

Lottery Gambling: A Review

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Abstract This paper presents an exhaustive review of the literature on lottery gambling involving numbers games, lotto, and scratch cards. Results provide tentative answers to the question why people buy lotteries, and support the theory of judgment under uncertainty, cognitive theory of gambling, and theory of demand for gambles. Results also indicate some potential addictiveness of this form of gambling. Youths buy different forms of lotteries and the best predictor of their lottery purchases is their parents' lottery participation. Contrary to the myth that a big lottery win will ruin the winners' lives, lottery winners tend to be well-adjusted and their life quality seems to improve. Suggestions for future research are discussed.

Keywords Lottery gambling · Theory of judgment under uncertainty · Cognitive theory of gambling · Theory of demand for gambles · Lotteries' potential addictiveness · Adolescent lottery gambling · Life after winning lotteries

Lotteries have been a part of human history since its beginning. Different forms of lottery gambling were recorded in the Old Testament; Roman emperors offered them for entertainment; French kings used them to balance state deficits; and modern states rely on lotteries to finance an important part of their public works (Willmann 1999). Lotteries are now a big business, involving at least 100 countries and 200 jurisdictions, and worldwide sales of lotteries are estimated to amount to almost \$224.3 billion in 2007 (LaFleur's 2008 World Lottery Almanac, cited in Scientific Games 2009).

Despite lotteries' long presence in human history and the vast amount of money involved, there are two notable gaps in the literature on this form of gambling. First, although several attempts have been made to explain why people play lotteries (Clotfelter and Cook 1989a), no definite answer has yet been found (Willmann 1999). Second, a coherent theory of lottery gambling needs to be developed. At the moment, the most comprehensive model of lottery gambling comes from cognitive theory (Rogers 1998). A

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decade has elapsed since both observations were made, and there seems to be a need for a review of the literature to examine if new significant findings can answer why people play lottery, and if new empirical data still support the cognitive theory.

To review the literature, the author searched the databases such as Academic Search Premier, Business Source Premier, Google Scholar, PsychInfo, Sage Journal Online, Science Direct, SpringerLink, and Wiley Interscience for the period 1990–2009, using the key word lottery gambling in titles and abstracts, and selecting only articles dealing with the psychological aspects of the number games, lotto, and scratch cards (instant lottery). This review will focus on the motivation of lottery buyers, theories of lottery gambling, adolescent lottery gambling, lotteries' potential addictiveness, and life after winning lotteries. Future research to expand our understanding of lottery gambling will be suggested in the last paragraphs.

Why Do People Buy Lotteries?

Lotteries are sold in various forms, the most popular being the numbers game, lotto, and scratch card (Clotfelter and Cook 1991; Clotfelter et al. 1999). The most traditional one is the passive lotteries; the gamblers buy a ticket on which numbers are already printed and a later date is indicated for the drawing. Another form requires the gamblers to select different numbers. In Pick-2, Pick-3, or Pick-4, the gamblers select two-digit, three-digit, or four-digit numbers respectively. In the 6/49 lotto or the pseudo active lottery, the buyers select six two-digit numbers from 01 to 49. In scratch cards, the gamblers scratch the surface of the tickets to reveal the award amounts under the coating; if three numbers or symbols are matched the gamblers win a prize. Scratch cards are essentially slot machines on paper.

Lotteries have two distinctive features. The first is an extremely low probability of winning. The 6/49 lotto carries a one in 14 million probability of winning. Lottery's second feature is its low pay-out ratio, or the total amount of money returned to the gamblers. The payout ratio for lottery is typically 50%, compared to 74% in bingo, 81% in horseracing, 89% in slot machine, and 98% in blackjack played according to the basic rules (Clotfelter and Cook 1990).

With an extremely low probability of winning and the lowest pay-out ratio, buying lotteries is evidently a losing proposition. Yet, people continue to buy lotteries, and the lotteries' popularity puzzles researchers. A large number of studies have been devoted to answer the question as to why people buy lotteries, and they provide the following tentative answers.

People Do Not Exercise Rationality in Lottery Gambling

Researchers, particularly economists, generally assume rationality and point out that, at an expected value of 50 cents to each dollar of purchase price, buying lottery tickets is a bad deal. The instances when the expected value exceeded the purchase price were very rare (Matheson 2001). It is possible that the lottery gamblers do not use rationality or expected value in their gambling; participants with knowledge of mathematics had more erroneous perceptions of gambling (Pelletier and Ladouceur 2007). Recent studies showed that improvement in knowledge and skill in gambling odds was not associated with any decreases in actual gambling behavior (Williams and Connolly 2006). Gamblers seemed to switch off their rational belief during gambling and switch it on again after gambling (Sevigny and Ladouceur 2003).

Lottery Gambling is for Fun

People gambled in lotteries for the money and the challenge (Lam 2007). Desire to win, impulse/curiosity, feeling lucky, and enjoyment were four main motivations for purchasing lotteries (Miyazaki et al. 1999). A ticket provided a hope of winning the jackpot (Forrest et al. 2002), and the hope of winning the prize was the strongest predictor of lottery participation (Ariyabuddhiphongs and Chanchalermporn 2007). Hope of winning rewards was high among slot machine and lottery players (Clarke 2005). Playing the lottery is a pastime among friends; lottery tickets validated the gamblers' membership in a reference group (Adams 2001), and friends' lottery play significantly predicted the participants' lottery purchases (Coups et al. 1998). In addition to financial gain, social enhancement and positive changes in affect were reported among college students (Wickwire et al. 2007).

Buying lottery tickets is also related to reduced negative mood; the more the lottery expenditures were, the bigger the reduction in negative mood was (Bruyneel et al. 2006).

Lotteries are so Common That They are Not Viewed as Gambling

Lotteries have become the most popular form of gambling, by the Americans in a 1999–2000 survey (Welte et al. 2002) and in a 2008 Gallup poll (Jones 2008), as well as by the British (Parsons and Webster 2000), Canadians (Azmi 2000), Norwegians (Gotestam and Johansson 2003), and Thais (Piriya-rangsan et al. 2004). Minors also play lotteries; parents routinely bought lottery tickets for their children (Felsher et al. 2003), and lottery tickets were sold to minors despite its legal prohibition (Radecki 1994). Because of lotteries' ubiquity, people do not consider them a form of gambling; women in the U.K. defended their lottery gambling as a leisure activity (Casey 2006); students who bought scratch cards and state lottery tickets did not see themselves as gamblers (Lange 2001); and young people did not perceive buying lotteries and scratch cards as a form of gambling (Wood and Griffiths 1998).

Not only is the lottery no longer viewed as gambling, gambling itself is no longer looked upon as a vice but as a refuge for women from the sense of alienation (Trevorrow and Moore 1998), a forum of social support for older adults (Vander Bilt et al. 2004), a social activity (McNeilly and Burke 2001) for relaxation, passing time, and getting away for the day (McNeilly and Burke 2000).

Theories of Lottery Gambling

Theories of lottery gambling may be divided into theory of judgment under uncertainty (Tversky and Kahneman 1974, 1981), cognitive theory of gambling (Griffiths and Wood 2001; Rogers 1998), and theory of demand for gambles (Nyman 2004).

Theory of Judgment Under Uncertainty

Theory of judgment under uncertainty (Tversky and Kahneman 1974, 1981) explains lottery participation in terms of the gambler's perception of pattern of numbers, and probabilities of winning. Under this theory, lottery gamblers use different heuristics such as representativeness, availability, anchoring and adjustment, and framing of decisions to select their lottery numbers. These heuristics and some examples are briefly reviewed below.

Representativeness heuristic refers to the tendency to judge the probability of an event on the extent of its similarity to a parent population (Tversky and Kahneman 1974). The example of the representative heuristic in lottery play is the player's selection of the numbers that appear to be random because random-looking numbers seem to be more representative of winning numbers than numbers with repeating digits (Holtgraves and Skeel 1992). Results showed that subjects preferred numbers without repeating digits, and these numbers were actually more frequently chosen in the Indiana daily Pick-3 lottery (Holtgraves and Skeel 1992). Given four sets of 6/49 lottery numbers: long sequences, patterns in a pseudo-psychological order, unbalanced, and random-looking numbers, participants chose the random-looking sets using perceived randomness to justify their choice (Hardoon et al. 2001).

Availability heuristic explains that people will buy lotteries because it is easier to imagine what they would do if they won the lotteries than to imagine the small probability of winning lottery (e.g. one in 14 million in the case of lotto; Tversky and Kahneman 1974). The availability heuristic was used to develop a scale to measure cognitive distortions in video lottery terminal gamblers (Jefferson and Nicki 2003), but has not been tested by comparing the difficulty of imaging the probability of winning against the ease of imaging what to do after a lottery win.

Anchoring and adjustment heuristic states that the estimates people make depend on the initial values and on the adjustments they make to arrive at the final estimates. Low initial values will yield low final estimates and high initial values will yield high final estimates. Subjects who were asked to estimate the product of multiplying 1–9 (1 being a low initial estimate) came up with lower estimates of the product than those who were asked to estimate the product of multiplying 9–1 (9 being a high initial estimate; Tversky and Kahneman 1974). Implausibly extreme anchors had a proportionally smaller effect than anchors close to the expected value of the lotteries, and anchoring occurred only if the anchor and preference judgment were expressed on the same scale (Chapman and Johnson 1994). The anchoring and adjustment heuristic has been supported. Subjects in two experiments perceived their chances of winning to be greater when the lottery was based on 1 in 10 than when it was 10 in 100, or 100 in 1000 (Holtgraves and Skeel 1992), supporting anchoring heuristic hypothesis. Revision of stated probability, and reasoning based on information on team location and home or away game, were found to be key cognitive processes in sports gambling (Ranyard and Charlton 2006), supporting adjustment heuristic hypothesis.

Framing of decisions heuristic refers to decision makers' preference for framing of the decision problems in positive rather than negative terms; 72% of the participants chose a program where 200 out of 600 people will be saved whereas 22% of the participants chose a program where 400 out 600 people will die from a disease (Tversky and Kahneman 1981). Applied to lottery gambling, the lottery gamblers tend to prefer the framing of the lottery results in terms of winning rather than losing. Advertisements of lotteries may be said to exploit the framing of decisions heuristic. Lottery advertisements provided the prospects of huge jackpots, attractive consumer goods and easy wins, and displayed top prize winners, and lottery's life-changing nature with little reference to the actual odds of winning (McMullan and Miller 2009). Lottery advertising was influential in lottery purchase behavior, particularly among individuals with lower incomes and schooling (Lee and Chang 2008).

Cognitive Theory of Gambling

The cognitive theory of gambling emphasizes the gamblers' irrational beliefs at the different stages of their activities (Griffiths and Wood 2001; Rogers 1998). The main irrational beliefs are gamblers' fallacy, entrapment, belief in hot and cold numbers, unrealistic optimism or perceived luckiness, superstitious belief, illusion of control, near miss, and roll over effect. The following paragraphs will briefly review these beliefs and provide some illustrations.

Gambler's fallacy refers to the gamblers' belief that the probability of a number being drawn again is lower after it has already been drawn (Clotfelter and Cook 1993). Gambler's fallacy was found to influence the gamblers' frequency and amounts of lottery gambling (Ariyabuddhiphongs and Phengphol 2008). The amount of money bet on a particular number fell sharply immediately after the number had been drawn, and gradually recovered to its former level over the course of several months (Clotfelter and Cook 1993). Regular lottery players were prone to believe that a winning six number combination had a much lower chance of being drawn for a second successive week (Rogers and Webley 2001).

Entrapment or escalation of commitment refers to the decision makers' increasing commitment to a previously chosen course of action when they are personally responsible for the previous decision's negative outcome (Staw 1976). In lottery gambling, it refers to the gamblers' belief that they have invested so much money in the lottery that if they were to give up playing the lottery they would never win their money back. Entrapment was found to influence the frequency and amounts of lottery gambling (Ariyabuddhiphongs and Phengphol 2008).

Belief in hot and cold numbers Hot numbers refer to the numbers that are seen to be drawn with regularity whereas cold numbers refer to the numbers that are seldom drawn in recent games (Rogers 1998). The belief in hot and cold numbers has not yet been tested among lottery gamblers.

Unrealistic optimism or perceived luckiness Unrealistic optimism refers people's belief that negative events are less likely to happen to them than to others, and that positive events are more likely to happen to them than to others (Weinstein 1980). Unrealistic optimism is similar to the concept of perceived luckiness or belief in good luck, defined as a belief that luck is a stable characteristic that consistently favors some people but not others and is especially likely to favor oneself (Darke and Freedman 1997). Unrealistic optimism or perceived luckiness has not been tested among lottery gamblers.

Superstitious belief refers to a strong conviction of a cause-effect association between two independent events (Joukhador et al. 2004). Superstition did not involve just touching wood, wearing lucky charm, or buying tickets from a certain stall; the ages at death of famous deceased persons, the count of oddly shaped bananas, and the shape of a malformed piglet were believed to indicate winning numbers, and gamblers who held such superstitious beliefs were significantly more involved in lottery gambling than those who did not (Ariyabuddhiphongs and Chanchalermporn 2007).

Illusion of control refers to the lottery gamblers' tendency to believe that the tickets they have selected have a higher probability of winning than other tickets such that they would not trade or sell their tickets (Ladouceur et al. 1987; Langer 1975). The decisions to exchange and retain lottery tickets were attributed to anticipatory regrets (Bar-Hillel and Neter 1996), as well as probability judgments (Risen and Gilovich 2007).

Near Miss is defined as a kind of failure that comes close to winning and used to describe a missing symbol in slot machine play (Reid 1986). Applied to lottery gambling,

near miss is said to occur when the numbers on the player's ticket nearly match the set of six winning numbers (Rogers 1998). A near miss also refers to a missing digit in the six-digit numbers, and a near miss was related to the frequency and amounts of lottery gambling (Ariyabuddhiphongs and Phengphol 2008).

Roll over effect describes the effect on the gamblers when the amounts of the unclaimed jackpot prizes of the previous draws are added to the following draw (Rogers 1998). Although regular lottery players viewed that winning a rollover jackpot was less likely than winning a standard jackpot (Rogers and Webley 2001), response to lottery sales increased with jackpot size (Guryan and Kearney 2008), and gamblers switched from other forms of gambling to lotteries when there was a jackpot roll over (Forrest et al. 2008).

An analysis of these irrational beliefs reveals a common basic denominator, the gamblers' inability or unwillingness to apply the principle of independence among events. Gamblers continue to take into account past outcomes before predicting or placing the next bet and one explanation is that the temporal and physical proximity of the gambling outcomes may induce the perception of interdependence (Ladouceur and Walker 1996, 1998).

Theory of Demand for Gambles

The theory of demand for gambles (Nyman 2004) is based on the premises that individuals gamble to obtain "something for nothing" and that in order to obtain something it is necessary to give up something else. Thus, the gambling motivation involves not only the utility gained from the winnings, but also the utility costs that are saved by not having to work to earn them. The theory suggests that economically vulnerable populations are more likely to engage in recreational gambling and the use of lotteries and gambling taxes to raise government revenues will be disproportionately borne by those who are disadvantaged and vulnerable in the labor market. Nyman et al. (2008) tested this theory using the 1999–2000 Survey of Gambling in the U.S. (Welte et al. 2002) and found that recreational gambling was more prevalent among those who engaged in service occupations, were non-white, and lived in a census block group with a higher percentage of unemployment, as predicted by the theory.

Empirical Research on Lottery

Various frameworks have been used to conduct empirical research on lottery gambling. These works may be divided into those that used psychological variables such as attitudes, norms, motivations, and those that used demographic variables such as gender, age, education, and SES.

Studies Using Psychological Variables

A few psychological variables have been used to predict lottery gambling. Under the theory of planned behavior, intention was found to be an important predictor of the decision to play the lottery (Walker et al. 2006). Anticipatory regret, a sense of regret that the gamblers feel to discover that their regular numbers were drawn when they have not purchased the tickets, was found to influence the decision to play the lottery in the Netherlands (Zeelenberg and Pieters 2004), and the U.K. (Wolfson and Briggs 2002).

Lottery gambling has been found to relate to personality traits. Frequency of the U.K. national lottery play was related to lower self control, lower intellectual efficiency, lower

status, lower achievement via independence, and lower responsibility (Cook et al. 1998). However, Sprott et al. (2001) found that consumers with internal locus of control and high desire for control played the lottery to the greatest extent. Lottery and scratch card purchases were found to be positively related to the extraversion dimension of personality, and negatively related to the agreeableness and intellect dimensions of personality (Balabanis 2002).

Studies Using Demographic Variables

Gender

In the latest U.S. survey, men gambled in lottery slightly more than did women (68–64%), and the amount gambled was higher for men (\$362) than for women (\$295; Welte et al. 2002). Women in Australia had a higher preference for bingo, lotto, and lotteries (Hing and Breen 2001). In Thailand, women gambled in lottery more than men by a small margin (52.6 against 47.4%; Ariyabuddhiphongs 2006).

Age

The inverted U-shape relationship between age and lottery participation (Clotfelter and Cook 1989b) was no longer detected in the 1999–2000 survey (Welte et al. 2002; Table 1).

Lottery participation by four age groups (18–30, 31–40, 41–50, and 51–60) did not differ much from each other (68, 70, 69, and 66% respectively); participation by the 61+ age group was the lowest at 55% but their mean amount of individual lottery involvement was the highest at \$424 (Welte et al. 2002). The mean amounts of individual lottery involvements per year varied among the first four age groups at \$234, \$382, \$321, and \$336 respectively. In Thailand, lottery gamblers tended to be drawn from the working age brackets: 21–30 years (28.2%), 31–40 years (30.2%), and 41–50 years (21.8%; Ariyabuddhiphongs 2006).

Education

Although gambling in general increased with education, lottery gambling follows the opposite trend (Brown and Kaldenberg 1992; Clotfelter and Cook 1989b; Clotfelter et al. 1999). In the U.K., frequency of lottery play was also negatively correlated with general education (Rogers and Webley 2001), a finding later confirmed in a nation-wide study (Forrest and Gulley 2009). At the country level, countries with higher levels of education sold fewer lottery products (Kaizeler and Faustino 2008).

Table 1 Relationships between age groups, and percent of lottery gambling and mean individual lottery involvement

	Age groups				
	18–30	31–40	41–50	51–60	61+
Percent of lottery gambling	68	70	69	66	55
Mean individual lottery involvement in \$/year	234	382	321	336	424

Source: Welte et al. (2002)

SES

The inverted U-shape distribution of lottery gamblers among five SES quintiles (low, 2nd, 3rd, 4th, and high) showed larger proportions of lottery gamblers in the 2nd and 3rd quintiles (70% each), whereas the low, 4th, and high quintile accounted for 61, 65, and 63% respectively (Welte et al. 2002; Table 2). The amounts of participation tended to be high at the low and the 3rd quintile at \$400 and \$435, and low at the 2nd, 4th, and high quintiles at \$353, \$256, and \$176 respectively (Welte et al. 2002). Almost two thirds of lottery gamblers in Thailand (61.3%) were in low income bracket, earning almost a quarter less than the average monthly salary (Ariyabuddhiphongs 2006).

At country level, if per capita GDP was used as a proxy of SES an inverted U shape relationship was observed between per capita GDP and per capita sales of lottery products (Kaizeler and Faustino 2008).

The examination of the relationship between lottery buyers' SES and their lottery gambling has produced strong criticism. Thus, the states were accused of using their power to fleece the poor (Wisman 2006), and using counterfactual thoughts, such as high personal involvement and perceived proximity of actual outcome, in the marketing of lotteries (Landman and Petty 2000). State lotteries were found to foster income concentration, and states with lotteries had higher levels of income inequality than those states without a lottery (Freund and Morris 2005). Sales data of lotteries from 39 states over 10 years showed a strong and positive relationship between sales and poverty rates (Blalock et al. 2007). Lottery sales increased with jackpot size and the increase was larger in areas with more economically disadvantaged populations (Guryan and Kearney 2008). These results provide support for the theory of demand for gambles (Nyman 2004).

Without doubt, lotteries are attractive to poor people. Lottery play in Cameroon was an answer to the economic crisis that had plagued the country for some years (Brenner and Lipeb 1993). The least wealthy and African American respondents were more likely to lose a higher proportion of their respective incomes purchasing lottery tickets and engaging in pari-mutuel betting than wealthier respondents and whites (Lang and Omori 2009). Even people who are made to feel poor gamble in lotteries; participants were more likely to purchase lottery tickets when they were primed to perceive that their own income was low relative to an implicit standard (Haisley et al. 2008).

Lotteries' Potential Addictiveness

The Diagnostic Statistical Manual-IV scale (DSM-IV; American Psychiatric Association 1994), and the South Oaks Gambling Screen (SOGS; Lesieur and Blume 1987) are the main instruments used to assess pathological lottery gambling.

Table 2 Relationships between SES, and percent of lottery gambling and mean individual lottery involvement

	SES (quintiles)				
	Low	2nd	3rd	4th	High
Percent of lottery gambling	61	70	70	65	63
Mean individual lottery involvement in \$/year	400	353	435	256	176

Source: Welte et al. (2002)

Negative effects of lottery gambling were brought to the attention of researchers (Lorenz 1990), and studies from various countries have shown the potential addictiveness of lottery gambling. Problem gambling was early on conceptualized to proceed from gambling to loss of control over gambling to negative consequences (Hraba et al. 1990). Later research utilized the DSM-IV to assess the addictive potential of lottery gambling. The introduction of a national lottery in the United Kingdom led to a pronounced increase in average gambling expenditure (Grun and McKeigue 2000). The endorsement of the DSM-IV criteria increased significantly at 6 months after the introduction of the U.K. national lottery and remained at that level at the 12 month follow-up (Shepherd et al. 1998).

Larger percentage of Thai lottery gamblers who held superstitious beliefs exhibited more symptoms on the DSM-IV scale and the SOGS scale than did the lottery gamblers who did not hold superstitious beliefs (Ariyabuddhiphongs et al. 2009). German pathological lottery gamblers differed significantly from non-pathological lottery gamblers on the diagnostic criteria for addiction (Grusser et al. 2007). Three percent of the employees of a U.S. university health center were classified as problem gamblers and 1.8% as pathological gamblers on the SOGS (Petry and Mallya 2004). Among Austrian sport betters who also played the lottery, one fifth was diagnosed as pathological lottery gamblers; sport betting and lottery play had addiction potential and could be classified as non-substance-related addiction (Plontzke et al. 2004). Lottery gambling was the only form of gambling that separated Australian pathological gamblers from sub-threshold pathological gamblers (Namrata and Oei 2009). In the U.S., lottery, card, and bingo gamblers carried a moderately high risk of pathological gambling (Welte et al. 2004), and gamblers who lived close to a lottery outlet were most likely to have gambled frequently (Welte et al. 2006).

Pathological lottery gambling has also been assessed with other instruments. Norwegian gamblers who were classified as non-problematic on the NORC Diagnostic Screen (NODS) pointed to the lotteries as their most important game (Bakken et al. 2009). Pathological lottery and scratch card gamblers reported more obsessions, compulsions, and avoidance behavior than the light gamblers, and also reported having urges to injure themselves and others (Frost et al. 2001). Using the sale of a winning ticket in the zip code and the relationship between present and future purchases as an index of addiction, Guryan and Kearney (2009) found that roughly half of the initial increase in lottery purchase was maintained and 40% of the increase was maintained 18 months later. Canadian instant ticket buyers reported one or more indicators of the Canadian Problem Gambling Index for problem gambling (Papoff and Norris 2009).

The relatively small number of pathological lottery gamblers among the population has cast doubts on the extent of pathological lottery gambling, at least in the Netherlands. Although at-risk players of the Dutch instant lottery were more likely to come from a poor socio-economic background (Hendriks et al. 1997), scratch cards were later found to have a very low addiction potential among adults in the Netherlands, given the relatively small amount of money they spent (DeFuentes-Merillas et al. 2002), and the findings were confirmed in a survey 2 years later (DeFuentes-Merillas et al. 2004).

Adolescent Lottery Gambling

Two out of three underage youths in the U.S. and Canada gambled for money, and lotteries dominated legalized forms of gambling among juveniles in both countries (Jacobs 2000).

Adolescents' lottery gambling may be traced to their parents' gambling behavior: parental gambling behavior predicted college students' lottery gambling (Browne and Brown 2001); and adolescents with significant gambling problems perceived higher parental lottery gambling compared to non-gamblers and social gamblers (Felsher et al. 2003). There was a significant relationship between parents' buying scratch cards and the children's scratch card buying behavior (Griffiths 2000). College students' lottery gambling was related to the gambling of their parents and their best friend (Hira and Monson 2000). One of the best predictors of adolescents' participation in the U.K. national lottery online games was household participation (Pugh and Webley 2000); and the parents bought most lottery tickets and scratch cards for their children (Ladouceur et al. 1998; Wood and Griffiths 1998).

Young gamblers maintain cognitive biases similar to adult gamblers. They have misconceptions related to the belief in luck and the laws of probability (Wood et al. 2002). As they grow older they use cognitive heuristics underlying the randomness concept (Herman et al. 1998). Their personal beliefs that gambling is a good idea, their subjective norms, and perceived behavioral control are an accurate predictor of their lottery gambling activities (Wood and Griffiths 2004). They see lottery and scratch card gambling as associated with winning money, socialization, excitements (entertainment, the fantasy of winning, and the "buzz"), personal choice, luck, chance, and social problems (Wood and Griffiths 2002).

Lotteries are addictive for adolescents as for adults, and adolescents exhibit similar behavior as addicted adults. Youths with gambling problems gambled primarily with lottery products and exhibited pathological gambling behavior, such as chasing, similar to adults addicted to other forms of gambling (Felsher et al. 2004a), and met the DSM-IV criteria for pathological gambling on scratch cards (Griffiths 2000).

Life After Winning Lotteries

What happens to people who have won large amounts of money from lotteries is an interesting topic of research. According to myth, lottery winners are predominantly working class and poor, and once they become millionaires they quit their jobs, become spendthrifts and lose all their money (Kaplan 1987). This myth is based on anecdotal descriptions of some winners from the working class who, after having won millions of dollars, embark upon ill-advised investments and end up in debts (Bankrate.com 2009). Also, early empirical research does not point to the positive effect of lottery winning: lottery winners are not different from the control group in the ratings of their happiness (Brickman et al. 1978), and there are winners who are hospitalized for depression after winning lotteries of over 1 million deutsche marks (Nissle and Bschor 2002).

Reality does not confirm the myth. Lottery winners seem to be well adjusted, secure and generally happy: they come from various education and employment backgrounds, tend to earn higher incomes than the general population, continue working regardless of the amounts they win, and do not spend money lavishly but do give large amounts of winnings to their children and their churches (Kaplan 1987). Winners also did not increase the amount of money they spent on lotteries after winning, and rarely engaged in other forms of gambling (Kaplan 1988). Research conducted in Europe support Kaplan's findings. Lottery winners paid off their debts and shared their winning with their children. Their betting before and after winning lotteries was modest; their experiences with winning were largely positive; and their life quality was either stable or had improved (Eckblad and von de Lippe 1994). A comparison was made in the U.K. between a group of lottery winners of

moderate amounts with two control groups—no-win and small-win groups. Results showed that the moderate winner group exhibited significantly better psychological health and the mental well-being was still evident 2 years after the lottery win (Gardner and Oswald 2007).

To work or not to work after a lottery win is another post-winning research topic. The winners' tendency to continue working depended on their social desirability (Snir and Harpaz 2002), the extent to which work was central to their life, and the amounts they won (Arvey et al. 2004). A 2005 survey of Swedish lottery winners suggested that the large windfalls did not undermine the winners' willingness to continue working (Furaker and Hedenus 2009). The majority of the German lottery millionaires did not quit their job (Lau and Kramer 2005). The increased wealth however changes the winners' attitudes. Lottery-induced wealth increased hostility toward estate taxes, marginally increased hostility towards government redistribution, but had little effect on broader attitudes concerning economic stratification or the role of government as a provider of social insurance (Doherty et al. 2006). College students indicated that had they won lottery changes to themselves would be more positive than changes to others (Nelson and Beggan 2004).

Conclusion

Empirical knowledge on lottery gambling has increased significantly over the past decade. Recent literature on lottery gambling involving numbers games, lotto, and scratch cards has provided three tentative answers to the question as to why people buy lotteries: some people do not behave in a rational way while gambling on lottery; lottery gambling is for fun; and lotteries are so common they are not viewed as gambling. Lottery gambling theories, classified into one that deals with judgment under uncertainty and another that deals with irrational beliefs, continue to be the theories of choice in lottery gambling research. Theoretical frameworks other than those of cognitive theories, such as social cognitive theory and theory of planned behavior, have been introduced in lottery gambling research. Dimensions of personality have also been found to relate to lottery gambling.

The demographic profile of lottery gamblers has changed slightly. The relationship between age and lottery participation is no longer in an inverted U-shape. People of all ages play lottery and although the 61+ age group has the lowest rate of participation in lottery gambling their mean individual lottery involvement is the highest. Education remains negatively related to lottery gambling. An inverted U-shape relationship is found between SES and lottery gambling and the large amounts of participation come from the low and the third SES quintiles. The poor are still the leading patron of the lottery and even the people who were made to feel poor buy lotteries. The legalization of gambling has seen a significant increase of young people gambling, particularly in lotteries, and the best predictor of their lottery gambling is their parents' lottery participation.

Studies from various countries indicate the potential addictiveness of lottery gambling. Young people exhibit the same cognitive biases and become addictive to the lottery as do adults. Whereas the myth portrays a picture of the lottery winners quitting their jobs, recklessly spending the money they have won, and losing all their money, the lottery winners in reality tend to continue working regardless of the amounts they have won and share their money with their children and churches.

Suggestions for Future Research

Much remains to be done in future research. This review identifies possible topics in the theory application, methodology, demographic and psychological characteristics of lottery gamblers, cross-cultural research, and addiction.

Theory Application

Social cognitive theory model (Bandura 1986) proposes three two-way interactions among person, environment, and behavior variables. The model has been used in studying lottery gambling (Ariyabuddhiphongs 2006); opportunities exist for research using this model, such as one that examines the effect of lottery gambling of friends and family members on the gambler's cognition and behavior. Studies of gambling motivation are not likely to be valid unless person and environment factors are taken into account (Griffiths and Delfabbro 2001).

There are also opportunities for research to integrate theory of judgment under uncertainty and cognitive theory of gambling. For example, it is possible that the selection of numbers and the belief in good luck are linked; after having selected their numbers the players may refuse to trade or sell their tickets because of their belief in good luck.

Methodology

Most lottery gambling research is cross-sectional. Longitudinal research involving lottery gambling by young people is needed. Youths participated in other types of gambling (Felsher et al. 2004a) and longitudinal research will throw light on the extent and pattern of their lottery play, the progress of their participation in other types of gambling, and their gambling addiction.

Research on lottery gambling could examine the effect of mediators in the relationships between independent variables and gambling behavior. Mediation is defined as a relationship where an independent variable causes a mediating variable that in turn causes a dependent variable (MacKinnon 2008). The examination of the mediating effects offers a potential to yield information critical to the advancement of theory and practice (MacKinnon and Luecken 2008). The roles of mediating variables have been examined in connection with lottery gambling (e.g. Ariyabuddhiphongs and Phengphol 2008), and offer the potential to increase our understanding of the relationships between independent variables and lottery gambling.

Demographic and Psychological Characteristics of Lottery Gamblers

Studies on demographic and psychological characteristics of lottery gamblers (e.g. Clotfelter et al. 1999; Welte et al. 2002) are still needed to update patterns of behaviors of lottery gamblers. These studies should include variables such as entrapment and rollover effects as mediators; entrapment and rollover effects will explain lottery gambling behaviors of various groups of lottery gamblers. The role of a mediator between demographic and psychological variables, and lottery gambling has been under-explored.

The relationships between personality characteristics, such as the Big Five (Goldberg 1992) or the Five Factor (Costa and McCrae 1985), namely openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism, and lottery gambling are

another promising research area. Extraversion was positively related whereas agreeableness was negatively related to lottery gambling (Balabanis 2002); the relationships of other personality factors such as conscientiousness, openness to experience, and neuroticism with lottery gambling remain to be examined.

Cross-Cultural Research

A gap previously identified by Raylu and Oei (2002) in connection with pathological gambling is found in connection with lottery gambling: most research on lottery gambling tends to be conducted in western countries. Only a few studies were conducted in developing countries such as Thailand. Research on the contribution of cultural variables (Raylu and Oei 2004), and socio-demographic characteristics and legal residential status (Momper et al. 2009) on lottery gambling is also needed.

Addiction

Although studies in the developed countries on the adverse consequences of lotteries may not be conclusive (DeFuentes-Merillas et al 2002), research in a developing country indicates that there are people addicted to lotteries (Ariyabuddhiphongs et al. 2009). More research on potential addictiveness of lottery play is required to clarify the contradictory findings.

Research on prevalence of pathological gambling usually reports the percentage of people who show symptoms of gambling addiction (Stucki and Rihs-Middel 2007). Prevalence studies should include the types of gambling engaged in, particularly various types of lotteries. The number of pathological gamblers in each type of lottery can then be tabulated to show the extent of lottery gambling addiction.

A Modest Proposal

Whether or not it is appropriate for the government to sponsor lotteries (Macauliffe 2006), lotteries will be justified on the basis of the following three reasons: public benefits such as education without income or property tax increases, decrease of illegal gambling, and the voluntary nature of lotteries (Gribbin and Bean 2005). Lotteries have been with us for a long time and it is likely that they will remain with us for a long time to come. There is thus a need for the protection of people who are vulnerable, such as youth and older adults, from the adverse effects of lottery gambling. Because of lotteries' easy access despite legal prohibitions and their potential addiction, there is a need for responsible social policy and prevention programs for youth lottery gambling (Felsher et al. 2004b).

Where voluntary self-exclusion did not prevent problem gamblers from returning to gambling (Faregh and Leth-Steensen 2009), teaching the knowledge of random events, problem gambling awareness and self-monitoring, and coping skills (Turner et al. 2008) may help prevent problem gambling. The illegality of lottery sales to minors and the low probability of winning lottery still need to be made known to lottery players because warning notice seemed to be effective in countering gamblers' misconceptions of the probability of winning (Miyazaki et al. 2001). Lottery sale outlets should be required to display the sign stating that sales of lotteries to minors are illegal. A warning statement on the probability of winning lottery should be printed on the lottery tickets; not simply a statement on one in 14 million probability but a statement that may be more readily understood by laymen such

as “if you bought a ticket every day from birth and lived to be 100 it would take you 383 life times to win a lotto.”

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