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Components of identity expression in problem and non-problem gamblers

Ian P. Albery [a,*], Christy Milia [a], Briony Gunstone [b], Marcantonio M. Spada [a], Antony C. Moss [a]

[a] Centre for Addictive Behaviours Research, London South Bank University, London, United Kingdom
[b] You Gov, Plc, 50 Featherstone St, London EC1Y 8RT, United Kingdom

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ABSTRACT

Few studies have examined whether specific aspects of group identification predict problematic and non-problematic addictive behaviours and none have focused on gambling. Applying Leach et al.'s (2008) hierarchical model of in-group identification, we tested the associations between components of self-investment (satisfaction, solidarity, and centrality) and components of self-definition (individual self-stereotyping, in-group homogeneity) on distinguishing between problem and non-problem gambling (n = 10,157) and on the severity of problematic gambling behaviour (n = 2,568). Results showed that (i) in-group-based identities are important in predicting problematic vs. non-problematic gambling behaviours; (ii) in-group-based identities are important in predicting the severity of problematic gambling; (iii) how self-invested an individual is with their in-group and aspects associated with self-definition processes are both important predictors; (iv) perceptions related to how chronically salient one's group membership is for the self (centrality) are essential features of the self-investment mechanism; and (v) self-stereotypical beliefs about one's essential similarities to the prototypical gambling group member norm are fundamental for the defining oneself as a gambler.

1. Introduction

Gambling is popular in the United Kingdom (UK). Almost a half of the British adult population engage in some form of gambling activity (i.e., from buying lottery tickets to playing casino games) with one fifth doing so at least twice per week (Gambling Commission, 2022). Since the 2005 Gambling Act there has been a significant liberalisation of the gambling market in the UK (Banks & Waters, 2022) with gambling viewed as a legitimate, normal, fun, and social form of entertainment that leads to big financial wins and the alleviation from daily stresses. However, gambling is a potentially harmful addictive behaviour (Korn et al., 2004; Monaghan et al., 2008) for the individual, and at a societal level an increasing public health hazard (Wardle et al., 2018). As such exploring and assessing possible predictors of gambling-related harm is important for providing an evidence base to which potential interventions may be applied.

1.1. Social identity and addictive behaviours

Recent work has started to examine the role and importance of relevant social identities in predicting the personal severity of one's addictive behaviour (see Frings & Albery, 2021; see Montes & Pearson, 2021). Social identity is described as those features an individual attributes to oneself in relation to the social groups to which they belong (i.e., one's in-group) compared to those to which they do not belong (i.e., an out-group) (Tajfel, & Turner, 2004). Identification with an in-group in comparison to an out-group is grounded in the social activities engaged in and is usually experienced positively to realize, preserve, and protect a positive self-construct and superiority over out-groups (Spears, 2021). In this way, social identities are important moderators of *all* behaviours, including those related to health, because they reinforce and enable the beliefs and actions are permissible or available to people as invested and committed *in-group* members (Haslam, et al, 2021; Häusser et al, 2020; Cruwys et al., 2021; Bentley et al., 2020). Social identities can perpetuate certain behaviours and obstruct others by affecting perceptions of self-efficacy, confidence, and control over the social environment, attitudes about others and the world, as well as attempts at behavioural change and recovery (see Lindgren et al., 2023; Craig et al, 2022; Reith & Dobbie, 2012; Albery et al, 2021; Frings, Wood & Albery, 2021; Frings, Kim & Albery, 2022; Frings et al, 2019; Best et al, 2016, 2018; Frings & Albery, 2015, 2016, 2021; Frings et al, 2016; Buckingham et al., 2013; Hutchison et al, 2018; Dingle et al, 2015).

Evidence suggests that the degree of identifying oneself as a smoker, drinker, gambler, or even Facebook user predicts engagement in related

* Corresponding author at: Centre for Addictive Behaviours Research, School of Applied Sciences, London South Bank University, United Kingdom.
E-mail address: alberyip@lsbu.ac.uk (I.P. Albery).

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behaviours (Savolainen et al, 2021; Albery et al, 2021; Frings et al., 2016; Marino et al, 2016; Buckingham et al., 2013; Hutchison et al, 2018) and can influence initiation of attempts at recovery, perceptions of self-efficacy, esteem, norms, and social control (Dingle, Cruwys, & Frings, 2015; Frings & Albery, 2015, 2021; Frings, Wood, & Albery, 2021; Frings, Wood, Lionetti, & Albery, 2019; Dingle et al., 2019). Likewise, when people identify as "ex-problem gamblers" or "ex-addicts", they feel more capable of maintaining their "changed" behaviour and are less likely to relapse following triggers (Frings & Albery, 2015, 2021; Dingle et al., 2019; Haslam et al, 2019; Hutchison et al., 2018).

The literature focusing on the influence of identities on gambling behaviour is sparse. However, this limited evidence has shown that gambling group identity moderated the relationship between social norms and gambling behaviour in a group of college students (Foster, et al., 2014). A positive relationship between endorsement of gambling-related descriptive norms and gambling behaviour was only shown for those who identified most strongly with others who also gamble (i.e., the in-group) (Foster, et al., 2014). In a more heterogeneous sample, Montes (2020) showed that gambling identity predicted recent and lifetime measures of numerous negative gambling-related factors (e.g., frequency of the behaviour, expenditure, use of protective behavioural strategies, gambling severity [measured via the South Oaks Gambling Screen; Lesieur & Blume, 1987]) above and beyond self-reported behavioural motives. From this evidence it is likely that those who report increasing levels of gambling-related identity will behave in ways that are consistent with that identity (i.e., increased gambling activity) and experience negative outcomes associated with that behaviour. What is not clear is whether differential components of this identity are more or less important in understanding this association.

1.2. Components of In-Group identity

One useful account for how people articulate themselves as a function of their group membership is the hierarchical model of in-group identification (Leach et al, 2008). For Leach et al (2008) in-group identification is characterized by how people evaluate the similarities they share with other group members and whether they view their psychological investment in the group as meaningful. The model proposes five distinct components across the higher-order group dimensions of *self-investment* and *self-definition*. The self-investment dimension is characterized by three factors: (i) *satisfaction* (i.e., the amount of positive appraisal given to the in-group); (ii) *solidarity* (i.e., a psychological sense of belonging and attachment to an in-group), and (iii) *centrality* (i.e., how salient and essential the in-group is for one's self-identity). The self-definition dimension comprises; (i) *individual self-stereotyping* (i.e., one's self-perception of how similar or representative they are of the prevalent in-group prototype), and (ii) *in-group homogeneity* (i.e., perceptions related to how uniform the in-group is and, concurrently, how relatively different it is from an out-group). Together these experiential components are argued to account for those factors which define one's experienced identity.

Acknowledging how *self-investment* and *self-definition*, expressed in terms of their component parts, shape how one comprehends and makes sense of one's identity is fundamental because it provides a more nuanced understanding of how aspects of identity may be influential for predicting an individual's behaviour. For example, even though one may see oneself as gambler (referred to as identity endorsement [see Hertel et al, 2019]), how and to what extent psychological resources are invested in this comprehension will predict one's experienced identity (see DeMarree, Petty, & Briñol, 2007, DeMarree, Petty, & Turnes, 2007). Validating oneself as a gambler in terms of being "similar" to other members of this group is qualified by how invested to this understanding one is and it is this combination that is likely to result in ongoing actions (Albery et al, 2021).

Whilst this approach has provided a valid understanding across a range of target groups including racial (e.g., Koval et al, 2012), online (e.g., Howard & Magee, 2013) and gender-based (e.g., Kenny & Garcia, 2012) in-groups, only limited evidence has explored how these component dimensions foster emergent identities by in-group members groups engaging in addictive behaviours. One study highlighted that a feature of identity investment - the intensity of thoughts associated with one's drinker identity - was positively related to alcohol consumption as well as the risk of alcohol use disorder, whereas identity importance, was not (Hertel et al, 2019). Similarly, Albery et al. (2021) showed that increasingly problematic Facebook use was *only* predicted by identity-related perceptions associated with feelings of belonging and attachment to in-group members (i.e., solidarity) and, most prominently, by how salient one's group membership was for the self (i.e., centrality). Both aspects related to the self-investment mechanism (Leach et al, 2008). Importantly, perceived similarity to other prototypical group members and how homogenous the group is perceived to be (i.e., characteristics of self-definition) were not.

1.3. Aims and objectives

The current study adds to this work by further testing the differential effects of the core components of self-definition and self-investment for driving in-group identity in individuals who vary according to the severity of risky and problematic gambling behaviour. We also tested whether there was an advantage in specifying this multicomponent identity model in comparison to an approach that emphasizes identity in a more unidimensional manner. In addition, recent interest in the role of identity processes in gambling behaviour has been highlighted by observations from a series of focus groups which identified a seemingly influential and important distinction between individuals' perceptions of themselves as either a "bettor" or a "gambler" (The Nursery, 2018). Identifying oneself as a "bettor" was perceived as less risky and linked to positive attributes such as fun, small amounts of money, skillfulness, and knowledge. In contrast, identifying as a "gambler" was perceived as riskier, linked to pursuing hedonic thrills from large bets, and an increased experience of negative consequences, including addiction-related problems. That people seemingly differentiate gambling-related identity as linked to betting or gambling may be important for further specifying the operation of distinct conceptions of self. If this is the case, then these different conceptions may be linked to distinct patterns of both gambling-related activities and the severity of experience of any associated harm. The current study incorporates this "self as bettor" or "self as gambler" identity observation to test the meaningfulness of this distinction for predicting problematic and non-problematic gambling behaviour according to both self-definition and self-investment components of identity operation. We predict that all aspects of self-definition and self-investment components will be associated with increased problematic gambling, but this will be especially important for those components associated with self-investment (i.e., centrality, satisfaction, and solidarity). We also predict that whilst "bettor" and "gambler" identities may be associated with differential levels of perceived problematic behaviour, the same pattern will emerge relating to importance of self-investment for both identities.

2. Method

2.1. Participants and procedure

Recruitment took place via the *YouGov Plc UK* online panel of over 800,000 individuals who had given consent to participate in surveys for redeemable point incentives. Inclusion criteria were being over the age of 18, living in the UK and having engaged in any type of gambling activity over the last 12 months. A non-probability quota sampling method was used to recruit the desired gambling sample. Information about age and residency was verified via an automated screening of all demographic profiles held by YouGov. Demographically eligible panellists were randomly sent an email invitation with the study brief and a

link to a multiple-choice screening question about their past-year gambling engagement. A broad set of gambling activities were presented as options (e.g., '*Bingo (including online)*', '*Gaming machines in a bookmakers*', etc.). If respondents selected one or more of these options, they progressed to the main study. Answering '*None of the above*' or '*Don't Know*' automatically excluded them from recruitment as non-gamblers.

The sample comprised of 10,157 participants who were credited 50 points to their YouGov account for taking part in the study – i.e., the standard incentive for similar surveys on this platform. Most participants were aged over 35 years (73.1% vs. 26.9% aged 18–34 years), originated from a White ethnic background (93% vs. 7% Black, Asian, and Minority Ethnic) and lived in England (86.4% vs. 8.7% in Scotland and 4.9% in Wales). Just over half of respondents identified as males (53.1% vs. 46.9% females) and held professional, administrative, or managerial occupational roles (53% vs. 47% manual labour roles and non-working). The National Lottery Draw was the most popular gambling activity across participants (78.3%), followed by scratch cards (31.3%), other lotteries (22.4%), and online betting on football (15.5%) and horses or dogs (10%). The sample was weighted by demographics to match census data of the British adult population and ensure representativeness. Measures used in the current analysis are drawn from a larger programme focused on the self-recognition of gambling-related harm.

The study received ethical clearance from London South Bank University Ethics Panel (ETH2021-0007).

2.2. Materials

2.2.1. Problem gambling severity Index (PGSI; Ferris & Wynne, 2001)

This nine-item self-report scale is a subset of the Canadian Problem Gambling Inventory and was used to assess the level of respondents' gambling harm over a 12-month period. Participants responded to four items concerning problem gambling behaviours (e.g., 'Have you borrowed money or sold anything to gamble?') and five items concerning negative consequences (e.g., 'Has your gambling caused any financial problems for you or your household?') using a Likert type scale (0 = Never, 1 = Sometimes, 2 = Most of the time, 3 = Almost always). PGSI scores are used to classify respondents into non-problem gamblers (score 0) (gamble without experiencing adverse consequences); low-risk gamblers (score 1–2) (few or no identified problems); moderate-risk gamblers (scored 3–7) (some problems that affect them moderately) and problem gamblers (score 8–27) (experience severe negative consequences from gambling). The PGSI is characterized by good internal reliability (study Cronbach's $\alpha > 0.85$), factor structure (loadings: 0.63 – 0.79) and construct validity (Holtgraves, 2009; Orford et al., 2010).

2.2.2. In-Group identification scale (IGIS; Leach et al., 2008)

This 14-item instrument captures multiple components of identification through five distinct subscales across two dimensions. The self-investment dimension comprises of centrality [the importance of the group (e.g., 'I often think about the fact that I am a… [Ingroup]')]; satisfaction [positive and negative feelings from being a group member (e.g., 'I am glad to be [In-group]')]; and solidarity [commitment to the group (e.g., 'I feel a bond with [In-group]'). The self-definition dimension is composed of in-group homogeneity [perceived degree to which all members of the group share strong similarities (e.g., '[In-group] people have a lot in common with each other')], and self-stereotyping [perceived similarity with typical group members (e.g., 'I have a lot in common with the average [In-group] person')]. Respondents rated their level of agreement with each statement using a 7-point Likert scale (1 = Strongly disagree to 7 = Strongly agree). Identification as "bettors" and "gamblers" were tested via two distinct versions of the IGIS: the betting-adjusted scale (BIGIS) and the gambling-adjusted scale (GIGIS). Order of presentation of these scales was counterbalanced to control for order effects with half the sample receiving the BIGIS first and the other half receiving it second. The internal reliability of the BIGIS and GIGIS was good to excellent (BIGIS Cronbach's $\alpha = 0.83$; GIGIS Cronbach's $\alpha = 0.92$).

2.3. Analytical framework

Initially, to establish the discriminant validity of the bettor and gambler versions of the IGIS measures, Pearson's r correlation coefficients were used. To examine the effect of identity components on whether individuals were non-problem (PGSI = 0) or problem gamblers (PGSI $\geq$ 1) logistic regression was performed in SPSS Version 26. All relevant statistical assumptions were tested prior to implementation (see below). Finally, to test the appropriateness of the multidimensional model of in-group identity components for predicting risky gambling activity (PGSI $\geq$ 1 only) compared to a unidimensional alternative structural equation modelling procedures (SEM) the maximum likelihood estimation procedure in Lavaan for R (version 4. 3. 1) was used. Model fit was evaluated using Chi-square measure of fit, the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR). We adopted the following indicators as evidence of good fit: CFI>0.95, TLI > 0.90, RMSEA < 0.08 and SRMR < 0.08 (see Browne and Cudeck 1993; Hu and Bentler 1998, 1999). For this analysis a complete data set for analysis was available and no decision with respect to treatment of missing data was required. Relevant statistical assumptions were tested prior to implementation (see below).

3. Results

3.1. Betting and gambling identities

Discriminant validity was examined to establish whether the two IGIS versions measured different identity constructs. Pearson correlations between equivalent BIGIS and GIGIS subscales ranged from 0.73 to 0.85, indicating that these measures were capturing the same construct. As such, they were combined for further inferential analysis (see Table 1). On this basis, mean scores of the combined IGIS subscales were generated to determine the level of identification with bettors or gamblers across the sample. Fig. 1 plots mean scores for each identity components as a function of combined IGIS. In general, level of identification across each dimension was low ($M = 1.53 – 3.31$, $SE = 0.01 – 0.02$), with participants who scored over 1 on the PGSI showing increased scores on all IGIS subscales ($Ms = 2.16 – 3.58$, $SEs = 0.02 – 0.03$) compared to those who scored 0 (non-problem gamblers) ($Ms = 1.32 – 3.21$, $SEs = 0.01 – 0.02$).

3.2. Gambling identification and gambling harm

Participants were initially assigned to a dichotomous PGSI variable that categorised respondents as either non-problem gamblers (PGSI = 0) or problem gamblers (PGSI $\geq$ 1). Table 2 shows problem gamblers to be younger (aged 18 – 34) and male.

To explore the relationship between gambling identification with the

Table 1
Discriminant Validity of the Betting and Gambling Identification Measures (Pearson's r Coefficients).

	GIGIS 1	GIGIS 2	GIGIS 3	GIGIS 4	GIGIS 5
BIGIS 1	**0.85****	0.59**	0.73**	0.22**	0.59**
BIGIS 2	0.59**	**0.85****	0.69**	0.20**	0.63**
BIGIS 3	0.72**	0.67**	**0.84****	0.25**	0.67**
BIGIS 4	0.25**	0.26**	0.29**	**0.73****	0.30**
BIGIS 5	0.59**	0.64**	0.68**	0.26**	**0.81****

**$p < 0.01$; BIGIS = Betting-adjusted In-Group Identification Scale; GIGIS = Gambling-adjusted In-Group Identification Scale; 1 = Centrality Subscale; 2 = Satisfaction Subscale; 3 = Solidarity Subscale; 4 = Homogeneity Subscale; 5 = Self-Stereotyping Subscale.

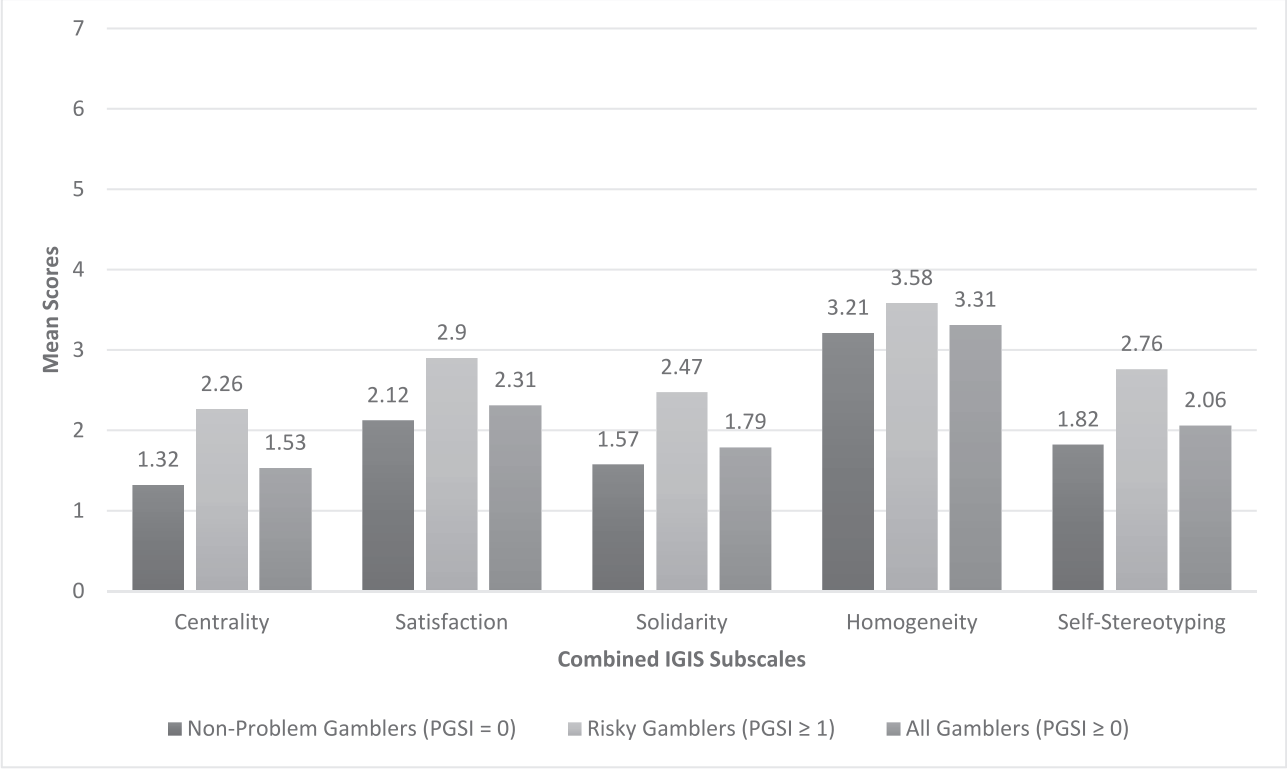

Fig. 1. Mean Scores of Gambling Identification Components by Gambling Group. PGSI = Problem Gambling Severity Index; Combined IGIS Subscales = Combined Scores from Betting-adjusted In-Group Identification Scale (BIGIS) and Gambling-adjusted In-Group Identification Scale (GIGIS).

Table 2
Gender *and Age Distributions for Problem and Non-Problem Gamblers.*

Variable	Problem Gamblers		Non-Problem Gamblers		Total Sample	
	n	%	*n*	%	*n*	%
Age 18—–34	1121	43.7	1612	21.2	2734	26.9
Age 35—–54	949	36.9	2742	36.1	3690	36.3
Age 55 +	498	19.4	3235	42.6	3733	36.8
Gender - Female	944	36.7	3818	50.3	4762	46.9
Gender Male	1624	63.3	3771	49.7	5395	53.1

Note: N = 10,157.

overall risk of gambling harm Pearson's correlations were initially calculated between the combined IGIS subscales and the dichotomous PGSI score. All IGIS subscales had weak to moderate positive relationships with the dichotomous PGSI score ($r = 0.11 – 0.38$) allowing for a binary logistic regression analysis to be performed to estimate the effect of gambling identification on predicting the likelihood of experiencing gambling harm. To control for multicollinearity, intercorrelations $rs > 0.70$ between each of the IGIS subscales were excluded from the regression analysis, i.e., satisfaction and solidarity ($rs > 0.70$). Assumptions regarding adequate sample size and lack of influential outliers were met with all 10,157 participants included in the analysis and Cook's distances below 1.

A three-predictor logistic model was fitted to the data (IVs: centrality, homogeneity, self-stereotyping subscales; DV: dichotomous PGSI score). The results showed that there was a significant association between gambling identification and gambling harm ($\chi^2(8) = 143.84$, $p < .001$). The R^2 was 0.13 based on the Cox and Snell criterion or 0.19 based on the Nagelkerke criterion. Only centrality and self-stereotyping were significant predictors in the model, with the former constituting the strongest coefficient (see Table 3). Centrality (OR = 1.95, $p < 0.001$) and self-stereotyping subscales (OR = 1.27, $p < 0.001$) were positively related to the odds of developing gambling problems suggesting that the higher respondents scored on these IGIS subscales, the more likely they were to experience gambling harm.

3.3. Gambling identification and risky gambling behaviour

To explore the relationship between risky gambling behaviour and gambling identification in risky/problem gamblers, only participants who scored 1 or more on the PGSI (i.e., mild to serious problems with gambling) were included ($n = 2,568$) in two structural equation models to test the relative utility of specifying a unidimensional versus multidimensional model of in-group identity expression on problematic gambling behaviour. The first fitted a unidimensional model comprising all seven variables of the IGIS centrality, homogeneity, and self-stereotyping subscales and their covariances as a single latent

Table 3
Logistic Regression Statistics with Gambling Harm (PGSI) as the Criterion Variable (n = 10,157)[a,b].

Predictor	B (SE)	Wald's χ^2	df	p	OR	95% Cl Lower	95% Cl Upper
Centrality	0.67 (0.33)	404.27	1	0.000	1.95	1.825	2.079
Homogeneity	−0.03 (0.19)	3.34	1	0.068	0.97	0.932	1.002
Self-Stereotyping	0.24 (0.25)	92.26	1	0.000	1.27	1.209	1.332

Criterion Variable: Problem Gambling Severity Index (PGSI) Dichotomous Score.
[a]Cox & Snell Criterion = 0.13; [b]Nagelkerke Criterion = 0.19.

exogenous variable and the continuous PGSI 1 + scores as an endogenous variable. The second model fitted three latent exogenous variables, centrality (two items), in-group homogeneity (two items) and self-stereotyping (two items) and related covariances to the continuous PGSI 1 + scores as an endogenous variable.

Initially linearity and homoscedasticity were assessed via a scatterplot of the standardised residuals and their predicted value. Both assumptions were met. The scatterplot of the distribution for the PGSI 1 + scores was skewed slightly to the left because over half of the selected sample scored 1–2 on the PGSI (57.4% vs. 16.6% PGSI 8 +). Normality was also assumed as shown by an approximate bell-shaped histogram of the standardised residuals. Pearson correlations between the IGIS subscales were used to test multicollinearity and showed strong intercorrelations for satisfaction and solidarity with at least two other potential predictors (*ps* > 0.70). When these were excluded from the regression equation no multicollinearity was present in the data (VIFs < 10, Tolerances > 0.2). Mahalanobis distance flagged 12 multivariate outliers for exclusion (Tabachnick et al., 2013) (n = 2,556). Finally, all predictors correlated significantly with PGSI 1 + scores: centrality, r = 0.49; homogeneity, r = 0.23; self-stereotyping r = 0.38 (all *ps* < 0.001).

Confirmatory factor analysis and model fit indices were calculated for unidimensional and multidimensional models using the maximum likelihood estimation procedure (Lavaan in R, version 4. 3. 1) with model fit evaluated using the χ^2 measure of fit, the CFI, TLI, RMSEA and SRMR.

3.3.1. *Unidimensional identity modelling*

This model was not shown to be a good fit of the data for the model (χ^2 (20) = 4374.78, p <.001, CFI = 0.69, TLI = 0.56, RMSEA = 0.30, SRMR = 0.13.

3.3.2. *Multidimensional identity modelling*

Whilst the goodness of fit measures produced a significant effect, χ^2 (15) = 681.07, p <.001, other indicators showed that the data were a good fit for the specified model (CFI = 0.96, TLI = 0.95, RMSEA = 0.06, SRMR = 0.05). Fig. 2 and Table 4 provide a graphical illustration of the derived model and related regression statistics.

4. Discussion

The current study examined the differential impact of self-investment and self-definition components of in-group identification for (i) distinguishing between problem and non-problem gamblers and (ii) predicting the degree of problem or risky gambling severity in a large nationally representative sample of current gamblers in the UK. In addition, the study also sought to establish whether betting and gambling were perceived as distinct identities amongst a wide gambling audience, and if so, to what degree they would be endorsed.

Our initial analyses highlighted a very strong relationship for all components of in-group identification associations between the "bettor" and the "gambler" identity responses. The magnitude of these

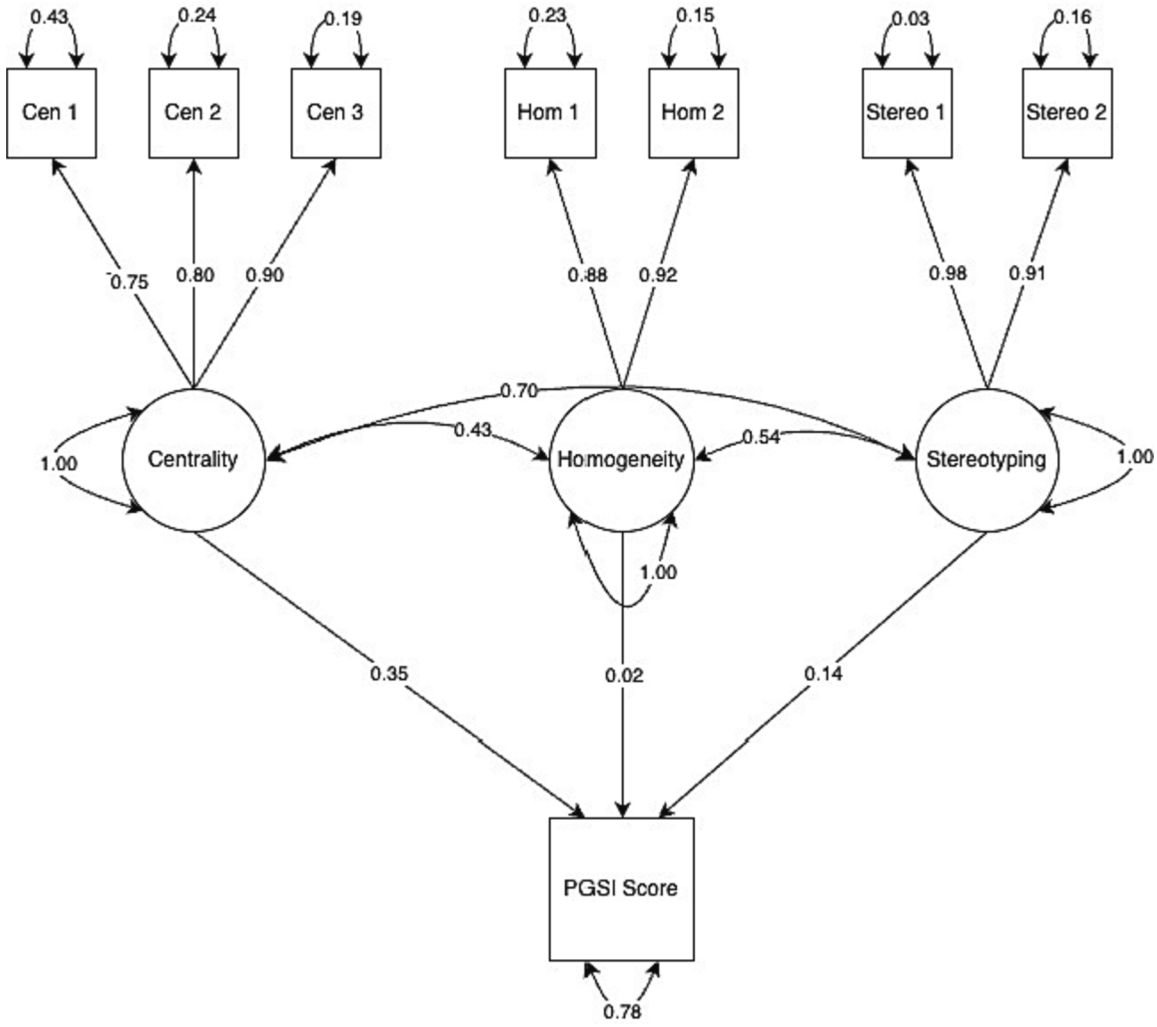

Fig. 2. Standardised βs for Within Variable Variances, Latent Variable Covariances, Latent Factor Composite Variable Effects, and Latent Variable Effects on Risky Gambling Behaviour. Note 1: Boxes signify measured variables and circles represent latent factors.

Table 4
Regression Statistics with Risky Gambling Behaviour (PGSI + 1 score) as the Criterion Variable and Centrality, Homogeneity and Self-Stereotyping as Latent Factors (n = 2,556).

Latent Factor	Unstandardised B (SE)	Standardised β	z	p	95% Cl Lower	95% Cl Upper
Centrality	1.38 (0.12)	0.35	11.89	0.000	1.15	1.61
Homogeneity	0.07 (0.08)	0.02	0.80	0.426	−0.10	0.23
Self-Stereotyping	0.44 (0.09)	0.14	4.74	0.000	0.26	0.62

Note 1: Fit Indices - $\chi 2$ (15) = 681.07, p <.001, CFI = 0.96, TLI = 0.95, RMSEA = 0.06, SRMR = 0.05.

relationships suggests that it may *not* be justified to assume that self-as-bettor and self-as-gambler conceptions are independent orthogonal factors but are more likely to be tapping the same identity-based understanding. As such, in terms of those factors describing both self-investment (i.e., centrality, solidarity and satisfaction) and self-definition (i.e., homogeneity, individual self-stereotyping) aspects of in-group identification there should be *no* distinction made between either a betting in-group or a gambling in-group. In other words, people who may identify themselves as a bettor also identify themselves as a gambler and vice versa.

4.1. Identity-Based dissociation of problem versus Non-Problem gamblers

Our next objective was to examine the dissociation of problem and non-problem gambling behaviour from self-investment and self-definition dimension components. Based on previous work in other behavioural addictions (e.g., Albery et al, 2021) we hypothesised that both self-definition and self-investment components would be associated with problematic gambling and not non-problem gambling. We also proposed that this would be more apparent for those components reflecting one's in-group self-investment (i.e., centrality, satisfaction, and solidarity) but most particularly centrality. Our findings suggest that problem gamblers and non-problem gamblers could be reliably differentiated by the combination of *one* self-investment identity factor (i.e., centrality) and *both* self-definition identity factors (i.e., in-group homogeneity and self-stereotyping). However, in terms of the independent significance of these dimensions, both centrality and self-stereotyping were apparent whilst in-group homogeneity was not. Problem gamblers, it seems, show increased self-investment in their understanding of themselves as a bettor/gambler. This is characterised by heightened saliency, or centrality, of thoughts related to the subjective importance credited to one's group membership (Cameron, 2004). In addition, our findings suggest that there is a 95 per cent increase in the chances of correctly identifying a problem gambler vs. a non-problem gambler given the strength of this saliency. The odds ratio in relation to the tendency to self-stereotype as a bettor/gambler for differentiating problem from nonproblem gamblers was a 27 per cent increase. This highlights that although both self-investment (i.e., centrality) and self-definition (i.e., self-stereotype) factors together and independently predict problem gambling relative to non-problem gambling, the strength of the saliency of one's identity as a bettor/gambler accounts for the vast proportion of explanatory power. As with previous work (i.e., Albery et al, 2021; Cameron, 2004), one's investment in their ingroup in terms of how chronically prominent that identity is experienced as, is fundamental for describing what self-investment *per se* is characterised by. It seems that identity centrality is the most fundamental identity-related component for discriminating problem from non-problem gamblers.

4.2. Predicting individual differences in risky gambling from In-Group identity components

Our final objective was to explore the relationship between the magnitude of risky gambling behaviour and in-group gambling identification in self-reported problem gamblers only. Consistent with the model that distinguished problem from non-problem gamblers, the magnitude or degree of problematic gambling was predicted by *one* self-investment dimension (i.e., centrality) and one self-definition component (i.e., self-stereotyping). Again, the picture for describing an increasing likelihood of more problematic gambling is best articulated by the extent to which people report (i) shared similarities with others in their in-group (*self-definition*) and (ii) a meaningful sense of purposeful *self-investment* with their in-group. More particularly, self-definition was specific to an increasing propensity towards self-stereotyping (i.e., how similar to a prototypical group member we view ourselves to be) and *not* in-group homogeneity (i.e., perceived shared similarities and minimal differences with other ingroup members). In terms of self-investment, how salient for the self the in-group membership is and the enduring nature of that saliency (i.e., centrality) is of primary importance and confirms previous findings in other addictive behaviours (Albery et al, 2021; Lindgren, Ramirez, et al., 2016, Lindgren, Gasser, et al., 2016; Hertel et al, 2021; Frings & Albery, 2021). That centrality was also the most influential identity predictor bar none further establishes it as the most important component again reinforcing previous work (i.e., Albery et al, 2021).

In addition, our results also demonstrated the utility and appropriateness of adopting this multidimensional approach for in-group identity operation. By comparing the data fit properties of an approach which characterises in-group identity as a collection of related distinguishable factors against one which assumes experienced identity in more unidimensional terms, we showed clear evidence in favour of the former. Indeed, whereas the model fit properties were good for the model which emphasised independent effects of centrality, homogeneity and self-stereotyping, fit thresholds were not met in the unidimensional version. This reinforces the theoretical appropriateness of the multidimensional approach as a parsimonious account of identity operation in risky gambling behaviour. Whether the clarity of this reasoning extends to the operation of other addictive behaviour identities whilst likely given observations to date (e.g., Albery et al, 2021), remains to be tested explicitly.

4.3. Limitations

Whilst these findings highlight the importance of ingroup-based investment and self-definition components for differentiating problem from non-problem gamblers and separately for predicting increasing harm among problem gamblers, limitations are apparent. Even though the study sample was recruited as a large nationally representative cohort of current gamblers in the UK, and effects sizes were shown to be large, we are unable to draw any causal conclusions with respect to the relationship between identity components and risky gambling behaviour because the study was cross-sectional in nature. As such, we cannot claim that increasing gambler ingroup self-investment and self-definition processes are causally related to the chances of becoming problem gambler or increasing severity of that problem or vice versa. Only evidence utilising either prospective designs or experimental manipulations of identity-related factors can provide the required evidence for such claims, and this has been limited only to alcohol use. For instance, in one prospective study Hertel et al (2021) showed identity endorsement to predict problematic drinking over time but not vice

versa (see also Lindgren, Ramirez, et al., 2016, Lindgren, Gasser, et al., 2016). In addition, the current study only employed self-report identity data. Future work should incorporate other more indirect (and objective) measures of identity (e.g., implicit association tasks) which have been shown to account for unique variance in explaining other forms of addictive behaviours such as alcohol use and misuse (e.g., see Frings & Albery, 2021; Frings, Melchiar & Albery, 2016; Lindgren, Ramirez, et al., 2016, Lindgren, Gasser, et al., 2016; Hertel et al, 2019; Montes et al, 2018; Lindgren et al., 2020).

Whilst the current study successfully demonstrated that degree of gambling identity was important for dissociating problem from non-problem gamblers, as well as the level of risky gambling among problem gamblers, it does not talk to whether and how different forms of gambling may influence the chronicity of the identity experience. For a more nuanced understanding future work should examine whether the degree of identity *per se* differs as a function of gambling activity type. If this is a possibility this work needs to measure identity more specifically within gambling activity domains (e.g., as a slot machine gambler, as a horse race gambler, etc.). A second possibility is that the chronicity of the broadly defined gambling identity operates as a function of the number of gambling activities engaged in. Is the degree of gambler identity the result of level of exposure to various forms of activity or activity nested in one form of behaviour?

4.4. Summary

Overall, the current study identified that there is little meaningful distinction to be drawn from perceiving oneself as either a "bettor" or a "gambler." Viewing oneself as a gambler is very closely associated with seeing oneself as a bettor to the extent that they are likely to be semantically indistinguishable and synonymous aspects of ingroup identification. It is also apparent that compared to those gamblers who show no evidence of risky gambling those who are riskier in their behaviour can be meaningfully differentiated by (i) how self-invested they are in their gambler ingroup as characterised by how continually salient their ingroup membership is for them, and (ii) how self-stereotyping they are in terms of their perceived similarity to the prototypical group member norm. Importantly, the same pattern of findings emerged specifically within problem gamblers. Self-investment in the ingroup via how apparent their ingroup membership is and self-definition of themselves as prototypical examples of gamblers was reflected in the increasing likelihood of more severe problem gambling.

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CRediT authorship contribution statement

Ian P. Albery: Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft. **Christy Milia:** Conceptualization, Methodology, Data curation, Formal analysis, Writing – review & editing. **Briony Gunstone:** Methodology, Writing – review & editing. **Marcantonio M. Spada:** Conceptualization, Writing – review & editing. **Antony C. Moss:** Conceptualization, Methodology, Writing – review & editing.

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Data availability

Data will be made available on request.

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