# Graphic Gambling Warnings: How they Affect Emotions, Cognitive Responses and Attitude Change

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**Abstract** The present study focuses on the effects of graphic warnings related to excessive gambling. It is based upon a theoretical model derived from both the *Protection Motivation Theory (PMT)* and the *Elaboration Likelihood Model (ELM)*. We focus on video lottery terminal (VLT), one of the most hazardous format in the gaming industry. Our cohort consisted of 103 actual gamblers who reported previous gambling activity on VLT's on a regular basis. We assess the effectiveness of graphic warnings vs. text-only warnings and the effectiveness of two major arguments (i.e., family vs. financial disruption). A 2 × 2 factorial design was used to test the direct and combined effects of two variables (i.e., warning content and presence vs. absence of a graphic). It was found that the presence of a graphic enhances both cognitive appraisal and fear, and has positive effects on the Depth of Information Processing. In addition, graphic content combined with family disruptions is more effective for changing attitudes and complying with the warning than other combinations of the manipulated variables. It is proposed that ELM and PMT complement each other to explain the effects of warnings. Theoretical and practical implications are discussed.

**Keywords** Warning arguments · Image (graphic warning) · Pathological gambling · Emotion · Information processing · Attitude change

## Introduction: What Persuasive Strategies to Curb Gambling Problems?

Video lottery terminals (VLT's) have been found to be the most dangerous form of gaming (Griffiths 1990). Excessive gambling behavior is strongly associated with adverse social

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and public health outcomes (Azmier 2005). Problem gambling leads to greater negative emotional outcomes, in particular financial and family disruptions (Hodgins et al. 2002), which can lead to suicide.

Governments and public health managers provide gamblers with hotline services and personal counseling. Financial disruptions and negative emotional outcomes of gambling are the most common problems mentioned on these hotlines (Hodgins et al. 2002). Despite the importance of such disruptions, few studies have explored the potential effects of these outcomes as elements of the arguments employed in warnings. The reviewed literature leads us to hypothesize that mentioning such outcomes in warnings may enhance protective behavior.

Verbal arguments may not be sufficient to convey the message of danger to gamblers, as shown by the literature on warnings. Consequently, we test the hypothesis that graphic warning may enhance gamblers' cognitive, emotional and behavioral responses.

The purpose of this paper is to explore the potential direct and combined effects of two variables potentially affecting attitude toward gambling and compliance intent among actual VLT gamblers, that is, warning content (i.e., family vs. financial disruptions caused by excessive gambling) and graphic-vs. text only warning.

Our research questions are the following:

1. Which type of content will be more effective at promoting attitude change and compliance intent among VLT players?
2. Do graphic pictures increase the effectiveness of such warnings?
3. Is there a combination of content and (presence vs absence of) graphic pictures that proves to be more persuasive?

## Literature Review: Effects of Graphic Warnings from Two Theoretical Perspectives

### Content of Prevention Messages

Excessive gambling is a growing public concern in many countries, particularly in Canada (Korn and Shaffer 1999; Azmier 2005) and the United States (Netemeyer et al. 1998). Messages aiming at changing potential hazardous behaviors take the form of posters, advertisements, brochures and responsible gaming features on the gambling machines (Wynne and Stinchfield 2004).

However, most strategies and studies focus on correcting irrational cognitions (Miyazaki et al. 2001; Cloutier et al. 2006; Gray et al. 2007), such as those related to special skills for winning (Ladouceur et al. 2000a) and illusion of control (Langer 1975).Such strategies assume that changing gamblers' wrong cognitive assumptions will reduce pathological gambling (e.g. Floyd et al. 2006). Such studies pose some problems, in particular, the fact that participants are students, not gamblers, and the degree of pathological gambling is not measured. More importantly, these studies focus solely on cognitive biases and do not take into account emotional responses to warnings. Fear caused by threatening warnings has been proved to be efficient in the case of gambling warnings. Munoz et al. (2010) found that gambling warnings had to be threatening to increase cognitive responses, which in turn affected attitude change. Threat can be conveyed through graphic warnings and/or verbal arguments.

In the next paragraphs we examine how the tenets of Elaboration Likelihood Model and Protection Motivation Theory are relevant to our understanding of the persuasive effects of warnings.

Elaboration Likelihood Model (ELM)

ELM proposes that receivers of persuasive messages may take two routes to persuasion, that is, the central route or the peripheral route. In the central route, individuals careful scrutinize the message arguments. For this to occur, message receivers have to be characterized by adequate levels of both motivation and ability to process the message (Petty and Cacioppo 1986).

Munoz et al. (2010) showed that only 11 % of gamblers had some form of cognitive responses to it, while 40 % of the subjects thoroughly scrutinized the messages. In other words, the production of cognitive responses demands not only attention to the message, but also ability to process it. In the present study, we test the hypothesis that the production of cognitive responses to the warning is enhanced by the presence of graphic pictures conveying explicit arguments.

Most studies employing ELM as their theoretical basis, use the number of thoughts as a measure of cognitive response. We propose that this measure is inadequate. All cognitive responses do not bring about the same attitudinal effects. On the one hand, mere paraphrasing of the incoming message generates only mere attention to the message; on the other hand, deep thoughts related to personal experience is related to the fact that the receivers have some personal goals to achieve. As stated by Mick (1992:421), "deep levels (of cognitive responses) have stronger relation with attitude shift". In the field of warnings, a strong correlation was shown to exist between the intensity of cognitive activity triggered by an anti-smoking warning and the intent to stop smoking (Hammond et al. 2004). Similarly, Munoz et al. (2010) showed that the deeper the information processing, the stronger the attitude change and the intent to act accordingly, which confirms a basic tenet of the Elaboration Likelihood Model.

In the next section, we review the tenets Protection Motivation Theory (PMT) in relation to warnings.

Protection Motivation Theory (PMT)

Research on threat appeals is based on models related to protective behaviors such as the Fear Drive Model (Janis and Feshbach 1953; Janis 1967), the Parallel Response Model (Leventhal 1970). These models are concerned with the effects of physical threats on attitude change and behavioral intent. Little research has explored the effects of specific types of threats in the area of gambling warnings.

Most studies in the field of health warnings are based on Protection Motivation Theory (Rogers 1983; Tanner et al. 1991). PMT helps explain how threatening messages work (Rogers 1975) especially in the field of health warnings. PMT proposes that two cognitive appraisals mediate the effects of warnings. The first appraisal includes two initial processes related to the threat, that is, Perceived Severity (i.e., the potential size of the loss) and Perceived Vulnerability (i.e., the likelihood that the recipient can be affected by the loss) (Tanner et al. 1991). The second appraisal is related to the response to the threat, the Self-Efficacy, that is, the degree to which the warning receiver believes he/she can cope with the threat and avoid the negative consequences of the threat (Bandura 1997), and second, the Response Efficacy, that is, the degree to which the way to cope with the threat is perceived as efficacious.

Motivation to protect oneself is aroused if the message receiver believes that the threat is serious and personal *and* that h/she can cope with it, which triggers the intent to perform the desired behavior (Boer et al. 1993), such as, reducing or stopping excessive gambling behavior.

Expanding on this line of research, we seek to assess the effects of graphic warnings that accompany two different messages raising the issue of long-term negative personal outcomes and how they might impact cognitive as well as emotional responses. Effects of graphic warnings can be interpreted from both ELM and PMT, as shown in the next section.

Use of Graphic Warnings

Pictures are used in advertising to attract receivers attention to the message itself, as pointed out by Pieters and Wedel (2004: p. 44): "The pictorial has an intrinsic tendency to capture a substantial amount of attention, independent of its surface size". That's the role expected from peripheral cues in ELM. However, pictures also influence consumers evaluations of products (Peracchio and Meyers-Levi 2005), which is the role of central cues. Miniard et al. (1991:104) pointed out that pictures used in advertisements may enhance cognitive activity, as long as "they elicited thoughts germane to the product itself". In the case of warnings, it can be proposed that pictures elicit a higher level of cognitive activity as long as pictures are involving the receivers (i.e., the gamblers) in problems that are relevant to them.

The warning literature tends to support this proposition. First, graphic warnings have been shown to reduce smoking intent more effectively than text-only warnings (e.g., Golmier et al. 2007). Second, anti-smoking warnings with fear appeals conveyed by graphic pictures work quite well (Hammond et al. 2007), especially when they depict health consequences of smoking (Kees et al. 2006: 220). In other words, pictures are more than a peripheral cue designed to enhance attention. They may also enhance cognitive responses if they are perceived as appropriately connected to the central message.

In the next section we propose a set of hypotheses related to the effects of warnings content and pictures on health-related attitudes and behaviors in the gambling setting. These hypotheses stem from Elaboration Likelihood Model (ELM) and Protection Motivation Theory (PMT).

## Research Hypotheses

Using PMT in the field of gambling behavior, Munoz et al. (2010) found that threatening messages positively impact on attitude change, *as long as* warnings enhance cognitive responses, which in turn enhances Self-Efficacy. This combines the basic tenets of ELM and PMT. The hypotheses stemming from ELM hold that Depth of Information Processing is enhanced by involvement, that is, when receivers feel that the gambling message is important to them. The hypotheses stemming from PMT are based on the idea that warning-driven fear also enhances the cognitive activity.

The first set of hypotheses stems from PMT. Basically, we propose that cognitive appraisal is a necessary precondition to assess the danger of gambling with VLT.

Hypotheses Derived from PMT

**Hypothesis 1**  Compared to VLT players exposed to financial disruption content, VLT players exposed to family disruption content experience higher Perceived Severity and higher Perceived Vulnerability.

**Hypothesis 2** Compared to VLT players exposed to text-only warnings, VLT players exposed to graphic warnings experience higher Perceived Severity, higher Perceived Vulnerability, stronger negative emotions (fear) and deeper information processing.

Hypotheses Derived from ELM

**Hypothesis 3** High-involved subjects presented with a graphic warning, will experience both more fear and deeper information processing than low-involved subjects.

ELM leads us to hypothesize that the deeper the gamblers' information processing, the more significant their attitude change toward gambling. PMT lead us to hypothesize that attitude change also depends on two other variables, that is, Response Efficacy and Self-Efficacy. Finally, attitude change is hypothesized to affect behavioral intent.

**Hypothesis 4** Depth of Information Processing, Response Efficacy and Self-Efficacy affect positively attitude change.

**Hypothesis 5** The more important the attitude change, the stronger the intent to comply with the warning.

*Hypothesis Related to Mediation Process:*
The last hypotheses deals with the mediating role of Response Efficacy and Self-Efficacy between Depth of Information Processing and Attitude Change. It is assumed that Attitude Change results from a higher level of DIP as proposed by ELM *and* by a combined effect of Response Efficacy and Self-Efficacy, (which are both enhanced by DIP as proposed in H4)

**Hypothesis 6** Response Efficacy and Response Efficacy mediats the relation between DIP and Attitude Change.

**Method**

Participants

The cohort consisted of 103 adult gamblers 60 % of them being males, since this is the proportion of excessive gamblers. Each subject received a $20 gift card from a pharmacy for their participation in the project. The mean age of the sample was 45 years (a range of 18 to over 65 years of age) (see Table 1). A vast majority of participants (88.6 %) reported having engaged in VLT gambling in the past month; 50 % gamble on VLT's at least one a week.

Experimental Design and Materials

A 2 × 2 factorial design was used to test the hypotheses: content of the threat (financial disruptions and family disruptions) × graphic picture (presence vs. absence). The choice of the content of the threat, that is either financial or family disruptions, derives from previous studies (Hodgins et al. 2002; Munoz et al. 2010) showing that gamblers were sensitive to these two types of disruption. The threat intensity was checked for these two types of content (family and financial disruptions) using two items on a 9 point scale (i.e. how threatening this message can be for you?). Appendix shows the arguments used in the family-versus-financial manipulation.

**Table 1** Sample characteristics (N = 103)

| Variable | Level | Family disruptions without image (n = 29) | Family disruptions with image (n = 24) | Financial disruptions without image (n = 27) | Financial disruptions with image (n = 23) |
|---|---|---|---|---|---|
| Gender | Women | 37.9 | 45.8 | 40.7 | 34.8 |
|  | Men | 62.1 | 54.2 | 59.3 | 65.2 |
| Age | 18–24 | 10.3 | 0.0 | 7.4 | 13 |
|  | 25–34 | 24.1 | 12.5 | 7.4 | 8.7 |
|  | 35–44 | 17.2 | 20.8 | 22.2 | 17.4 |
|  | 45–54 | 37.9 | 33.3 | 33.3 | 39.1 |
|  | 55–64 | 10.3 | 20.8 | 14.8 | 13 |
|  | 65+ | 0.0 | 12.5 | 14.8 | 8.7 |
| Marital status | Single | 51.7 | 58.3 | 55.6 | 65.2 |
|  | Married | 20.7 | 20.8 | 14.8 | 8.7 |
|  | Divorced | 17.2 | 20.8 | 18.5 | 21.7 |
|  | Widowed | 10.3 | 0.0 | 11.1 | 4.3 |
| Education | Elementary | 0.0 | 12.5 | 3.7 | 8.7 |
|  | Secondary | 34.5 | 29.2 | 44.4 | 47.8 |
|  | College | 24.1 | 37.5 | 37 | 17.4 |
|  | University | 27.6 | 20.8 | 14.8 | 17.4 |
|  | No answer | 13.8 | 0.0 | 0.0 | 8.7 |
| Annual income | Less than 15,000 | 20.7 | 20.8 | 18.5 | 34.8 |
|  | $15,001–39,999 | 44.8 | 58.3 | 55.5 | 34.8 |
|  | $40,000–59,999 | 20.7 | 0.0 | 7.4 | 8.6 |
|  | $60,000–79,999 | 3.4 | 16.7 | 7.5 | 4.5 |
|  | $80,000—or more | 0.0 | 0.0 | 3.7 | 4.3 |
|  | No answer | 10.4 | 4.2 | 7.4 | 13 |

The other independent variable manipulated was the presence (vs. absence) of a graphic. The graphic picture was inspired by a brochure used in a study by Ladouceur et al. (2000b), where a VLT was depicted as a monster eating a gambler. We expanded on their idea by showing circles on the VLT screen that depicted the negative (financial or family) outcomes that gamblers might suffer from gambling. The picture was designed by a professional artist. Appendix shows the picture used in the presence (vs. absence) of picture manipulation.

Dependent Variables

*Cognitive Variables Related to PMT*

The four cognitive variables in PMT were adapted from Maddux and Rogers (1983) and Laroche et al. (2001). Perceived severity and Perceived probability were measured by a 7-point scale were 1 (strongly agree) and 7 (strongly disagree). Response efficacy and self-efficacy were also each measured on a 7-point scale.

*Emotions (Fear)*

The original scale, called Fearfulness (Maheswaran and Meyers-Levy, 1990), was adapted from Laroche et al. (2001). Our scale of five items measured emotional response: "This message makes me feel fearful," "It makes me feel anxious," "It makes me feel nervous". We measured fear on a scale from 1 (not at all) to 9 (to a great extent).

*Depth of Information Processing*

We used the procedure proposed by Petty and Wegener (1999) and Mick (1992), who suggested having subjects list their thoughts after being exposed to the warnings. Two M.S. students, acting as blind judges, classified the evoked thoughts into two main groups: quantitative data (i.e., number of thoughts listed by each participant) and qualitative data (including the four categories described by Mick 1992). The four categories ranged from surface thoughts, in which there are no personal inferences, to deep thoughts, where personal inferences occur spontaneously.

*Attitude Change*

This scale (Reichert et al. 2001) was created to measure the perceived cognitive change associated with the persuasiveness of the message. The scale was adapted for use in this study. It was applied to four items (e.g., "Did the warning cause you to think differently about your gambling behavior?" and "How much did the warning cause you to want to make changes in how you behave regarding gambling?") rated from 1 (strongly disagree) to 7 (strongly agree).

*Behavioral Intent*

This construct was measured with five items in two dimensions: present and future behavioral intent (Maddux and Rogers 1983). Two items were negative statements emphasizing intent for the present and three items were positive statements emphasizing intent for the future.

Other Measures

*Canadian Problem Gambling Index (CPGI) (Ferris et al. 1999)*

We used only the problem gambling assessment, which includes nine items to measure four behaviors and five consequences (Schrans et al. 2004).

*Issue Involvement*

This scale used measures the degree to which receivers of a message feel that the issue of the message is important to them (Cox and Cox 2001). This scale is frequently used in advertising research. It was adapted to measure involvement with the warning (e.g., "I got involved in what the warning had to say"; "The warning related content that seemed relevant to me"). The scale has six items rated from 1 (strongly disagree) to 7 (strongly agree).

Procedure

Data collection lasted 3 months during the summer of 2008. Once our research project was approved by our university ethics committee, we assembled a cohort of 103 participants through advertisements in the local press and contacts with some organizations that help individuals who are at risk for or are currently experiencing gambling problems. Each subject gave his/her informed consent before participating in the study. To protect the privacy of participants, informed consent was kept separate from the questionnaire, which did not include any personal data.

For an individual to be included in the study sample, they had to have been gambling on VLT's at least once a month. Subjects received a questionnaire. The first part captured the most-used games and their frequencies; it also gathered data for the index of pathological gambling. The second part of the questionnaire proposed a warning matched to their treatment condition (with a visual graphic either included or not) and a blank space allowing people to write anything that came to mind. The third part captured the emotions triggered by reading the warning, warning message involvement, attitude change, and PMT cognitive appraisal, and behavioral intent. The fourth and last part of the questionnaire collected demographic data. After the respondents had completed it, they were debriefed, handed a hard copy of the consent form and thanked for their participation.

Findings

Sample socio-demographic characteristics are shown in Table 1: none of them is significantly related to the manipulated variables, meaning that the sample is homogeneous. The quantitative data was analyzed by performing a series of ANOVA's, ANCOVA's and MANOVA's. Linear regression was also required in some cases. As for the mediation test, we employed the method proposed by Preacher and Hayes (2007), as shown below.

Internal Consistency

A series of factor analyses was performed on the scales. All factor analyses showed that one single factor explained more than 68 % of the variance for all the scales used in this study. In the case of Perceived Severity and Perceived Vulnerability, we found that over 72 % of the variance was explained by only one single factor. All Cronbach's alphas were satisfactory.[1]

Hypotheses Testing

*Hypotheses Derived from PMT*

It was hypothesized (H1) that compared to VLT players exposed to financial disruption content, VLT players exposed to family disruption content experience higher Perceived Severity and higher Perceived Vulnerability. A MANOVA indicated that the content of the warning, (i.e., financial vs. family disruptions) had no significant differences on both

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[1] Emotions = 0.91; Involvement = 0.88, Perceived Severity = 0.76, Perceived Vulnerability = 0.81; Coping Response Efficacy = 0.84; Self Efficacy = 0.80; Attitude Change = 0.67; Intent to Comply = 0.71.

Perceived Severity ($F_{1, 99} = 0.154$, $p = .69$ *ns*) and Vulnerability ($F_{1, 99} = 0.57$, $p = .81$ *ns*) H1 is therefore rejected.

Hypothesis 2 suggests that compared to VLT players exposed to text-only warnings, VLT players exposed to graphic warnings experience higher Perceived Severity, higher Perceived Vulnerability, more fear and deeper information processing. Graphic warnings were found to enhance both Perceived Severity ($F_{1, 51} = 12.28$, $p \leq .001$; $M = 6.6$) and Perceived Vulnerability ($F_{1, 51} = 23.96$, $p \leq .001$, $M = 6.5$) (see Figs. 1, 2).

Also, graphic warnings, as compared to text-only warnings, enhance fear ($F_{1, 96} = 11.26$, $p \leq .001$, $M = 6.8$ vs. 5.6), and depth of information processing ($F_{1, 99} = 6.74$, $p \leq .01$, $M = 3.2$ vs. 2.4). H2 is supported.

**H3** holds that when presented with graphic warnings, highly involved gamblers report more negative emotions and deeper information processing than low involved gambles. An ANCOVA where the dependent variable was fear, and the independent variables was the (presence vs. absence of) graphic warning and the covariate variable was involvement, showed that highly involved subjects reported higher levels of fear when exposed to
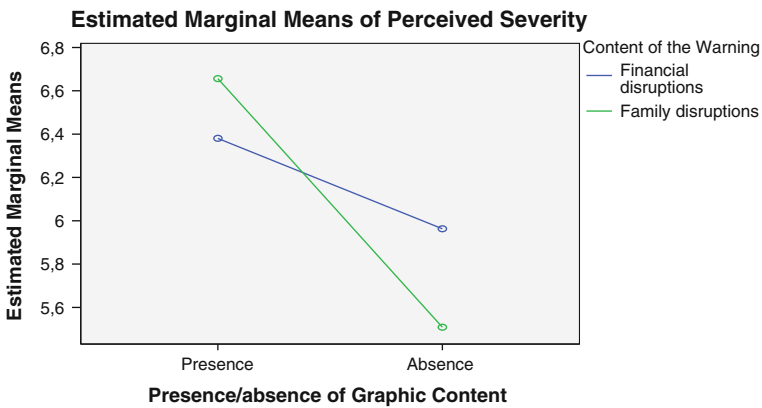


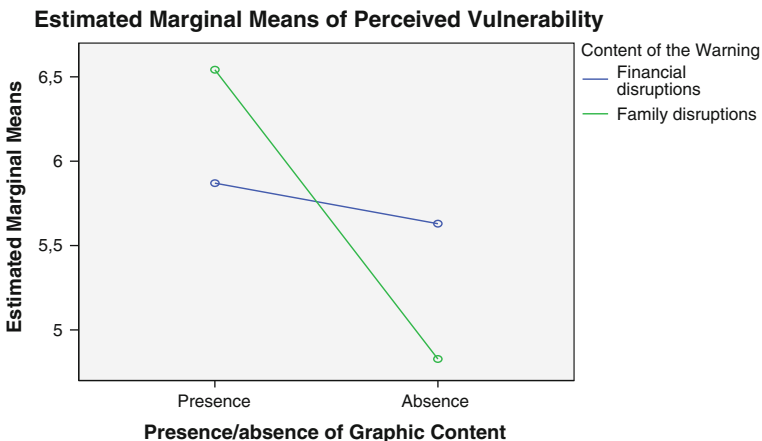**Fig. 1** Perceived severity by the presence/absence of graphic content and type of content



**Fig. 2** Perceived vulnerability by the presence/absence of graphic content and type of content
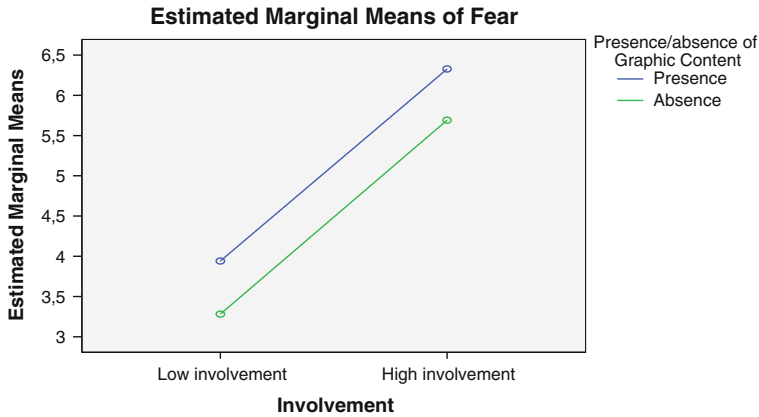
**Estimated Marginal Means of Fear**



**Fig. 3** Fear by involvement in presence of graphic warnings

graphic warnings ($F_{2, 89} = 22.32, p \leq .001; M = 6.4$ vs. 3.9 for low involvement subjects) see Fig. 3.

Highly involved subjects were also hypothesized to demonstrate deeper information processing. Another ANCOVA where the dependent variable was the depth of information processing, the independent variable were the (presence vs. absence of) graphic warning and the covariate variable was involvement, showed a significant relation: ($F_{2, 94} = 5.32$, $p \leq .006$) in the expected direction ($M = 3.2$ for high vs. $M = 1.4$ low involved subjects). H3 is supported.

### Attitude Change and Coping Appraisal

H4 predicted that the antecedents of attitude change were three variables: Response Efficacy, Self-Efficacy and Depth of Information Processing. This hypothesis is tested along with the mediation relation through the Preacher-Hayes procedure described below

### Mediation Test

We tested if Response Efficacy and Self Efficacy mediate the relation between Cognitive Activity (i.e. Depth of Information Processing) and Attitude Change. In other words, we tested if cognitive activity is a sufficient condition to enhance attitudes, as predicted by ELM or if the process is mediated by Self-Efficacy and Response Efficacy as predicted by PMT.

The potential mediating effects of Response Efficacy and Self Efficacy between DIP and Attitude Change were tested using Preacher and Hayes (2007) SPSS macro for multiple mediator models. Bootstrap estimates of the total and specific indirect (or mediating) effects of brand and website attitudes, and their bias corrected and accelerated 95 % confidence interval, were obtained based on 5,000 resamples.[2] Table 2 presents the results of the mediating effect analyses.

The coefficient estimate of the independent variable of Cognitive Activity increased from 0.2979 (regression model with only Cognitive Activity as the independent variable)

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[2] For more details on bootstrap estimates, (see Bollen and Stine 1990; MacKinnon et al. 2004; Preacher and Hayes 2007; Shrout and Bolger 2002).

**Table 2** Results of the analyses testing the mediating effects of self efficacy and response efficacy on the relation between cognitive activity and attitude change

|  | Coefficient estimate | Standard error | T Value | p Value |
|---|---|---|---|---|
| Step 1: Total effect of type of cognitive activity on attitude change | | | | |
| Cognitive activity | 0.3860 | 0.1318 | 2.9289 | 0.0042 |
| Step 2: Effects of type of cognitive activity on the mediators | | | | |
| On response efficacy | 0.3424 | 0.1217 | 2.8135 | 0.0059 |
| On self efficacy | 0.1533 | 0.1394 | 1.0996 | 0.2742 |
| Step 3: Direct effects of the mediators and cognitive activity on attitude change | | | | |
| Response efficacy | 0.2404 | 0.1122 | 2.1415 | 0.0348 |
| Self efficacy | 0.0379 | 0.0980 | 0.3870 | 0.6996 |
| Cognitive activity | 0.2979 | 0.1346 | 2.2140 | 0.0292 |
| Indirect effects | | Estimate | 95 % CI | |
| Total (Response efficacy and self efficacy) | | 0.0881 | 0.0113 | 0.2321 |
| Response efficacy | | 0.0823 | 0.0144 | 0,2242 |
| Self efficacy | | 0.0058 | 0.0230 | 0.0781 |

Bootstrap estimates of the indirect effects based on 5,000 resamples and bias corrected and accelerated 95 % confidence interval

to 0.3860 (regression model with Cognitive Activity and Response Efficacy as the independent variables), yielding a statistically significant *total* mediating effect of Response Efficacy and Self Efficacy (bootstrap estimate = 0.0829; 95 % CI = 0.0130 to 0.2321). The effects of Response Efficacy on Attitude Change are significant (However, only Response Efficacy can qualify as a mediator since in that case the bias corrected and accelerated confidence interval does not include zero (0.0144, 0.2242) whereas in the case of Self Efficacy is includes zero (−0.0230, 0.0781).

The findings of the Preacher-Hayes mediation test lead to two conclusions:

First, in Zhao, Lynch and Chen (2010) typology of mediators, Response Efficacy qualifies as a *complementary mediator*, for the following reasons: the Indirect Effects of the Independent Variable (*DIP*) on the Dependent Variable (*Attitude Change*) through Proposed Mediator, *that is Response Efficacy* (i.e., a × b paths) are significant; the coefficient of Direct Effects of the Independent Variable on the Dependent Variable (i.e., c) is significant ($p = 0.0042$); and the product of the three coefficients(a × b × c) is positive (since all coefficients are positive). A *complementary mediator* "overlaps with Baron and Kenny's partial mediation" as stated by Zhao et al. (2010:200), that is, a mediation accompanied with direct effects.

Second, H4 is partially supported, since DIP and Response efficacy affect Attitude Change significantly (respectively: $\beta = 0.428$; $p = .003$; $\beta = 0.342$; $p = .27$) Self-Efficacy ($b = 0.011$; $p = .911$).

### Present and Future Intent to Comply

A MANOVA was performed where the dependent variable were the present and future intent to comply, the independent variable was attitude change and the covariates variables were the manipulated stimuli. A significant two-way interaction was found. Graphic

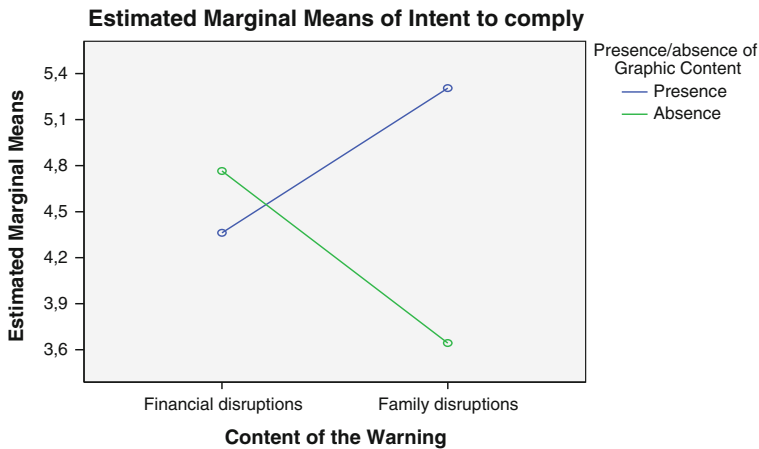**Estimated Marginal Means of Intent to comply**



Fig. 4 Intent to comply associated with the presence of graphic warnings

warnings significantly affected short-term behavioral intent if coupled with family disruption content ($F_{1, 50} = 16.38$, $p \leq .001$);while text-only warnings significantly affected short-term intent if coupled with financial disruption content ($F_{1, 56} = 6.13$, $p \leq .01$) (see Fig. 4). H5 is partially supported.

## Discussion

Ecological Validity of Our Findings

In this study the ecological validity of the findings is enhanced by the fact that we gathered information from actual VLT players. Not surprisingly, the score for pathological gambling in our cohort is high: 78.6 % of participants recognized that they had a gambling problem. This is quite different from previous studies which enrolled only students and non players or players no showing any sign of problem gambling (e.g., Steenbergh 2004; Floyd et al. 2006).

Theoretical Implications

Our study is based on a model derived from two well-established psychosocial theories used in persuasion, especially in the field of health marketing, that is the Elaboration Likelihood Model (ELM) and the Protection Motivation Theory (PMT). It focuses on the potential effects of warnings content and warning format (i.e. graphic vs. text-only warnings). We found that both warning content and format affected directly or interactively the dependent and mediating variables of our model: cognitive appraisals, emotions, information processing, attitudes and behavioral intent.

Our findings confirm what the research literature on tobacco warnings showed, that is, on the one hand, the verbal content has little impact on attitudes, whereas, on the other hand, the presence of graphic warning does impact them significantly.

The graphic warning also impacts fear felt by highly involved gamblers, which is coherent with the Protection Motivation Theory. The graphic warning also enhances the

Depth of Information Processing of highly involved gamblers, which is not coherent with the Elaboration Likelihood Model, which proposes that graphic picture such as the one we employed are an effective persuasive tool mostly for low involved receivers. Our finding shows that involvement is not a sufficient condition to enhance the Depth of Information Processing. We suggest that graphic pictures makes the arguments more salient and more vivid. It's likely that gamblers exposed to our graphic warning can more easily envision the problems triggered by excessive gambling.

The mediation analysis points out two important findings. First, the significant relation between Depth of Information Processing (DIP) and Attitude Change (AC) is coherent with the Elaboration Likelihood Model, that is, the more the receivers respond cognitively to the incoming warning, the more they change their attitudes toward gambling. However, the mediation analysis shows that the effects of DIP on AC is partially mediated by the Response Efficacy. In other words, the more receivers respond cognitively to the warning, the more they consider that its main proposal (i.e., invitation to seek for help from professionals) makes sense in their case. The Response Efficacy ≥ AC relation is coherent with the Protection Motivation Theory (PMT). In other words, the mediation analysis shows that ELM and PMT produce complementary effects in this complementary mediation.

These findings have important theoretical implications. We built a hybrid model based on both PMT and ELM. PMT predicted the effects of perceived efficacy and self-efficacy. ELM predicted the effects of the Depth of Information Processing. Our findings show that the two models complement each other quite well. Response Efficacy and Self-Efficacy are not sufficient in themselves. Warnings are efficient only as long as they enhance cognitive activity. From a theoretical viewpoint: our findings bring empirical support to the Munoz-Chebat-Suissa model (2010), which allows to better understand the link between cognitive activity and attitude change. More specifically, it is shown that the more receivers think of the message, the more they feel that the response to dangers proposed by the warning is efficient and, consequently change their attitudes toward gambling.

Our model and findings go beyond ELM, in the sense that we show a direct link between involvement and emotions, which is not included in ELM. Higher Involvement leads to greater fear, which increases attention (Tanner et al. 1991). Contrary to what is proposed by ELM, the effects of involvement on attention are not direct as proposed by ELM. They are mediated by fear that arouses cognitive activity. Highly involved individuals are more attentive to warnings because they feel more fear.

As expected, 59 % of the respondents' thoughts were classified in the third and fourth levels of Mick's (1992) subjective comprehension. The thought listing indicates that subjects carefully scrutinized the warnings and felt motivated to think about the negative consequences generated by irresponsible gambling behavior. This aspect confirmed that most participants followed the central route proposed by the ELM.

More Specific Findings

The results of this study support five of our hypotheses, two of which were partially confirmed and two (H1 and H7) of which were rejected. The fact that H1 was rejected confirms that VLT players acknowledge equally the two types of risks associated with VLT's.

Our findings support the hypothesis that attitude change is predicted by two types of factors: an *external* factor, the Response Efficacy and an *internal* factor, the Self-Efficacy. In other words, VLT gamblers change their attitude toward gambling if three conditions are

fulfilled: first, the protection process proposed by the warning to reduce the risks of problem gambling seems efficacious; second, the gamblers feel that can follow the process proposed by the anti-gambling agency; third the warning has triggered enough cognitive activity.

Another important finding is related to the interaction between the warning content and the warning format. In order to increase compliance, the content of financial disruptions has to be coupled with text warnings, while the content of family disruption has to be coupled with graphic warnings.

Our findings show the significant effects of graphic warnings on both emotions and cognitive appraisals. First, Threat is significantly enhanced if warnings include a graphic picture. Second, both cognitive appraisals (Perceived Severity and Perceived Vulnerability) are enhanced by the presence of graphic warnings., which is consistent with studies related to anti-smoking warnings (Kees et al. 2006; Hammond et al. 2007)

This study also suggests that Perceived Vulnerability, not Perceived Severity, triggers fear: a warning enhances fear because gamblers feel that they are likely to be affected by negative effects of gambling not because these effects are highly negative the. The reason is straightforward: even though an event is perceived as extremely severe, its severity has no effects of fear if it is unlikely. Our results are consistent with those from Block and Keller's (1998) study, which challenged the implicit assumption in PMT that perceptions of vulnerability and perceptions of severity are equally weighted across individuals.

Type of Arguments

Family disruption content—which appeals to people's concerns about what would happen to their relations with family members if they continue to place bets on VLT's—coupled with a graphic message cause people to become concerned about the negative outcomes of their gambling behavior. Graphic warnings enhance fear which in turn enhance attention and attitude change. For this reason, its effects on short-term intent to comply are stronger than graphic content on financial disruptions. This is a key finding, because underscoring such a negative outcome may cause players to realize that pathological gambling has an impact on family commitment, which could lead to increased vulnerability toward emotional family disruptions.

Financial disruption is the primary reason people give when calling for help (Hodgins et al. 2002). It was thus expected that this warning content would be more closely related to cognitive activity, which may explain why financial disruption does not require graphic support to catch the attention of VLT players.

Response Efficacy is a significant antecedent of attitude change, while Self-Efficacy is not in terms of Response Efficacy of help-lines, VLT players believe that it works and are able to engage with it. In contrast, Self-Efficacy predicts attitude change only when VLT players were engaged in intense cognitive activity, motivated by the potential danger. This finding is consistent with previous studies dealing with fear and the Self-Efficacy (Witte and Allen 2000).

Practical Implications

Problem gambling is a growing societal phenomenon. Public health managers are increasingly interested in promoting responsible gaming strategies, and they must promote information focused on the PMT appraisals by including content on the financial and

family disruptions caused by excessive gambling in order to keep players well informed about the risks of such behavior.

These warnings need to go beyond fighting irrational cognitions that are not as important as the negative consequences on health. Public health managers should also focus on enhancing both warning contents, that is, family and financial disruption content. These messages may also generate stronger negative emotions and DIP for individuals who need to be reminded of the risks inherent in excessive gambling.

Since the format (i.e., graphic vs. text) of the warning has to be coupled with the content of the message (i.e., family vs. financial disruptions), public health managers should pay attention to the format as well as the content in combination with each other. Both content and format should be tested separately *and* in combination with each other. Financial disruption content does not require the use of graphic messages to be effective, but family disruption content does.

Public health managers may issue messages designed to enhance coping appraisal, particularly those related to response efficacy. They should *not* say simply, "There is help. Call." Instead, they should say "Last month we received three thousand calls because people know they can count on our help."

Limitations

This study has several limitations. First, forced-exposure studies cannot reveal what happens in real settings, such as bars where the level of attention to warnings is reduced by ambient cues (e.g., noise, crowd) and by consumption of alcohol. Many of our subjects were problem gamblers recruited because they were problem gamblers, which may have affected our findings. First, the fact that some of our subjects were receiving some form of psychological treatment may have enhanced their Self-Efficacy. Second, a snapshot study like ours cannot take into account the effects of warnings on attitudes over time.

Avenues for Future Research

Gambling behavior may cause gamblers to lose their sense of reality. Casinos and bars are often bathed in darkness, and this atmosphere is likely to create a continuous state of arousal for gamblers. In such environments (Diskin and Hodgins 1999), processing warnings information is all the more difficult. Research to improve attention from gamblers in such venues is needed.

**Conclusion**

Our study supports the model designed on the basis of both PMT and ELM. Many contributions can be expected from our findings and our modelwork. First, public health campaigns on gambling can be improved by underscoring the negative personal long-run outcomes of such behavior, inasmuch we understand the effects of graphic warnings designed to promote responsible gambling. Second, cognitive appraisal of the threats related to gambling behavior can be enhanced through the use of graphic warnings. Third, this study helps close this gap and open new avenues of investigation, in particular those related to the interaction of graphic message and verbal message.

## Appendix

Stimuli Used in this Study

Description of the warnings employed in the experiment

1. Type of content

"Excessive gambling may cause you financial disruptions bringing you regrets and despair"

"Excessive gambling may harm your family, break down your couple and your home"

Note that the original stimuli used in our study were in French.

Graphic Used in the Study



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