

The influence of music tempo on gambling: The role of arousal

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ABSTRACT

Background

Drawing on research which has investigated music tempo's effect on behaviour in a number of domains we consider tempo as a factor which can influence gambling behaviour. We also consider whether arousal is a psychological mechanism responsible for tempo's influence on gambling behaviour. Following this we outline our study which has investigated the influence of music tempo on virtual roulette behaviour and tests whether subjective and/or physiological arousal are responsible for tempo's effects on gambling behaviour. The findings of this study will be presented at the conference. To conclude we consider the implications of determining arousal as responsible for music tempo's effects on gambling behaviour for gamblers, gambling operators and current gambling practice.

Aims

Our goals are to provide an overview of the research which has investigated music tempo's influence on gambling behaviour and examine whether arousal could be responsible for music tempo's effects on gambling behaviour.

Background

A body of research has investigated music's effects on behaviour in laboratory, retail and commercial environments. Music has been found to influence a plethora of behaviours including increasing individuals' pain tolerance (Mitchell & MacDonald, 2006) and leading participants to exhibit more risky driving behaviour (Brodksy, 2002). It may be that effects of music transfer to gambling situations and if so, such effects need to be understood, given that music has been identified as a feature which can entice individuals to gamble (Griffiths & Parke, 2003). Griffiths and Parke (2003) distinguished between features of music within gambling contexts: as a situational characteristic music can help to encourage individuals into the gambling environment; as a structural characteristic music can induce individuals to gamble or continue gambling. Griffiths and Parke (2003) hypothesized that music may increase gamblers' confidence, arousal, relaxation, and help gamblers to disregard previous losses or induce an affective state which leads gamblers to believe that their chances of winning are better than they are. Hypotheses such as those suggested by Griffiths and Parke (2003) have provided a basis for our research which investigates how music tempo influences gamblers and their gambling behaviour.

There is evidence to suggest that the manipulation of music tempo influences behaviours in retail and commercial

environments (see North & Hargreaves, 2008). For example, fast tempo music has increased the speed of eating (Roballey et al., 1985) drinking (McElrea & Standing, 1992), moving through a supermarket (Milliman, 1982) and reading (Kallinen, 2002). A meta-analysis of eight studies which investigated the impact of music tempo on the speed of behaviour found that fast tempo consistently covaried with faster behaviour (Kämpfe, Sedlmeier & Renkewitz, 2011). We focus on the influence of music tempo on gambling behaviour because to date three studies have found that fast tempo music heard in laboratory gambling situations leads to individuals placing bets at a faster rate when playing virtual roulette (Spenwyn, Barrett & Griffiths, 2010; Bramley, 2009; Dixon, Trigg & Griffiths, 2007). These findings suggest that previously observed effects of tempo on speed of behaviour transfer to at least one gambling activity (i.e. virtual roulette). In gambling, the speed of play is one of the structural characteristics which differentiates between forms of gambling (e.g. internet gambling and gambling in traditional gambling environments) and gambling activities (e.g. roulette, playing the lottery, betting) (Orford, 2011). Speed of play encompasses the time elapsing between events, time elapsing before another bet can be placed, interval between staking and knowledge of result, and receipt of winnings (Orford, 2011). The concern is that differences in structural characteristics such as speed of play may permit and encourage repeated, rapid cycles of staking, additionally, playing and receiving feedback may make certain gambling activities potentially dangerous and addictive (Orford, 2011). Furthermore, as betting becomes quicker this could contribute to gambling becoming a habit as gamblers repeat actions and receive reinforcement.

The theorization of the psychological mechanisms which underlie music tempo's influence on gambling behaviour and the speed at which other everyday behaviours are performed remains speculative. In the study to be presented at the conference we investigate whether arousal is a psychological mechanism contributing to music tempo's effects on betting speed. Arousal has been hypothesized as mediating music tempo's effects on virtual roulette betting speed (Spenwyn et al., 2010; Dixon et al., 2007). This follows the suggestion that tempo is an intrinsic physical property of music and fast tempo music is higher in arousal potential thereby produces more activity in the autonomic nervous system (Berlyne, 1971). A number of studies have shown that fast tempo music is associated with higher heart rate when music listening is the primary task (Coutinho & Cangelosi, 2009; Gomez & Danuser, 2007; Bernardi, Porta & Sleight, 2006). Similarly, increases in skin conductance have been observed when listening to fast tempo music (Coutinho & Cangelosi, 2009; Gomez & Danuser, 2007; Carpentier & Potter, 2007). Studies which have measured arousal whilst individuals are listening to music that differs in tempo and are simultaneously engaged

in an activity can be found in the field of exercise studies. Fast tempo music led to faster pedaling, increased distance covered and an increase in heart rate (Waterhouse, Hudson & Edwards, 2010). Edworthy and Waring (2006) found fast tempo music led to higher treadmill speeds and heart rate. In the present study we measure participants' heart rate and skin conductance to examine arousal response patterns when gambling whilst listening to music. The experimental design manipulates tempo in order to better understand whether arousal is a psychological mechanism which underlies music tempo's influence on betting speed.

When both physiological and subjective arousal are measured there is conflicting evidence of whether changes in physiological arousal result in a change in subjective arousal and vice versa. Van der Zwaag et al. (2011) observed a positive correlation between subjective arousal and skin conductance responses; however, heart rate variability was negatively related to subjective arousal. Fast tempo music heard prior to completing a tennis task led to participants reporting higher subjective arousal however heart rate did not significantly differ between conditions and fast tempo music did not lead to shorter choice reaction times (i.e. forward movement and arm extension in preparation for returning a serve) (Bishop, Karageorghis & Kinrade, 2009). In addition to physiological arousal, we therefore also record participants' subjective arousal responses to examine if there are any relationships between physiological and subjective arousal responses. We also consider whether individuals' arousal response patterns to changes in music tempo are similar to those recorded in other domains.

In addition to the arousal associated with listening to music, gambling participation also elicits changes in physiological arousal: heart rate (Coulombe et al., 1992; Leary & Dickinson, 1985; Coventry & Hudson, 2001; Anderson & Brown, 1984; Diskin, Hodgins & Skitch, 2003) and skin conductance level (Diskin et al., 2003) have been found to increase during periods of gambling. However, differences in individuals' arousal responses have been observed according to whether individuals gambled frequently (Moodie & Finnigan, 2005), the gambling environment (Anderson & Brown, 1984), whether gamblers were given the opportunity to win money (Wulfert et al., 2005; Ladouceur et al., 2003) and whether individuals were classified as a pathological or non-pathological gambler (Diskin & Hodgins, 2003). We will therefore compare individuals' subjective and physiological arousal responses when gambling without music and when music can be heard which will enable us to determine whether music inhibits or heightens individuals' arousal responses when gambling and to consider how gamblers interpret music tempo-induced-arousal.

The consequences of induced-arousal for individuals' gambling behaviour have been explored in two studies (Rockloff & Greer, 2010; Rockloff, Signal & Dyer, 2007). These studies have shown that gamblers can interpret induced-arousal differently due to the number of gambling problems that they have and whether the individual is either low or high in negative affect (Rockloff & Greer, 2010; Rockloff et al., 2007). Rockloff et al. (2007) found that induced-arousal led those with many gambling problems to have a lower average bet compared to individuals with few gambling problems. Rockloff and Greer (2010) found that

high induced-arousal can intensify gambling (i.e. individuals' increased their bet size) for at-risk gamblers but only if they are low in negative affect because they misattribute the induced-arousal to be a predictor of their future gambling success. These studies highlight that there may be individual differences which ought to be considered when investigating the influence of tempo-induced arousal on gambling behaviour. With regards to the influence of music on behaviour, music preference has been shown to be a significant factor in any effects of music (Herrington & Capella, 1996) and has been suggested as potentially mediating music's influence on gambling behaviour (Griffiths & Parke, 2005). For example familiar and liked music may lead gamblers to gamble for longer periods of time as their behaviour may be reinforced by music's presence. In the present study, we also therefore consider the possibility of other factors which may mediate music tempo's influence on arousal and on gambling behavior, such as liking, familiarity and whether participants' are classified as potentially being problem gamblers.

Our study builds upon the current understanding that separately gambling and music influences aspects of arousal and tests whether music tempo influences indices of physiological and subjective arousal when gambling. From this we examine the consequences of music tempo-induced arousal on gambling behaviour. Participants are randomly assigned to play laboratory virtual roulette whilst listening to no music, fast tempo or slow tempo music. Participants' speed of betting, risk-taking (credits spent on high, medium and low risk bets) and average amount of credits spent are recorded during the experiment. Prior to and whilst playing virtual roulette participants' heart rate and skin conductance level are recorded. In addition subjective arousal responses are obtained prior to and following the experiment. Participants also complete a questionnaire following the experiment to collect responses about the music that they heard during the experiment, demographic information and their gambling habits. The results of this study will be presented at the conference.

Research into the influence of music tempo on gambling behaviour has a number of ramifications for those involved in gambling and the gambling industry. These will be highlighted during our presentation and discussed in relation to our findings. Music may be one of the features of gambling which influences individual differences in vulnerability to gambling addiction (Orford, 2011). Therefore, understanding the extent to which music influences aspects of gambling behaviour can contribute to the work of healthcare professionals for instance, who can use the results of our research to advise gamblers of how music can influence their gambling behaviour and gamblers can be given strategies as to how to minimise music's effects.

Keywords

tempo, arousal, gambling, background music

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