Decision support system for identification of gambling addiction

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ABSTRACT

Presented article aims to explore influential factors for gambling addiction. It proposes decision support model, based on overview of available research on gambling addiction and problem gambling. Two decision support models are proposed; a quantitative model aimed at identification of individual's risk for addiction and a qualitative model aimed at providing a suited intervention/therapy for individual at risk. The aim of developed models is to propose a set of models/tools that could be deployed in a real gambling operation to protect the customers (players).

Keywords

Decision support, problem gambling, gambling addiction, responsible gambling.

1. INTRODUCTION

Gambling addiction is a part of non-chemical addictions. It is estimated that anywhere between 0.5% and 5% of population is affected by gambling addiction [1], [14], [15]. It is however difficult to provide general estimations to the number of people suffering from gambling addiction as it is difficult to establish clear distinction between habitual gambling and true gambling addiction. An effort to produce standard classification of a diction is DSM classification [3]. This classification is based on questionnaire - most papers from the field of responsible gaming focus on connecting this classification to *real world* symptoms.

The focus of this work is to summarize all influential factors and create a decision support model that would help to identify gambling addiction from behavior of the player and its socio-economic circumstances. Such model would be more useful for real life application (than the questionnaire) as it:

- would not be based on active participation: only very small percentage of players would ever be willing to answer a questionnaire. An approach based on observation can cower more players.

- would be based on more realistic data: data gathered by observation is more realistic as players cannot try to present themselves in unrealistically favorable way.

2. INFLUENTIAL FACTORS

Development of gambling addiction can be linked to different influential factors. Relative importance of this factors and practicality of assessing them is beyond the scope of this work. The main goal is to present a comprehensive review of factors that influence or are a manifestation of gambling addiction.
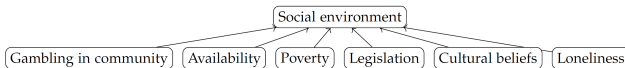
2.1 Social environment

Relationship to gambling, and consequently risk of addiction, is influenced by social environment of the individual [5], [7]. While prevalence of gambling in the community is important it is not necessarily the only influencing (risk) factor for gambling addiction; alongside gambling presence, *relationship* of the community to gambling is relevant. Communities where gambling is seen as something more than just entertainment are at bigger risk for higher prevalence of gambling addiction [6].

Risk factors for gambling addiction, associated with social environment are [4]:

- Presence of gambling in the community. Gambling can be a defining characteristic of lifestyle in the community. Higher exposure to gambling increases the number of people who try gambling - this increases the number of people who can potentially develop addiction. Additionally communities where gambling is very present tend to relativize the problem of addictive gambling - the victims of gambling addiction thus seek help later.

- Availability of gambling: presence of gambling venues (gambling shops, slot machines) in the community. More venues for gambling (especially at places such as shops, bars, restaurants) offer players to integrate gambling into other daily activities. This creates more opportunities for development of obsessive gambling.

- Poverty. Many poorer communities see gambling as a possible escape of poverty. Some forms of gambling (state lotteries) are especially prevalent among poorer communities.

- Legislation. Laxer legislation (such as Indian reservations in US) enable easier operation of casinos. This leads to bigger presence of gambling in the community.

- Cultural beliefs. Some communities see gambling as having a religious element (Indians in US). Winner of games is a favorite of the gods; the outcome of the game is not random but influenced by higher power - this leads to false image about gambling and to development of obsessive gambling.

- Loneliness. Especially problematic among elderly in some communities (Australia) and certain gambling types (bingo). Gambling can be a sort of social interaction (even if with casino personnel). This leads to people substituting normal social interactions with gambling which in turn leads to addiction.

Figure 1: Social environment model

Model describing risk for gambling addiction associated with social environment is presented on figure 1.
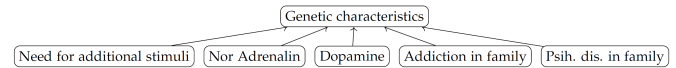
2.2 Genetic characteristics

Like other forms of addiction, risk for gambling addiction is also associated with biological factors [11], [12], [13]:

- Need for additional stimuli. Gambling (especially fast paced casino games such as slot games) can provide a lot of stimulation. This can cause people who biologically crave more stimuli to get addicted to the trill gambling provides.

- Lower levels of Nor Adrenalin. Gambling causes the players' brain to release Nor Adrenalin which can supplement naturally present lower levels. In time gambling can become main trigger for releasing Nor Adrenalin which can cause also biological addiction.

- Lower levels of Dopamine. Same basic principle as with Nor Adrenalin

- Addiction in the family. Risk for gambling addition is in part connected to physiology of a person and is as such hereditary.

- Psychiatric disorders in the family (especially obsessive compulsive behavior) can influence development of gambling addiction.

Model describing risk for gambling addiction associated with genetic factors is presented on figure 2.

**Figure 2: Influence of genetic factors**

2.3 Individual's characteristics

Individual's characteristics are probably the most important influential factor [8], [9], [10], [11], [1]. In part they are also influenced by genetic and social factors. Model describing risk for gambling addiction associated with Individual's characteristics is presented on figure 3. To make the model legible, influence factors in some nodes are abbreviated. Individual's characteristics, that influence gambling are:

- Psychiatric illness. Individuals suffering form certain psychiatry illness have higher risk of developing gambling addiction. Additionally, gambling addiction can worsen preexisting psychiatric condition witch in turn worsens gambling addiction (co-occurrence of gambling addiction and psychiatric illness often have self-amplifying effect). Conditions most associated with gambling addiction include:
  - depression
  - anxiety
  - behavioral disorders
  - obsessive compulsive disorder
  - bipolar disorder

- Gender. Women tend to have higher risk of gambling addiction (G on figure 3)

- Drug and alcohol abuse worsens individuals' control and makes them prone to make riskier decisions. Additionally (like with mental illness) co-occurrence of drug abuse and gambling adiction has self amplifying effect (gambling addiction often worsens alcohol addiction and vice versa). Drug and alcohol abuse is marked Abuse on figure 3.

- Attention deficit disorder (ADHD). Individuals with ADHD seek very intensive stimuli and activities that do not require a lot of attention. This is catered by some casino games (especially *fast games* such as slot machines or video poker

- Lack of self control leads to riskier behavior and inability to set boundaries. On figure 3 it is noted as C

- Need for immediate reward. Relevant especially for casino games (in contrast to sports betting). The need for fast-paced activity with immediate results. On figure 3 it is noted as R.

- Problems in school, work (not meeting personal expectations) leads to seek *success* or validation in gambling. This can also be connected to addiction to sports betting in particular (as some players believe there is skill involved - players seek personal validation in their ability to predict the outcome of the match. On figure 3 it is noted as Problems.

- Suicide tendencies and other self destructive tendencies can be manifested in excessive gambling (that can lead to gambling addiction). Depression and self destructive tendencies can also be a result of gambling addiction. On figure 3 it is noted as Suic.

- Not enough physical activity causes individuals to seek trill in gambling. On figure 3 it is noted as P. activity.

- Age. Younger individuals have higher risk for online gambling addiction while retired (seniors) individuals have higher risk for classical diction.

- Frequency of gambling. Higher frequency of gambling leads to higher chance for gambling addiction. On figure 3 it is noted as Freq.

- Tendency to chase losses. Desire to recoup losses with further gambling can cause development of addiction in the form obsessive desire to recoup ever increasing losses. On figure 3 it is noted as Losses.

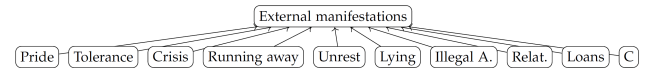**Figure 3: Influence of individual's characteristics**
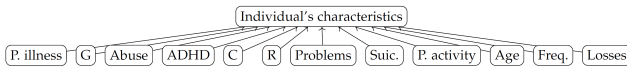
2.4 External manifestations

External manifestations can be used as a standalone model for identifying gambling addiction [1], [2]. An individual is at high risk of gambling addiction if he exhibits 5 or more of the following symptoms:

- Pride and arrogance when being confronted about gambling addiction. On figure 4 it is noted as Pride.

- Tolerance for personal problematic behavior/relativising the problem. On figure 4 it is noted as Tolerance.

- Crisis when unable to cope with the addiction. On figure 4 it is noted as Crisis.

- Trying to run away from the problem. On figure 4 it is noted as Running away.

- Drive (unrest) as a consequence of a personal crisis and inability to cope. On figure 4 it is noted as Unrest.

- Lying to cover up addiction.

- Illegal activities to procure funds for gambling (staling, extortion, frauds...). On figure 4 it is noted as Illegal A.

- Deterioration of relationships due to gambling. On figure 4 it is noted as Relat.

- Seeking loans or other funds for gambling. On figure 4 it is noted as Loans.

- Loos of control over gambling. On figure 4 it is noted as C.

External manifestations can also be an input factor into brother risk assessment model. External manifestations are modeled on figure 4.

Figure 4: External manifestations of addiction

3. DECISION SUPPORT MODEL FOR IDENTIFYING GAMBLING ADDICTION

General model for identification of gambling addiction is presented on figure 5. It is comprised of

- Risks associated by social environment

- Risk associated by biological/genetic characteristics.

- Risks associated with individual's characteristics.

- External manifestations of addiction

Identified risk factors asses risk factor of an individual. According to the overall risk factor and to its specific risk profile, different intervention options are possible.

3.1 Intervention options

Depending on overall risk factor and to specific risk profile (for instance high social risk vs. high genetic risk) different intervention options can be used [1].

- Realization of the problem. Aims to help individual recognize the problem.

- Individual therapy. It is especially useful for individual with high risk factors associated with personal characteristics and/or genetic factors. It consists of:

  - Encouragement to change activities (for instance find new hobbies).

  - Pressure to stop gambling. This can also be done in conjunction with individual's social environment (family, relatives, friends).

  - Prohibition. Legal prevention of gambling in casinos (casinos are usually required to offer binding self exclusions).

- Group therapy. Useful for individuals with high social risk for addiction.

- Cognitive behavioral therapy. Useful for individual with high risk factors associated with personal characteristics and/or genetic factors.

- Family therapy. Useful for individuals with high social risk for addiction.

Figure 5: General model with composite attributes
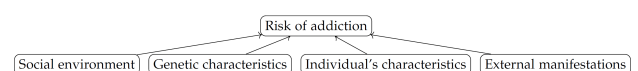
4. DECISION SUPPORT MODEL

Based on literature overview, two decision support models can be constructed:

- Quantitative model assessing *the risk* of addiction.

- Qualitative model advising about the most suitable intervention option.

4.1 Quantitative model

Quantitative model assesses the risk that an individual is suffering from gambling addiction. It is based on a model, presented on a figure 5. External manifestations are a standalone addiction identification model and are omitted in quantitative model. The overall quantitative model is presented on a figure 6. Because there is no practically feasible way of assessing genetic factors, they to are committed from the model.

Figure 6: Quantitative model
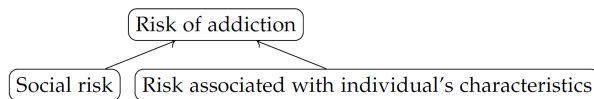
Social risk and risk associated with individual characteristics are further calculated as a weighted sum of their influential factors (figures 3 and 1 respectively). Weights themselves are a topic of further research as the current literature provides no robust methodology that would help us in setting them. Furthermore weights should be set for a specific environment; in North America for instance some environmental risks (cultural beliefs in some communities) outweigh others [5].

Model is implemented in Microsoft Excel. Output of the model is normalized (value between 0 and 1) assessment of risk for addiction of an individual.

4.1.1 Quantitative model thresholds

In order to make evaluation of individuals easier, some thresholds are set for quantitative model. For individual characteristics, these thresholds are:

- Psychiatric illness

  - No problems 0

  - Diagnosed unrated problems (anxiety, PTSDâĂę) between 0 and 0,6

  - Diagnosed psychiatric problems between 0,6 and 1

- Gender

  - Male 0

  - Female 1

- Drug and alcohol abuse

  - No use 0

  - Occasional abuse between 0 and 0,5

  - Frequent abuse between 0,5 and 0,8

  - Addiction between 0,8 and 1

- ADHD

  - No problems 0

  - Particular ADHD behavioral patterns between 0 and 0,7

  - Diagnosed ADHD between 0,7 and 1

- Lack of self control

  - Adequate reality control 0

  - Unrealistic self-image between 0 and 0,8

  - Total lack of self control between 0,8 and 1

- Need for immediate reward

  - No need 0

  - Immediate reward is welcome between 0 and 0,5

  - Immediate reward is needed between 0,5 and 0,8

  - Immediate reward in obligatory between 0,8 and 1

- Problems in school/work

  - No problems 0

  - Some dissatisfaction between 0 and 0,7

  - Serious problems between 0,7 and 1

- Suicide tendencies

  - No thinking about suicide 0

  - Occasional thoughts about suicide between 0 and 0,6

  - Frequent thoughts about suicide between 0,6 and 0,9

  - Suicide attempts between 0,9 and 1

- Not enough physical activities

  - Regular physical activity 0

  - Occasional activity between 0 and 0,8

  - No activity between 0,8 and 1

- Age (at the start of gambling)

  - between 30 and 50 between 0 and 0,4

  - between 50 and 60 and between 20 and 30 between 0,4 and 0,7

  - bellow 20 and above 60 between 0,7 and 1

- Frequency of gambling

  - Never gamble 0

  - 1-2 per year between 0 and 0,3

  - 1-2 per month between 0,3 and 0,6

  - 1-2 per week between 0,6 and 0,9

  - more than 2 per week between 0,9 and 1

- Casing losses
  - never chase losses 0
  - sometimes chase losses between 0 and 0,6
  - frequently chase losses between 0,6 and 0,8
  - always chase losses between 0,8 and 1

Environment influences are determined within the following thresholds:

- Gambling in community
  - Socially acceptable between 0 and 0,3
  - Socially encouraged between 0,3 and 1
- Availability
  - No venues 0
  - Gambling venue in the broader area between 0 and 0,7
  - Gambling venue in the neighborhood between 0,7 and 1
- Poverty
  - Above average income between 0 and 0,4
  - Average income between 0,4 and 0,6
  - Below average between 0,6 and 0,8
  - Below poverty line or very high high income between 0,8 and 1
- Legislation
  - Legal with limitations between 0 and 0,4
  - Legal with little limitations between 0,4 and 0,8
  - Almost no limitations between 0,8 and 1
- Cultural beliefs
  - Discouraged between 0 and 0,3
  - Acceptable between 0,3 and 0,6
  - Encouraged between 0,6 and 1
- Lonliness
  - Healthy social circle 0
  - Occasional lonliness between 0 and 0,6
  - Severe lonliness (living alone) between 0,6 and 1

4.2 Qualitative model

Qualitative model describes different possibilities for intervention:

- Individual intervention: more suitable for gambling risks, associated with personal characteristics.
- Social intervention/group therapy: more suitable fro risks associated with social environment.

Intervention model is described on figure 7. External manifestation is a feature that determines weather of not a risk exists for an individual (has only two values: risk and no risk). If there is no risk for addiction, other features (social and individual risks) are not even considered.

The model is implemented in DEXi [16]. End rules, generated by DEXi are presented in table 1.

	External	Social	Individual	Intervention
	79%	17%	4%	
1	Risk for addiction	high	<=med	both
2	Risk for addiction	<=med	med	both
3	Risk for addiction	low	low	both
4	Risk for addiction	<=med	>=low	social
5	Risk for addiction	>=med	high	individual
6	Risk for addiction	>=low	<=med	individual
7	*	>=low	no	none
8	*	no	>=low	none
9	No risk	*	*	none

Table 1: Rules, generated by DEXi.

Figure 7: Qualitative model
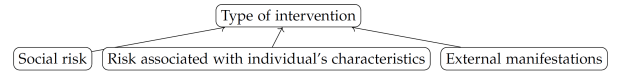
5. EXAMPLES OF INDIVIDUALS - QUANTITATIVE MODEL

For the purpose of demonstration of applicability of qualitative model, six toy (example) individuals are constructed. They have (from psychological) standpoint believable personal characteristics (for instance lack of self control and need for immediate reward is connected to alcoholism).

5.1 Description of individuals

Three different kinds of individual characteristics are examined set in two sets of social environments (environment that encourages and environment that discourages addiction).

Individual A. Individual characteristics of individual A are:

- No psychiatric illness
- Male
- Frequent abuse of drugs and alcohol (on the border of addiction)
- No ADHD
- Unrealistic self image
- Welcomes immediate rewards
- Faces some dissatisfaction in school/work
- Has never even thought about suicide
- Has almost no physical activity
- Started gambling between the ages of 30 and 50

- Gambles once per month

- Sometimes chases losses

Social environment of individual A is characterized by:

- Social acceptance of gambling

- Presence of gambling venue in the neighborhood

- Average income

- Gambling is legal with limitations

- Cultural background discourages gambling

- Person has a healthy social circle

Individual B. Individual characteristics of individual B are:

- Has diagnosed and untreated psychiatric illness

- Female

- Frequent abuse of drugs and alcohol

- Diagnosed with ADHD

- Displays total lack of self control

- Demands immediate rewards

- Faces some dissatisfaction in school/work

- Has frequent thoughts about suicide

- Has enough physical activity

- Started gambling after the age of 60

- Gambles once or twice per week

- Always chases losses

Social environment of individual B is characterized by:

- Social acceptance of gambling

- Presence of gambling venue in the broader area

- Above average income

- Gambling is legal with limitations

- Cultural background discourages gambling

- Person lives alone (severe loneliness)

Individual C. Individual characteristics of individual C are:

- Has diagnosed psychiatric illness

- Male

- Is addicted drugs and alcohol

- Has no problems with ADHD

- Displays total lack of self control

- Has no need for immediate rewards

- Faces serious problems in school/work

- Has frequent thoughts about suicide

- Has enough physical activity

- Started gambling between ages of 30 and 50

- Gambles more than once or twice per week

- Frequently chases losses

Social environment of individual C is characterized by:

- Social acceptance of gambling

- Presence of gambling venue in the broader area

- Above average income

- Gambling is legal with limitations

- Cultural background discourages gambling

- Experiences occasional loneliness

Individuals A', B' and C'. Individuals A', B' and C' have the same individual characteristics as individuals A, B and C respectively. In contrast to A, B and C they live in an environment where they are at greater risk for development of gambling addiction. This environment is characterized by:

- Social encouragement of gambling

- Presence of gambling venues in the neighborhood

- Living below poverty line

- Gambling is legal with virtually no limitations (e.g. Indian reservations)

- Cultural background that encourages gambling

- Live alone (experience extreme loneliness)

Individual:	A	B	C	A'	B'	C'
Risk:	0,3	0,57	0,47	0,66	0,85	0,79

Table 2: Qualitative model evaluation

5.2 Discussion

In contrast to general perception that personal characteristic (specially being prone to addictions - drugs, alcohol) play a vital role in development of gambling addiction, the model illustrates that also the social environment plays an important role. Regarding personal characteristics, comparing A, B and C the model illustrates that untreated psychiatric conditions (illness, ADHD) in combination with gender play a more important role than substance abuse. Results of qualitative model are presented on table 2.

A, B and C are examples set in Slovene (European) environment where gambling is legal (with limitations) and not socially encouraged. A', B' and C' demonstrate the decisive influence of environment on risk of development of gambling addiction. At risk individuals (such as Individual B) may not develop addiction (or are at significantly lower risk) in safer environments.

6. EXAMPLES OF INDIVIDUALS - QUALITATIVE MODEL

Individuals A, B, C and A',B',C' for qualitative model are (in theory) the same individuals with believable characteristics described for qualitative model. The results of the model illustrates the need for social therapy when dealing with individuals from problematic environments (table 3).

Individual:	A	B	C	A'	B'	C'
Intervention:	None	Individual	Individual	None	Both	Both

Table 3: Quantitative model evaluation

7. CONSEQUENCES OF ADDICTION

It is important to recognize individuals with high risk of addiction. Untreated gambling addiction can cause:

- Financial distress due to gambling losses.

- Emotional problems usually associated with financial loses and loss of control over behavior.

- Deterioration of social life caused by searching for funds for gambling (can also be combined with illegal activities) and lack of time for social life.

- Unemployment or problems with employment because of time spend gambling.

- Illegal activities searching for gambling money.

- Health problems.
  - Insomia
  - Drug abuse
  - Digestive problems
  - Cardiovascular problems

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