



Optimistic Bias in Physical Activity: When Exercise Flows into Addiction

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Abstract

Background: Traditionally, psychologists have been involved in identifying the minimum amount of physical activity needed to be healthy. Latest research has changed direction and is starting to shed some light on a new trend characterized by excessive physical activity, especially in young adults.

Objectives: This study aimed at examining how an intense physical activity can have detrimental psychological effects and turn into an addiction with possible repercussion on health, especially when individuals continue to have maladaptive behaviors such as smoking and drinking.

Patients and Methods: A convenience sample of 158 participants (female = 101; male = 57) was enrolled, with a mean age of 28 years (SD = 6.09). A questionnaire was administered to evaluate both the optimistic bias in smokers and drinkers and the time spent in physical activity.

Results: Participants showing smoking and drinking behaviors were categorized according to the extent of performed physical activity. Descriptive analyses revealed that 26% of participants were “inactive”, while 8.30% practiced “intense activity” and 8.30% practiced “extremely intense activity”. People who had 7 to 8 hours of physical activity per week estimated the risk of getting bladder cancer as “much below average” ($P = 0.039$). Consistent results were found for stroke ($P = 0.015$).

Conclusions: This study aimed at offering an innovative starting point to examine more closely the role of such mechanism in individuals practicing intense and sometimes excessive physical activity. Our results may offer new hints for researchers working in the prevention and education of adolescents and young-adults.

Keywords: Maladaptive Health Behavior Choice, Optimistic Bias, Physical Activity, Decision-Making

1. Background

The past decades have seen an increasing recognition of the importance of personal health behaviors for the prevention of illness and disability. As extensively discussed in previous studies, health risk perception has no objective meaning per se (1-3), but it is rather a notion strictly connected to individual beliefs, intuitive evaluation, and situational factors (4). In this vein, the risk judgment is characterized by biases activation or cognitive prejudices that can foster suboptimal decisions, such as smoking (5-7), unsafe driving (8), having unprotected sexual behaviors (9), and no use of skin protection (10).

An archetypal cognitive prejudice that occurs in risk perception is termed optimistic bias (11) or personal fable (12). People tend to underestimate the risk related to

negative events when the risk concerns themselves, while they shift their evaluation when the risk concerns other people. The optimistic bias is supported by psychological and motivational factors that lead participants to think they have control over events (illusion of control) and to overvalue the preventive strategies used to counteract unhealthy behaviors (overconfidence). Concerning the latter aspect mentioned, several authors (11) affirmed that habitual smokers systemically underestimate the risk of getting a smoking-related disease, and they overvalue the efficacy of their preventive strategies (for example, physical activity or healthy diet). While optimistic bias has been largely studied in some populations, such as smokers (13, 14), little attention has been paid to other types of populations, such as people who constantly practice intensive physical activity, a phenomenon gaining popularity today, especially

among young adults (24 - 35 years old).

Despite the lay belief that intensive physical activity could help compensate some damages provoked by other unhealthy behaviors, such populations are at higher risk of developing illness and disability. Recent publications have suggested that ultra-endurance exercise may result in the appearance of cardiac cell damage with an impact on the systemic circulation (15, 16). Moreover, concomitant unsafe behaviors such as alcohol consumption or sleeping time reduction are frequent and concur to enhance the risk of illness.

2. Objectives

Consistent with the above issue, the main aim of this study was to evaluate the tendency to overestimate the efficacy of preventive strategies and compensatory behaviors, such as physical activity, in countering the negative side-effects of other maladaptive decisions, such as smoking and drinking in young adults.

3. Patients and Methods

3.1. Participants

The present study was a non-interventional study. The sample size was established according to statistics from Arnett (17) and was measured using G*Power statistical on-line tool (18). To reach a power of 95% and achieve a medium effect size ($d = 0.30$), a minimum of 111 participants was needed to be enrolled (14). The following main inclusion criteria were established: age 18 to 30 years, attending university programs, and being an internet user. The exclusion criteria were the presence of neurological disorders and/or severe psychiatric disorders that could limit the completion of the questionnaire. A convenience sample of 158 participants (female = 101; male = 57) was enrolled, with a mean age of 28 years ($SD = 6.09$). Each participant signed an informed consent form before filling the questionnaire.

3.2. Procedure

Participants were recruited by the newspaper, the internet community, and the institutional mailing list of University of Milan (UNIMI). Participants completed a structured questionnaire including different dimensions organised in 4 sections: 1, demographic and physical parameters; 2, smoking behavior; 3, drinking behavior; and 4, physical activity. The questionnaire was delivered using an online platform named Lime Survey

(www.limesurvey.com). The study was conducted in accordance with the Helsinki declaration (59th WMA General Assembly, Seoul, 2008) and was approved by the institutional review board of University of Milan.

3.3. Instruments

3.3.1. Demographic Characteristics and Physical Parameters

A set of questions was used to collect data on respondent's age, gender, education level, occupation, and health style habits (alcohol consumption, tobacco cigarette smoking, and diet habits), weight, and height.

3.3.2. Physical Activity

This dimension was evaluated using the following item "How many hours do you spend doing physical activity every week?". The response was measured on a 6-point Likert scale: < 1 hour per week (inactive); 1 to 2 hours per week (light activity); 3 to 4 hours per week (moderate activity); 5 to 6 hours per week (vigorous activity); 7 to 8 hours per week (intense activity), and more than 8 hours per week (extremely intense activity).

3.3.3. Smoking and Drinking Status

The number of daily cigarette was assessed by asking participants how many cigarettes they smoked per day. The item was recovered from the Fagerström Nicotine dependence test (19). Drinking status was assessed by asking participants whether they had had a drink in the last thirty days. Habitual intake of alcohol was split into 3 classes: wine, beer, and distillate beverages (vodka, rum, whisky, etc.). In addition, the number of glasses consumed per week was used to evaluate the amount of alcohol consumed.

3.3.4. Optimistic Bias for Tobacco Cigarette Smoking and Alcohol Consumption

To assess the level of optimistic bias, Arnett's questionnaire on young adults has been adapted (17). Four items were used for tobacco cigarette smoking: Item 1, "Most people who smoke for all their lives eventually die from an illness caused by smoking"; Item 2, "I doubt that I would ever die from smoking even if I smoked for 30 or 40 years"; Item 3, "I could smoke for a few years and then quit if I wanted to"; Item 4, "Most people who smoke for a few years become addicted and can't stop."

The 4 mentioned questions used for smoking behavior were adapted to measure the optimistic bias associated with alcohol consumption (17): Item 1: "Most people who drink all their lives eventually die from an illness caused by drinking"; Item 2: "I doubt that I would ever die from drinking even if I drank for 30 or 40 years"; Item 3: "I could

drink for a few years and then quit if I wanted to”; Item 4: “Most people who drink for a few years become addicted and can’t stop.” Participants responded on a 4-point Likert scale (completely agree; slightly agree; slightly disagree; and completely disagree) for both groups of items.

3.3.5. Optimistic Bias Judgement About Cancer and Cardiovascular and Respiratory Diseases

Each enrolled participant was requested to assess the probability of experiencing cancer (lung, liver, and bladder cancer), cardiovascular (stroke), and respiratory diseases (cough, emphysema, and chronic obstructive pulmonary disease) compared to an average target person of one’s own age and sex.

More details about measures and methodology used in the research protocol are published elsewhere (14).

3.4. Statistical Analysis

Because the research on preventive strategies’ overestimation and associated psychological variables in healthy people is a poorly explored topic, we chose to describe the use of preventive strategies and compensatory behaviours cross-sectionally using a purposive sample of young adults.

We obtained descriptive statistics of baseline demographics and physical parameters, smoking behaviour, drinking behaviour, and physical activity. Associations between the level of physical activity and healthy behaviours (smoking and drinking) were tested using chi square for dichotomy and categorical variables. All statistical analyses were conducted using SPSS 20.0 (Version 20.0, IBM, USA, 2014), and P value < 0.05 was considered statistically significant.

4. Results

A total of 75% of participants had a normal BMI (18.5 - 24.9) and 47% reported performing light and moderate physical activity (Table 1). Considering daily cigarette consumption and alcohol intake, 55% of the participants smoked more than 6 cigarettes per day and 74% drank at least 2 glasses of distilled beverages per week. Smokers and drinkers were categorized as “inactive” (26.30%), as practicing “intense activity” (8.30%), or as practicing “extremely intense activity” (8.30%).

Descriptive statistics revealed that people who did 7 to 8 hours of physical activity per week estimated their risk of getting bladder cancer as “much below average” ($\chi^2 = 38.715$, $df = 25$, $P = 0.039$). Similar attitude was reported for other cancer syndromes, such as the risk of getting liver cancer ($\chi^2 = 40.875$, $df = 25$, $P = 0.024$), and for cardiovascular diseases ($\chi^2 = 57.902$, $df = 30$, $P = 0.002$). People who

Table 1. Sample Characteristics for Time Spent for Physical Activity and Body Mass Index

Physical Activity	Time	Total, %
Inactive	> 1 h per week	26.30
Light activity	1 - 2 h per week	24.40
Moderate activity	3 - 4 h per week	23.10
Vigorous activity	5 - 6 h per week	14.70
Intense activity	7 - 8 h per week	8.30
Extremely intense activity	< 8 h per week	8.30
Body mass index	Kilograms	Total, %
Underweight	> 18.5	7.80
Normal weight	18.5 - 24.9	75.80
Overweight	25 - 29.9	12.40

did less than 1 hour and 1 to 2 hours of physical activity per week considered their personal risk as “as average and as of other people”; instead, those with 7 to 8 hours and more than 8 hours of physical activity per week evaluated their risk as “much below average”.

Applying the chi square test, we found a significant association between smokers’ status and physical activity, meaning that intensive physical activity was considered as a protective factor against stroke ($P = 0.015$). Similar trends were observed for drinkers ($P = 0.022$).

5. Discussion

The results in this brief report suggest that optimistic bias is a very strong tendency in subgroups characterized by specific behavioral addiction patterns, such as tobacco cigarette smokers and alcohol consumers. More specifically, the optimistic bias about the risk of cancer or cardiovascular disease is very robust in people who adopt unsafe behaviors, such as smoking, alcohol consumption, and regular and intense physical activity. Our results are consistent with those arising from other studies such as the report done by Green (2003), according to which students who undertake regular physical activity showed a high level of optimistic bias about their risk of developing heart diseases (20). These results are also similar with the ones found in patients with some particular chronic disease (21-23). Results regarding tobacco cigarette smoking are confirmed by previous research studies (24). However, results regarding physical activity appear new and interesting; physical activity might be used as a shortcut to counteract the side effects of alcohol consumption and tobacco smoking behaviors.

This tendency of overvaluing the positive effects of physical activity could be partially explained as a coping

strategy to avoid the motivational conflict between the desire to protect one's health and the pleasure associated with the adopted unhealthy behavior as cigarette smoking and drinking.

In conclusion, the preliminary results of this study may represent an interest point of view for the psychology of addictive behaviors (25, 26) because it has the potential to address new interesting questions in the field of prevention and addiction, which are often characterized by an imprecise boundary. We argue that knowledge about this cognitive bias might contribute towards developing more efficient intervention programs and towards supporting the adoption of healthy lifestyles in young adults (27-29).

5.1. Limitations

The present results are innovative but should be used with caution. Indeed, the study shows some limitations concerning the small sample size that allows descriptive statistics, but no assumptions of causality can be made. Future studies are needed to overcome this limitation.

Footnotes

Authors' Contribution: Marianna Masiero, Silvia Riva, Ketti Mazzocco, and Gabriella Pravettoni study developed the study concept and design. Marianna Masiero, Silvia Riva, and Ketti Mazzocco performed the statistical analysis and interpreted the data. Marianna Masiero, Silvia Riva, Ketti Mazzocco, and Gabriella Pravettoni wrote the paper. All authors approved the final manuscript. Silvia Riva and Marianna Masiero have equally contributed to this work.

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