was 5.0% (December 2015 to April 2016), with a median of 3.9% (Statistics Norway, 2023). Accordingly, students, retirees, individuals on sick leave, or recipients of disability benefit are not defined as unemployed. Unemployed individuals may also qualify for financial aid. Unemployment benefit is a type of financial aid for residents of Norway that have lost their job or been temporarily laid off and is offered to individuals upon fulfilment of certain criteria: Having lost 50% or more of working hours, having had a set amount of income prior to unemployment, being below 67 years (retirement age), having lost income, registering as unemployed, and be actively applying for jobs (including reporting employment status every 14 days). Individuals that resign from their jobs need reasonable cause to qualify for unemployment benefit from the first day of unemployment (e.g., workplace bullying). Likewise, individuals who were terminated from their jobs cannot be personally responsible for termination to qualify for unemployment benefit from the first day of unemployment (e.g., the employer went bankrupt). Resignations or job terminations not meeting these criteria prevent the individual from qualifying for unemployment benefit for the first 18 weeks of unemployment (NAV, 2024). The present study makes the distinction

between unemployment days with and without benefit as paid and unpaid unemployment respectively.

The present study addressed two research questions (RQs): (i) is unpaid unemployment associated with increased odds for future gambling disorder diagnosis? If so, is this association moderated by age or sex? (RQ1); and (ii) is paid unemployment associated with increased odds for future gambling disorder diagnosis? If so, is this association moderated by age or sex? (RQ2).

MATERIAL AND METHODS

Participants and procedure

The current case-control study used health and social information from two Norwegian registries, the Norwegian Patient Registry (NPR) and the Social and Welfare Registry (FD-Trygd), to examine unemployment as a risk factor for GD (Bakken, Ariansen, Knudsen, Johansen, & Vollset, 2020; Mykletun & Øverland, 2010). Information on first GD diagnosis was retrieved from the NPR within specialist health services in Norway for all adults between January 2008 and December 2008 which resulted in 5,131 individuals with GD (i.e., the case group). These individuals were then age and sex matched with (i) 30,164 individuals from the general population retrieved from the FD-Trygd registry (i.e., general population control group), and (ii) 30,476 individuals with somatic or psychiatric diagnoses (excluding GD) from the NPR (i.e., illness control group). For each person with GD, between five and six age-matched and sex-matched individuals within each control group were aimed for. The project was funded by the Norwegian Research Council (grant no. 273718).

Measures

Information was available regarding age, sex, unpaid unemployment, paid unemployment, and GD diagnosis. Information regarding age and sex was based on participants' national identity numbers, the latter reflecting legal sex (i.e., a binary reflecting male and female).

Information regarding unemployment was available from January 2008 (study start) to December 2017 (last available recording from FD-Trygd when data collection was conducted), covering days paid and unpaid unemployed for each month in the study period. Unemployment information is collected in the FD-Trygd registry which is handled by Statistics Norway who in turn receive this information from the Norwegian Labor and Welfare Administration (NAV). Norwegians who register as unemployed at NAV are included in these statistics.

Information on first GD diagnosis was based on the F63.0 code pathological gambling as specified in the International Classification of Mental and Behavioral Disorders 10 (ICD-10; World Health Organization, 1993) which was used in specialist health services in Norway for the study period. Information about diagnosis was retrieved from the NPR.

Statistical analysis

Statistical analyses were conducted using R version 4.3.0 (R Core Team, 2023).

Descriptive statistics included study distribution of age in 2018 (study end), sex, proportion of individuals that had any days unemployed, proportion of individuals that had any paid unemployment, days unpaid unemployment among those unemployed, and days paid unemployment among those unemployed.

The research questions were investigated with unconditional logistic regressions utilizing loose matching (age and sex in the current study; Kuo, Duan, & Grady, 2018; Pearce, 2016). To investigate RQ1, the number of participants' days unpaid unemployment was summed. For the case group, only the number of unpaid unemployment days occurring one year before GD diagnosis was used because the study involved predicting future GD diagnosis. The one-year cut-off was chosen (i) because information on unemployment was available for one year shorter than information on GD diagnosis and (ii) to increase the likelihood of capturing unemployment prior to development of gambling problems (i.e., receiving a GD diagnosis likely represents a culmination of gambling problems developed over time). For participants who did not receive a GD diagnosis, only the number of unpaid unemployment days occurring before the median time to GD diagnosis was summed (September 2014) to allow for similar follow-up periods. Unpaid unemployment days occurring after this period were censored, i.e., coded as non-events. Additionally, extensions to this follow-up period were applied for individuals who were too young to accrue unemployment as adults (18 years) during this period. Control group individuals aged 17 years at study start in 2008 received an additional year before censoring (i.e., cut-off September 2015). Additional years were added down to those aged 14 years in 2008 (i.e., cut-off September 2018) and no censoring was applied for those younger than this.

A categorical variable was calculated based on quartiles of total unpaid unemployment days among all participants across the study period while taking censoring into account. A categorical approach was chosen because of the skewed distribution of days unpaid unemployment. This resulted in five levels in which 0 = 0 days, 1 = 1–17 days, 2 = 18–69 days, 3 = 70–273 days, and 4 = 274–2,645 days. Logistic regressions included one logistic regression using both control groups, one logistic regression using the general population control group (FD-Trygd), and one logistic regression using the control group consisting of individuals with other somatic and psychiatric diagnosis excluding GD (illness controls, NPR). Interaction terms for age as a continuous variable and sex as a binary variable were added in a stepwise fashion if they improved model fit in models using both control groups.

RQ2 was investigated in the same way as RQ1 with the difference being that days paid unemployment were included as a categorical predictor variable instead of the number of days unpaid unemployment. The number of

days paid unemployment was not included if the individual also had additional unpaid days unemployment. These individuals were coded 0. This approach was chosen to investigate the relationship between paid unemployment and subsequent GD diagnosis in isolation to unpaid unemployment. The reverse was not done when investigating RQ1 because excluding days unpaid unemployment for those that had additional paid unemployment would restrict the analytic group too severely. The categorical variable was calculated based on quartiles of days paid unemployment while taking censoring into account. This resulted in five levels in which 0 = 0 days, 1 = 1–66 days, 2 = 67–153 days, 3 = 154–340 days, and 4 = 341–2,435 days.

Ethics

The study was carried out in accordance with the Declaration of Helsinki. The Regional Committee for Medical and Health Related Research Ethics in Western Norway granted ethical approval for the study (no. 30393) and granted a waiver regarding informed consent.

RESULTS

Descriptive statistics are reported in Table 1. The distribution of age was the same across case and control groups with a median age of 39 years. The distribution of sex was nearly the same across case and control groups with approximately 18% women. Participants who received GD diagnosis during the study period were significantly more likely to have been unemployed during the study period (38.3%) compared to control groups (general population controls: 20.8%, illness controls: 20.5%). Participants who received GD diagnosis during the study period were also significantly more likely to have received unemployment benefit during the study period (16.3%) compared to control groups (general population controls: 9.2%, illness controls: 9.1%). Among those with any unemployment, participants who received GD diagnosis during the study period also had significantly higher median number of days unpaid unemployment (42 days) and paid unemployment (246 days) compared to general population controls (23 days and 169 days, respectively) and illness controls (24 days and 172 days, respectively). Number of days paid unemployment was summed irrespective of the presence/absence of additional unpaid days unemployed for these descriptives.

Table 2 presents a logistic regression model results with main effects of unpaid unemployment. Adding an interaction term between unemployment and sex did not improve model fit ($\Delta\chi2[\Delta df] = 2.69$ [4], $p = 0.612$) and neither did adding an interaction term for unpaid unemployment and age ($\Delta\chi2[\Delta df] = 6.53$ [4], $p = 0.163$). The results from the main effects models showed that the number of unpaid unemployment days were significantly and positively associated with higher odds for subsequent GD diagnosis. Having unpaid unemployment days in the first quartile was associated with 1.45 (95% CI [1.24, 1.67]) higher odds of subsequent GD diagnosis compared to having no unpaid unemployment days, in the model using both control groups. The strength of association between unpaid unemployment days and subsequent GD diagnosis increased for higher quartiles, with unpaid unemployment days in the fourth quartile being associated with 2.23 (95% CI [1.96, 2.52]) higher odds of subsequent GD diagnosis in the model using both control groups. Effect sizes were similar when using either general population controls (FD-Trygd) or illness controls (NPR). Figure 1 shows the predicted probability of receiving a GD diagnosis for different categories of unpaid unemployment days (based on the model using both control groups).

Table 1. Participant characteristics

Sample	GD (n = 5,131)	FD-Trygd (n = 30,164)	NPR (n = 30,476)	p-value
Age (in years) in 2018				
Median (IQR)	39 (32, 49)	39 (32, 49)	39 (32, 49)	0.91[4]
Mean (SD)	41 (12)	41 (12)	41 (12)	
Sex				0.65[5]
Women	936 (18.2%)	5,623 (18.6%)	5,606 (18.4%)	
Men	4,195 (81.8%)	24,541 (81.4%)	24,870 (81.6%)	
Any unemployment[1]	1,965 (38.3%)	6,265 (20.8%)	6,236 (20.5%)	<0.01[5]
Any paid unemployment[1]	836 (16.3%)	2,789 (9.2%)	2,773 (9.1%)	<0.01[5]
Unpaid unemployment days[2]				
Median (IQR)	42 (5, 277)	23 (0, 162)	24 (0, 175)	<0.01[4]
Mean (SD)	234 (428)	169 (345)	172 (344)	
Paid unemployment days[3]				<0.01[4]
Median (IQR)	246 (111, 519)	179 (76, 374)	174 (75, 384)	
Mean (SD)	382 (398)	279 (306)	283 (316)	

Note. [1]Percentage that were unemployed/received unemployment benefits between 2008 and 2018, [2]Days unemployed without benefit among those with any unemployment between 2008 and 2018. [3]Days with unemployment benefit among those with any unemployment between 2008 and 2018. [4]Kruskal-Wallis rank sum test for median. [5]Chi-squared test. SD = standard deviation, IQR = Interquartile range, GD = Gambling disorder, NPR = Norwegian Patient Registry (somatic and psychiatric illness control), FD-Trygd = Social Welfare Registry (general population control).

Table 2. Logistic regressions for unpaid unemployment days on odds for first gambling disorder diagnosis

Predictor	FD-Trygd + NPR			FD-Trygd			NPR		
	OR[1]	95% CI[1]	*p*-value	OR[1]	95% CI[1]	*p*-value	OR[1]	95% CI[1]	*p*-value
Quartiles for unemployment days									
1–17 days	1.45	1.24, 1.67	<0.01	1.43	1.22, 1.66	<0.01	1.46	1.25, 1.70	<0.01
18–69 days	1.78	1.55, 2.04	<0.01	1.79	1.54, 2.06	<0.01	1.78	1.54, 2.06	<0.01
70–273 days	1.83	1.60, 2.09	<0.01	1.82	1.58, 2.10	<0.01	1.84	1.59, 2.12	<0.01
274–2,645 days	2.23	1.96, 2.52	<0.01	2.25	1.96, 2.57	<0.01	2.21	1.93, 2.52	<0.01
Sex (Women)	0.98	0.91, 1.05	0.56	0.97	0.89, 1.04	0.39	0.99	0.91, 1.07	0.75
Age	1.00	1.00, 1.01	0.04	1.00	1.00, 1.01	0.06	1.00	1.00, 1.01	0.04

Note. [1]OR = Odds ratio, CI = Confidence interval, NPR = Norwegian Patient Registry (somatic and psychiatric illness control), FD-Trygd = Social Welfare Registry (general population control).

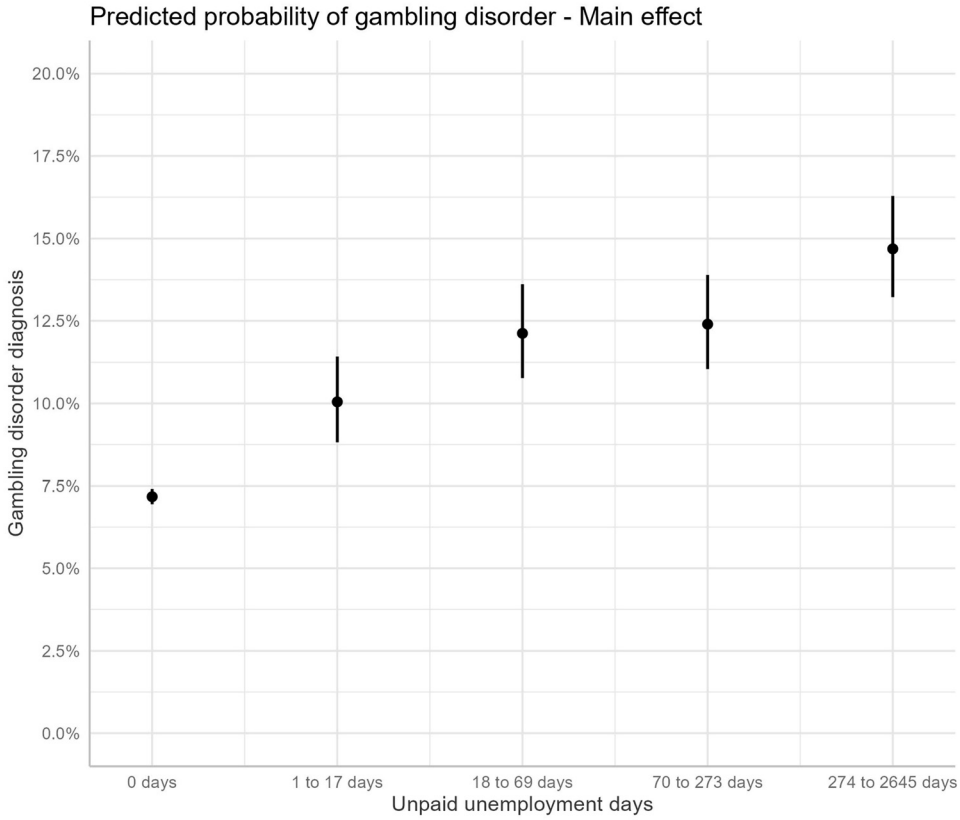

Fig. 1. Predicted probability of gambling disorder. Results are based on logistic regression model using both control groups

Table 3 shows the logistic regression model results with main effects of paid unemployment and model results with an interaction term between sex and paid unemployment. Adding an interaction term between paid unemployment and sex improved model fit ($\Delta\chi 2[\Delta df] = 13.24$ [4], $p = 0.010$), however adding an interaction term between paid unemployment and age did not ($\Delta\chi 2[\Delta df] = 3.89$ [4], $p = 0.421$). The results from the main effects models showed that the number of days paid unemployment was significantly and positively associated with higher odds for subsequent GD diagnosis for the second, third and fourth quartiles compared to having no days. Having paid unemployment days in the second quartile was associated with 1.48 (95% CI [1.17, 1.85]) higher odds of subsequent GD diagnosis compared to having no paid unemployment days in the model using both control groups. The strength of association between paid unemployment days and subsequent GD diagnosis increased for the higher quartiles, with paid unemployment days in the fourth quartile being associated with 1.86 (95% CI [1.50, 2.28]) higher odds of subsequent GD diagnosis in the model using both control groups. Effect sizes were similar when using either general population controls (FD-Trygd) or illness controls (NPR). The models with sex as an interaction term showed that the association between paid unemployment days and subsequent GD diagnosis was significantly moderated by sex for the fourth quartile of unpaid unemployment days for all models, and the third and fourth quartile in the model using general population controls (FD-Trygd). The interaction effect is visualized in Fig. 2, based on models with both

Table 3. Logistic regressions for unemployment days with benefit on odds for first gambling disorder diagnosis

		FD-Trygd + NPR			FD-Trygd			NPR		
Model	Predictor	OR[1]	95% CI[1]	*p*-value	OR[1]	95% CI[1]	*p*-value	OR[1]	95% CI[1]	*p*-value
Main effects only	Quartiles for unemployment days									
	1–66 days	0.90	0.68, 1.18	0.47	0.88	0.65, 1.16	0.37	0.93	0.69, 1.23	0.62
	67–153 days	1.48	1.17, 1.85	<0.01	1.47	1.15, 1.86	<0.01	1.49	1.16, 1.88	<0.01
	154–340 days	1.49	1.18, 1.86	<0.01	1.46	1.14, 1.84	<0.01	1.53	1.19, 1.93	<0.01
	341–2,435 days	1.86	1.50, 2.28	<0.01	1.90	1.51, 2.37	<0.01	1.82	1.45, 2.26	<0.01
	Sex (Women)	0.99	0.92, 1.07	0.79	0.98	0.91, 1.06	0.67	1.00	0.92, 1.08	0.98
	Age	1.00	1.00, 1.00	0.90	1.00	1.00, 1.00	0.84	1.00	1.00, 1.00	0.97
Interaction effects included	Quartiles for unemployment days									
	1–66 days	0.92	0.68, 1.21	0.55	0.90	0.66, 1.20	0.49	0.93	0.68, 1.25	0.65
	67–153 days	1.54	1.20, 1.94	<0.01	1.53	1.18, 1.96	<0.01	1.54	1.19, 1.98	<0.01
	154–340 days	1.62	1.27, 2.03	<0.01	1.59	1.24, 2.03	<0.01	1.65	1.28, 2.10	<0.01
	341–2,435 days	2.06	1.65, 2.55	<0.01	2.11	1.66, 2.65	<0.01	2.02	1.59, 2.54	<0.01
	Sex (Women)	1.01	0.94, 1.09	0.72	1.01	0.93, 1.09	0.85	1.02	0.94, 1.10	0.61
	Age	1.00	1.00, 1.00	0.87	1.00	1.00, 1.00	0.81	1.00	1.00, 1.00	0.95
	Quartiles for unemployment days × Sex (Women)									
	1–66 days × Gender (Women)	0.85	0.25, 2.19	0.77	0.76	0.22, 2.00	0.61	0.98	0.28, 2.66	0.98
	67–153 days × Gender (Women)	0.69	0.28, 1.45	0.36	0.68	0.27, 1.49	0.37	0.69	0.27, 1.52	0.39
	154–340 days × Gender (Women)	0.36	0.11, 0.89	0.05	0.34	0.10, 0.87	0.05	0.38	0.11, 0.99	0.08
	341–2,435 days × Gender (Women)	0.35	0.13, 0.76	0.02	0.35	0.13, 0.79	0.02	0.35	0.13, 0.78	0.02

Note. [1]OR = Odds ratio, CI = Confidence interval, NPR = Norwegian Patient Registry (somatic and psychiatric illness control), FD-Trygd = Social Welfare Registry (general population control).

control groups to aid interpretation. Figure 2 shows marginal effects and illustrates that the positive association between categories of higher paid unemployment days and GD diagnosis is primarily present for men, with women showing larger variations in predicted probability of GD across paid unemployment days quartiles.

DISCUSSION

The present study examined paid and unpaid unemployment as risk factors for future first gambling disorder (GD) diagnosis. The results from the main effects models for

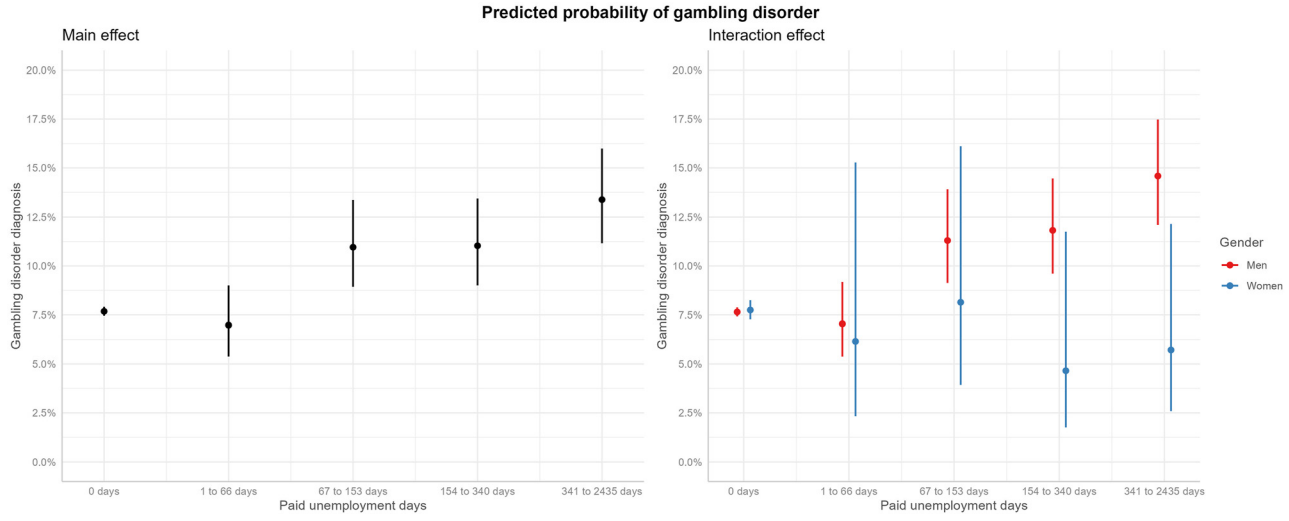

Fig. 2. Predicted probability of gambling disorder. Main effect results are based on logistic regression model using both control groups without interaction term. Interaction effect is based on logistic regression model using both control groups

unpaid unemployment days and odds for GD (i.e., Table 2) showed that higher quartiles were associated with higher odds for subsequent GD, while only the second, third, and fourth quartiles of paid unemployment days were significantly associated with higher odds for subsequent GD (i.e., Table 3). The use of psychoactive substances to cope with the distress of unemployment has been suggested to explain the association between unemployment and subsequent alcohol and substance misuse (Henkel, 2011). Gambling may serve as a similar coping strategy for those unemployed (Neophytou, Theodorou, Artemi, Theodorou, & Panayiotou, 2023). Additionally, those unemployed may experience a greater motivation to gamble to make money, hoping to recuperate lost income due to unemployment (Nower & Blaszczynski, 2010). The findings of the present study indicated stronger associations between unpaid unemployment and GD, compared to paid unemployment and GD. This difference might reflect that those with unpaid unemployment have a greater motivation to earn money by gambling compared to those with paid unemployment, although selection effects serve as a likely alternative explanation (see next paragraph). Disordered gambling appears more prevalent in socioeconomically disadvantaged areas characterized, for example, by high unemployment rates (Hahmann, Hamilton-Wright, Ziegler, & Matheson, 2021). Relatedly, poor employment prospects have been found to moderate the relationship between motivation to earn money by gambling and disordered gambling symptoms (Tabri, Dupuis, Kim, & Wohl, 2015). Paid or unpaid unemployment might also induce a sense of personal deprivation (i.e., resentment that an individual is deprived of desired outcomes relative to others). Perceived personal deprivation has been found to be positively associated with gambling urges (Callan, Will Shead, & Olson, 2015).

The finding that only the second, third, and fourth quartiles of paid unemployment days significantly predicted GD suggests that paid unemployment days must exceed some threshold to predict higher odds for GD. In comparison, unpaid unemployment days predicted higher odds for GD across all quartiles. Individuals who only experience short unemployment and receive concurrent compensation might constitute a group that (on average) is less vulnerable to illness, including GD. Such individuals met benefit criteria from the first day, meaning they were not terminated from their job (or had reasonable cause if terminated), had some prior income, had compliance with submitting employment status form(s), registered as job seekers, and/or found new employment or education within relatively short time (between 1 and 68 days in the present models; NAV, 2024). In contrast, individuals failing to qualify for paid unemployment might be disadvantaged in several additional ways that also predispose them to GD (Hahmann et al., 2021). In accordance with the deprivation model (Jahdoa, 1982) it is also conceivable that being unemployed implies losing time structure, social contact, collective purpose, identity/status and activity which also may trigger gambling behavior. In this realm, it would be of interest in future studies to investigate which aspects of being unemployed that may be of special relevance for predicting gambling behavior.

The present study also examined moderator roles for age and sex in cases where it significantly improved model fit. The relationship between paid unemployment and GD was significantly moderated by sex. Figure 2 indicated a positive association between paid unemployment days on predicted probability of GD for men, while showing greater variation among women. Paid unemployment, and its cumulative impact, mainly affected men's odds for GD. Paid unemployment poses less financial strain compared to unpaid unemployment, although still deprives the individual of meaning and fulfillment derived from work. Higher work-role centrality, the importance work placed on a sense of self has been associated with greater detriment to mental health and life satisfaction in unemployment (McKee-Ryan, Song, Wanberg, & Kinicki, 2005) and it is possible that paid unemployment is associated with increased odds for GD among men because they derive greater sense of identity from work compared to women. This could also induce greater sense of personal deprivation which predisposes for overinvolvement in gambling (Callan et al., 2015). While men report higher work-role centrality, sex differences in mental health consequences from unemployment appear more inconsistent (Álvaro, Garrido, Pereira, Torres, & Barros, 2019; McKee-Ryan et al., 2005; Picchio & Ubaldi, 2023).

Strengths, limitations, and future research

The present study has several notable strengths. Registry data affords large sample sizes with high quality data on relatively rare outcomes such as GD. Data collection is conducted independently of the study and the risk for recall and social desirability bias is consequently avoided. The study had a long follow-up period with monthly data across 11 years which represents a considerable strength in comparison to previous studies on unemployment and disordered gambling. Previous studies are mostly cross-sectional and/or based on general population surveys in which unemployment is not the main topic of investigation (e.g., Castrén et al., 2013; Latvala et al., 2021; Nower et al., 2015).

There are also several limitations to the present study that need addressing. The study design precludes conclusions regarding causality, although delineated temporal relationships which are requirements for this. The present study was also limited to investigating unemployment as a risk factor for GD and not unemployment following GD. The relationship between unemployment and GD may well be bidirectional. Jeopardizing or losing employment due to gambling is included in the criteria for GD, and multiple work-related gambling harms (e.g., reduced work performance, work absence, unemployment) have been recognized previously (Langham et al., 2016). The relationship between unemployment and GD was examined exclusively among treatment-seeking gamblers in the present study. Previous research indicates that treatment-seekers constitute only 5%–20% of individuals with disordered gambling (Loy, Grüne, Braun, Samuelsson, & Kraus, 2018). Unemployment has been found to be higher among

treatment-seeking individuals with disordered gambling compared to non-treatment seekers (Pulford et al., 2009). Furthermore, problems at work have been reported as a motive to seek help for individuals with disordered gambling (Loy et al., 2018). Therefore, the associations between unemployment and GD might be stronger in the present study compared to what would be observed among individuals with GD in general. The present study also lacked detailed information about the types of diagnoses/diagnostic groups represented in the control group comprising individuals with somatic and mental illnesses apart from GD. It appears somewhat surprising that effect sizes were similar when using both general population controls and illness controls (i.e., the results reported in Tables 2 and 3) given the previously observed association between unemployment and ill-health in general (Hergenrather et al., 2015a, 2015b). Information on distribution of diagnoses within the illness control group could have been used for exploratory analyses that could have provided more details and insight to this finding.

Future longitudinal studies on the relationship between (un)employment and GD would likely provide more detail to measures of (un)employment. The present study focused on the cumulative amount of paid and unpaid unemployment as a risk factor for GD, although separate examinations of job loss as a critical life event can potentially be an additional risk for GD. Further, unemployment from full-time work, (in)voluntary part-time work, or temporary work might impact risk for GD differently. The present study was also limited by not including additional covariates such as socioeconomic status (SES). Low SES has been found to exacerbate the association between unemployment and heavy alcohol drinking among young adults (Lee et al., 2015). SES might play a similar role as moderator in the relationship between unemployment and GD. The present study limited the investigation to the role of unemployment in predicting future GD, rather than vice versa. However, we cannot rule out that some participants could have developed gambling problems before becoming unemployed, although the study attempted to mitigate this by limiting investigation to unemployment occurring at least one year before GD diagnosis and to first GD diagnosis received.

Implications and conclusions

The present study findings should not inform intervention efforts on their own, although discussion of some practical implications appear warranted when considering the broader literature on employment and mental health. Reemployment is consistently associated with improvements in mental health and reductions in binge drinking of alcohol (Dooley & Prause, 1997; Schuring, Mackenbach, Voorham, & Burdorf, 2011). It is plausible that reemployment could similarly benefit those with GD. However, those assisting individuals at-risk or with GD in attaining employment should also ensure sufficient job quality because employment in poor quality jobs is associated with poorer mental health compared to being unemployed (Butterworth et al., 2011). In Norway, NAV (2023) is responsible for offering facilitated work schemes (e.g., work training, work application training) and individualized guidance. Additional services are likely required for those who have developed GD. Specialized health services offer treatment to individuals with GD in Norway. Many of these services also offer patients the possibility to enroll in Individual Placement and Support (IPS; Norwegian Directorate of Health, 2023). IPS is an evidence-based and effective model for assisting individuals with mild, moderate, and severe mental health and addictive disorders in obtaining and sustaining employment (De Winter et al., 2022). The present study suggests high rates of unemployment among treatment-seeking individuals with GD (see Table 1), and while direct investigations are lacking for IPS and GD, the IPS model might prove effective for this group as well.

Overall, the present study supports the role of both paid and unpaid unemployment as risk factors for GD. Findings suggest further studies on (un)employment and disordered gambling are warranted. Such studies may elucidate nuances in the relationship between (un)employment and disordered gambling, including possible causal mechanisms in the same way that previous research has done for (un)employment and mental health and substance use (Hergenrather et al., 2015a, 2015b).

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Availability of data and materials: This study used data from national registries and is available upon application only. The data is not publicly available due to restrictions from the Norwegian Patient Registry and the FD-Trygd registry.

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