

An in-depth characterization of online sports bettors: Refining profiles concerning putative risk factors, predicting gambling disorder, and exploring the relationship to player tracking data
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Background. The use of player tracking data has significantly facilitated responsible gambling measures and influenced research in online gambling. So far, putative individual including cognitive-behavioral risk factors assumed to underlie the development of gambling disorder (GD) across all types of gambling have received little consideration in online gambling and especially online sports betting research. Due to the global increase in online gambling and online sports betting, and potentially associated risks, a clear characterization of online sports bettors is needed.

Aims. Addressing a lack of studies on established putative risk factors in online sports bettors, the RIGAB project and the studies presented within this thesis aim to characterize online sports bettors with and without GD concerning putative individual risk factors. By that means, we are able to refine the profiles of online sports bettors and validate putative risk factors in this group. In addition, we examine the relevance of these factors in online sports bettors over time in a longitudinal design, thereby adding knowledge on the temporal role of these factors over the course of GD. Aiming at a more comprehensive understanding of online sports bettors, we explore the relationship between two frequently used but so far separate research approaches for the first time: putative individual risk factors and gambling behavior in the form of player tracking data.

Methods. German customers of an international gambling provider were randomly preselected to be invited to participate in an initial online survey by the study team. In this initial online survey, $N = 607$ online sports bettors ($M_{age} = 34$, 92% male) participated. $N = 325$ (53,45%) of the initial sample also participated in a follow-up online survey one year later ($M_{age} = 35$, 94% male). A subsample of $n = 54$ ($M_{age} = 33$, 96% male) of the initial sample participated in an in-person study at an average of 443 days after the initial online survey.

Study I characterized online sports bettors with and without GD concerning the following putative *individual* risk factors: alcohol and tobacco use, impulsivity, difficulties in emotion identification, emotion regulation strategies, comorbid mental disorders, and stress using cross-sectional data from the initial online survey. In a second step, we used this characterization to predict a GD diagnosis one year later at the follow-up online survey.

Study II characterized online sports bettors concerning the following putative *cognitive* risk factors: response inhibition, cognitive flexibility, working memory and delay discounting, probability discounting for gains and losses, and loss aversion by examining their association with GD symptom severity using cross-sectional data from the in-person study. In addition, we examined the association between these factors and the change in GD symptoms from the initial online survey to the in-person study.

Study III explored the relationship between the mentioned putative *individual* risk factors from the initial and follow-up online survey and player tracking data received from the provider before recruiting. Analyses of these associations were performed for both overall samples and in players with and without GD from both surveys.

Results. In the sense of a validation of putative risk factors for this subgroup, online sports bettors with GD showed more pronounced putative individual risk factors than online sports bettors without GD in cross-sectional analyses. More pronounced putative individual risk factors predicted a GD diagnosis one year later in longitudinal analyses, highlighting their importance for the course of GD in online sports bettors for the first time (**Study I**).

Concerning cognitive factors, we found isolated impairments as more fulfilled GD criteria in the in-person study were associated with worse working memory performance and reduced loss aversion. Only reduced loss aversion was associated with an aggravation of symptoms over time, further stressing its role in GD over time (**Study II**).

Player tracking data showed low to modest associations with a multitude of individual risk factors, with differences between individuals with and without GD (**Study III**).

Discussion. Overall, our findings highlight the importance of tailoring prevention and intervention efforts to individual needs to acknowledge the heterogeneity of gamblers (e.g. by integrating factors like impulsivity, stress, and reduced loss aversion). The validation of putative individual risk factors in our sample of online sports bettors suggests established intervention practices for GD also apply. The interaction of putative risk factors and actual gambling behavior is most likely multidimensional and very complex but further research offers potential insights into a more comprehensive understanding of risky gambling in online sports bettors. For a better understanding of disordered gambling in online sports bettors and consequently appropriate treatment options, various aspects like motivations for gambling, protective factors or the difference between strategic and non-strategic gamblers deserve further research, ideally in longitudinal studies. Gamblers and online sports bettors as such are characterized by heterogeneity, which should be accounted for in future studies for instance by adopting a continuous approach, subtyping and including a sufficient variety of disordered gambling severity in samples.