The effect of testosterone oscillations on men's consumer behavior

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Abstract

From the color to the smell, all aspects that influence the consumer when buying are studied and manipulated whenever possible. Yet, sometimes inherent biological phenomena are not taken into account as much as they should.

In women, the oscillation of female hormones is known to trigger cravings for comforting food during menstruation, and for shopping for clothes or beauty products during ovulation. For men, the role that fluctuations in testosterone plays in their consumption patterns is not so obvious.

Based on the academic literature, an experimental study was carried out to identify, empirically, whether a man's response (in the form of wanting to smoke, drink alcohol or ingest unhealthy foods) differed depending on manipulation-induced drops or rises in testosterone. The results tell us not only that fluctuations in testosterone may induce certain behaviors, but also that the desire to smoke, drink alcohol or eat unhealthy food could significantly be impacted by the following factors: long-term pre-manipulation testosterone production; the frequency of consumption of tobacco, alcohol and unhealthy food; and the participant's perception of the stimuli. Furthermore, evidence shows that testosterone could have both a reward or a comfort effect, depending on the stimulus and frequency of the habit.

This study has important implications for public policy.

Keywords: Testosterone, Consumer Behavior, Reward Effect, Comfort Effect, Hormones, Desires.

Resumo

Desde a cor ao cheiro, todos os aspetos que influenciam o consumidor no ato da compra são estudados e manipulados, sempre que possível. Ainda assim, por vezes, os fenómenos biológicos inerentes não são tidos em consideração tanto quanto deveriam.

Nas mulheres, sabe-se que a oscilação de hormonas femininas provoca desejos por comida reconfortante durante a menstruação, e por compras de roupas ou produtos de beleza durante a ovulação. Relativamente aos homens, não é tão óbvio o papel que as oscilações da testosterona têm nos seus padrões de consumo.

Tendo como base a literatura académica, foi realizado um estudo experimental para identificar, empiricamente, se a resposta de um homem (na forma de desejar fumar, beber álcool ou ingerir alimentos não saudáveis) diferia consoante as descidas ou subidas de testosterona induzidas por manipulação. Os resultados dizem-nos não só que as oscilações da testosterona induziriam determinados comportamentos, mas também que o desejo por fumar, beber álcool ou comer comida não saudável seria significativamente impactado pelos seguintes fatores: a produção de testosterona a longo prazo pré-manipulação; a frequência de consumos de tabaco, álcool e comida não saudável; e a perceção que o participante tem dos estímulos. Além disso, as evidências mostram que a testosterona poderia ter um efeito tanto de recompensa quanto de conforto, dependendo do estímulo e da frequência do hábito.

Este estudo traz implicações importantes para as políticas públicas.

Palavras chave: Testosterona, Comportamento de Consumidor, Efeito de Recompensa, Efeito de Conforto, Hormonas, Desejos.

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1) Introduction

Some studies were made to find associations between circulating testosterone levels and personality traits, as well as performance and other visible and measurable indicators, but not enough were done on consumer behavior (Gutmann, et al.). Nonetheless, understanding the effect of testosterone (or the lack of it) on the mentioned factors may serve as a helpful tool to find patterns on consumption and improve marketing segmentation.

For consumer psychologists and marketing researchers, understanding how men differ from women in their cognition process and consequent reactions to marketing stimuli is essential for anticipating their product choices and preferences (Meyers-Levy and Loken, 2014).

Apart from cognition processing styles, as developed further in the literature review, marketeers may be able to improve their targeting practices by taking into account biometrics, namely the digit ratio 2nd vs 4th finger size (Nepomuceno, et al.).

1.1) Problem Statement and Research Questions

This dissertation's intention is to further empirically investigate whether there is an association between matches outcomes, testosterone and consumption.

To answer the problem statement, it was formed a main research question and four sub-questions as follows:

1) Does a match outcome influence consumers desires?
2) To which extent does winning or losing affect a man's testosterone?
3) Does testosterone have a dual effect (Reward effect & Comfort Effect)? Or majorly rewards effect?
4) Does the importance that a man gives to an event influences his testosterone oscillations?
5) Does an event affect two men with different testosterone production levels the same way?

2) Literature Review

2.1) Hormones on Gender differences

It is commonly known that hormones, specifically the most common steroids (estrogen, progesterone and testosterone), have physical manifestations in someone's body and generate differentiation between both sexes. In a less visible parameter, dimorphisms have been found in the human brain, more specifically in the limbic areas, caused by nothing else but by sexual identity - whether the gender is feminine or masculine. According to the mentioned dimorphisms, the highest concentration of androgen and estrogens receptors is in the amygdala (Osterlund, et al., 2000; Ter Horst, 2010), giving support to the notion that it is expected that different genders imply a different emotional response to hormone alterations (Hampson, et al., 2006; Hoffmann, et al. (2010); Orozco & Ehlers, 1998; Schulte-Ruther, et al., 2008) and, usually, a consequent behavior (Archer, 2006; Fessler, 2003; Gangestad, et al., 2005; Mazur & Booth, 1998).

While women have a menstrual cycle defined and replicated among them (even if it may suffer some variations in hormones' quantity), the process has been clearly studied and measured in the past decades. By simply counting the days and noticing the start of the menstruation phase, it is easy to forecast the ups and downs of estrogen and progesterone. For men, there is no hormonal cycle per se. Apart from the prenatal predisposition for testosterone production (which can vary significantly), this hormone has fluctuations as well in the short term.

Both men and women have testosterone and estrogen, although women's levels of testosterone can be three to seven times lower than men's (Dabbs, 1990; Liening et al, 2010). Higher levels of this testosterone lead linearly more to a typical male development compared to lower levels of this hormone. On the other hand, estrogens, which are present in a higher quantity in women than in men, are not responsible for the femininization process. These demonstrate, therefore, that feminine characteristics are the default in both genders and it is testosterone that will make men differ from women in their development (Meyers-Levy & Loken, 2015). Following this reasoning, it is easier to study the impact of testosterone's high and low peaks in behavior if we focus on men.

Men and women are expected to be less different during women's menstruation (from day 1 to day 7 of the cycle in the image below) where both progesterone and estrogen are at their lowest

levels - the closest resemblance to a man. On the other hand, the phase where most differences are observable is the luteal phase (after ovulation, from day 14 to 28 of the cycle) (Rukavina, 2013).

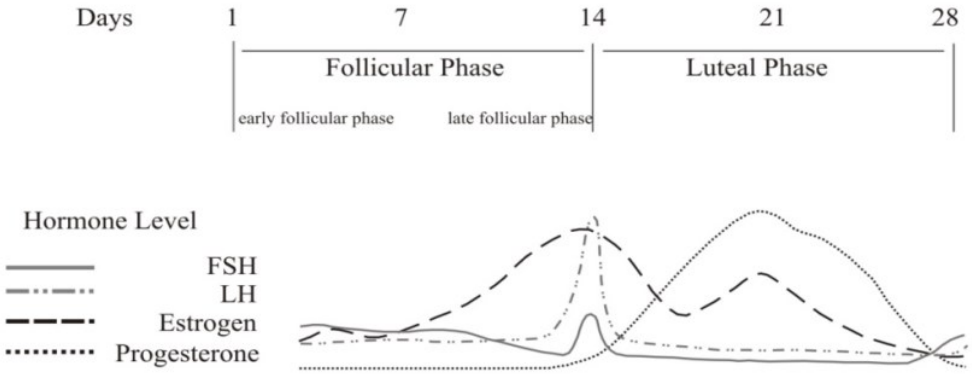


FIG. 1. The standard menstrual cycle (around 28 days).

2.2) The Effects of Prenatal Testosterone

Prenatal testosterone exposure has been attested to have an impact on the brain in the long term, which is reflected in a few typical behaviors, further to be explored below (Archer, 2006; Auyeung et al.,2009; Udry, 2000).

A very clear example of how prenatal exposure contributes to gender differences can be taken from studies made with children playing, where girls with CAH disorder (congenital adrenal hyperplasia - they produce higher levels of androgens than the norm) would naturally exhibit more typical male behaviors on toys preferences (Pasterki et al., 2015). Nonetheless, when comparing boys with and without this disorder (meaning with normal testosterone levels vs. abnormally high testosterone levels) would not show any difference in behavior concerning toys choices.

2.2.1) Testosterone and physical traits

a) The Digit Ratio

Apart from the physical developments during puberty, there are other traits less known by the common public, which can serve as an effective measure of the exposure to prenatal testosterone: the “digit ratio” - the ratio between the length of the index finger (2nd) and the ring finger (4th). Testosterone tends to inhibit the growth of the index finger, meaning that men who were exposed to healthy quantities of this prenatal hormone are expected to have the index

finger shorter than the ring finger, while on women we tend to verify the exact opposite (Lutchmaya, Baron-Cohen, Raggatt, Jnickmeyer, & Manning, 2004).

b) Strength

Another of the visible traits associated with testosterone is strength, as this hormone enhances the anabolic processes that stimulate muscle gain (Sinha-Hikim, Artaza, Woodhouse, et al., 2002). Chiu, Shih and Chen found in 2020 a correlation between testosterone and grip strength, where high testosterone levels were negatively associated with low strength ($p<.001$), with a slight variation on obese people.

2.2.2) Testosterone manifestations on personality and cognition

When it comes to behavior, the main question takes the form of the chicken and the egg order: does levels of testosterone influence the behavior, or does the behavior alter the hormone levels? The answer is both. (Gutmann, Nelson & Fuentes, 2021). Some behaviors and traits will depend on the predisposition to produce testosterone, but short-term behaviors can alter its levels as well, as explained in the points below.

a) Dominance

As disclosed by Luxen (2005), in one of his studies, men demonstrated several conducts related to dominance, and a higher incidence of dominance compared to affiliation (which has been seen more often in women). The study took as well into account one's personality, cultural and situational environment, which did not affect the final results. Nevertheless, it is important to notice that cortisol appears here as a mediator, where high circulating cortisol will inhibit the effect of testosterone (Josephs et al., 2011), further explained in status attainment.

b) Spatial Cognition and Memory

Men with a lack of production of androgens, as in hypogonadism, have less spatial cognition compared to the ones whose levels are in the norm (Janowsky, Oviatt & Orwoll, 1994). And although the exact mechanism of how testosterone impacts spatial cognition is not known, it has been verified that hormonal treatments done through injections of this hormone to older (but healthy) men have shown improvements in spatial cognition and verbal memory (Cherrier, et al. 2001). Even if a man is healthy, it is normal for the body to produce less testosterone as he ages. When reaching the age of 80, on average, approximately 50% of men suffer from hypogonadism (Harman, et al., 2001).

c) Depression

Another effect of testosterone deficiency to be mentioned is depression (Wang, et al. 1996; Burris, et al., 1992; Barrett-Connor, et al., 1999). What is known for *The Rancho Bernardo Study* came to divulge the tendency for depression with aging, especially between 50 and 89 years, being undeniably associated with lower levels of testosterone, independently of the age (between the mentioned range), physical exercise or weight alterations (Barrett-Connor, et al., 1999). In this case, a mechanism was identified that correlated longer CAG repeats (within the androgen receptor gene) and feelings of depression, revealing that genetics have a significant impact on the matter (Krithivas, et al 1999).

2.3) The Activational effects of Spontaneous and/or reflexive Testosterone

Besides the predisposition to produce testosterone in the long-term, circulating levels can be altered by short-term stimuli (eg.: behaviors or external events) and cause, what is called by Archer (2006), the "real-time activational effects on behavior".

a) Talking on feelings

John Gray, known for its publication *Men are from Mars and Women are from Venus* (1992) explores the effect of relationship dynamics and behaviors on hormones and the consequent self-esteem and well-being of each couple member. One of the points he articulates is that, although women are genetically programmed to talk extensively about their day and feelings, men are not. He explains that in our primordial times, women did field recognition to detect where the good fruit/plants and dangers were, reporting everything afterward to the family to protect them, in case something bad would happen to her. On the other hand, men were meant to worry about nothing but hunting and protecting the group physically. Gray and Tony Robbins say that women are genetically encoded to talk, resulting in them feeling heard and understood, which leads to the secretion of oxytocin and consequent increase of estrogen and reduction of stress (cortisol drops). Men, on the contrary, when they talk too much (especially if it is about their feelings), their testosterone lowers.

b) Dominance Part 2. - Relationships

Another point explored by Gray (1992) is that, when men are the ones to choose or make the decision, their testosterone rises. He analyzed relationships where the dynamic would favor women on making the decision and men would obediently do everything that the woman asked,

never having the initiative to decide anything. This can be extremely damaging for a man's testosterone and his self-esteem. In today's society, especially for the younger generation, the most common dynamic is an equilibrium where both members of the couple consider each other's opinion before deciding, having no negative implication on either the relationship dynamics or testosterone production.

c) Anxiolysis

A few experiments conducted by Aikey, et al. (2002) showed that reflexive testosterone release would reduce male mice's anxiety. In this case, reflexive testosterone was induced by exposing some mice to the opposite sex in the first study, and the opposite sex's urine in the second study. Results revealed that the anxiolysis process would be dependent on whether testosterone levels were "well above the baseline levels", otherwise, anxiety would not be significantly reduced.

d) Analgesia

Continuing on anxiolytic drugs, it is more than proved that these have an analgesic effect in the majority of cases they are used. As a matter of fact, making a parallelism to testosterone, mice that were castrated revealed to be more sensitive to pain compared to the control group non-castrated (Pednekar & Mulgaonker, 1995). Following the testing of this reasoning, the administration of testosterone and its metabolites, when done systematically, led to the analgesia of some of the body parts of the mice (Edinger & Frye, 2004).

e) Status Attainment

In 2015, a study gave out that male executives had lower levels of cortisol - a stress hormone - compared to colleagues in lower positions (Sherman et al., 2012), and that cortisol would inhibit the secretion of testosterone (Chen, et al., 1997; Viau, 2002; Liening & Josephs, 2010). High testosterone, along with low cortisol, creates a free road for the search for status attainment. For the ones with high testosterone, high cortisol will constrain the testosterone effect and lower the willingness of pursuing status (Mehta & Josephs, 2010).

When cortisol is low, people with low testosterone are less likely to hold a position of a high ranking, in the same way that people with higher quantities of this hormone are more likely to do so. However, when the cortisol is high, the role will be similar in terms of ranking regardless of the quantity of testosterone produced (Lerner, Josephs, Renshon & Gross, 2015).

After testosterone administration, researchers observed that both men and women were then more likely to both punish or reward the ones who deserved it, as a way of maintaining their social status and reputation, bringing evidence on both the prosocial and antisocial effects of testosterone (Eisenegger, C. et al., 2010).

f) Awakening time

It has been shown, and it is commonly known, that people who sleep fewer hours produce more cortisol - one of the inhibitors of testosterone (Sapth-Schwalbe et al., 1992). However, it is not only about the number of hours that a person sleeps. Early awakeners conveyed to produce more cortisol along the day compared to the ones who would wake up later, even though the declining phase of cortisol afterward would be more prominent on the early awakener as well (Edwards, S., Evans, P., Hucklebridge, F., Clow, A., 2001).

g) Relationships and Parenthood

"The Challenge Hypothesis" is a framework on consequent behaviors of testosterone and their interaction that highlights the role of competition in leading to aggressive behavior (Wingfield et al., 1990) One of the predictions of the *Challenge Hypothesis*, and later on supported by evidence, is that paternal care lowers testosterone levels (Gray, et al., 2002; Gettler, 2016). However, this alteration in hormones is mostly mediated by the cultural expectation of masculinity and not the action itself (Gutmann, et al., 2021). The same was verified for monogamous relationships, as novelty drove the production of testosterone, even though, in an experiment with mice, it also stimulated the secretion of cortisol as fear of the unknown, inhibiting, therefore, some part of the previous production of testosterone (Gettler, 2016).

h) Job Power and subordinates

There is evidence on the correlation between men, in jobs associated with competition, higher power or masculinity and higher testosterone production, even though this could be altered by socioeconomic status. On the other hand, for women, wielding power increases testosterone almost in the same way whether the activity performed is stereotyped as masculine or feminine. For men, they have a lower change in testosterone when wielding power compared to women, but a higher difference between a stereotyped masculine versus a feminine activity, producing higher testosterone on a masculine condition. Stereotypes have been shown to have a role in

mediating this hormone, but not in the same level across all situations, wielding power is one of them (Anders, et al., 2015).

Moreover, when it comes to subordinates, the more an individual had, the higher was the testosterone (for the ones with low cortisol) (Lerner, Josephs, Renshon & Gross, 2015).

i) Aggression

There is a common association in people's minds between high levels of testosterone and aggression Wingfield et al., 1990). Nonetheless, studies have disclosed a significantly weak correlation between these two. One study revealed that a single administration of this hormone would change a perception of a man's facial dominance. This implies that the inflated aggression due to the testosterone would not be directly caused by the hormone itself but by the enhanced perception of the self as more powerful and tough (Carré & Archer, 2017).

In a more recent study, in a similar scenario of testosterone administration, aggression would only increase if, before the administration, the man had already high regard for himself in terms of dominance and/or feelings of low self-control (Carré et al., 2017).

On the other hand, Sapolsky (1997) defends that, with exception of extreme cases, testosterone expressed no correlation with aggression in males, and nothing can be generally predicted on aggression just based on one's testosterone levels.

j) Rewarding effect

As expected, high testosterone is synonymous with positive sensations and feelings for males (Zitzmann, 2009). In a study of the rewarding effects of this hormone in the brain, it was found that dopamine release functioned as a mediator (as most rewarding drugs) and that the real inducer of rewarding feelings was the result of testosterone reduction - a metabolite, 5**α**-reduced. When researching on whether animals would voluntarily administer themselves with testosterone, "24% of male hamsters died of apparent overdose several days after a high intake of testosterone" (Nyby, 2007). Still, discovered by Peters and Woods (2005), the testosterone's addictive effect was not as strong as the ones caused by heroin or cocaine, but instead more similar to nicotine or caffeine.

Nyby (2007) comes with the hypothesis that the rewarding effect of testosterone might be related to reproduction, as both an incentive to do so and a way of learning through conditioning for effectiveness. Moreover, numerous studies came to show that rewarding properties are associated as well with conditioned place preference. This, along with territorial aggression, is the reason why during sports matches, the team playing at home has higher levels of circulating testosterone, giving it an advantage (further explained in the below section).

k) Competition

Bernstein (1974) has proclaimed that testosterone is not only essential to sexual activity but competition one-on-one among males. Testosterone is an important factor to consider when predicting the outcome of a fight: the one with initially higher levels of testosterone will more likely win the match. Referring to what was previously mentioned on how sports teams playing in their hometown field makes them produce higher levels of testosterone, it therefore also gives them higher probabilities of winning. In the end, it is known that the winner will have a sudden rise in its testosterone levels, and the loser will experience the exact opposite, its testosterone will drop. Interesting to note that this is not exclusive to physical/fight-like competitions: a study on cerebral contests, such as chess, has proven the same consequence on the endocrine system (Mazur, et al.). 1980).

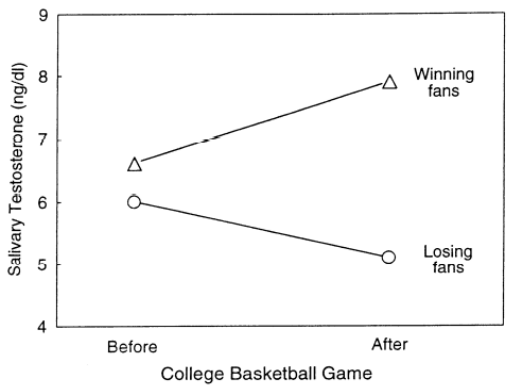


FIG. 2. Basketball fans' testosterone levels before and after their team has won or lost.

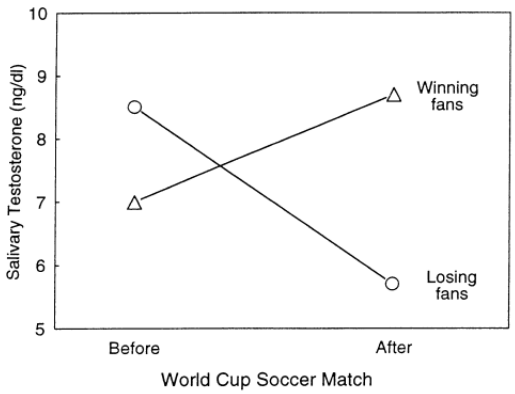


FIG. 3. Soccer fans' testosterone levels before and after their team has won or lost. Circle corresponds to the fans whose team was playing at the home field. Triangle corresponds to the fans whose team was playing on a foreign field.

In the same study mentioned in the aggression section by Carré et al. (2017), it was realized that competitive motivation was not only dependent on testosterone secretion but as well on whether the man saw himself as dominant.

Moreover, a study revealed that in some species, the more competition an animal faced during his life, the smaller the response would be in terms of testosterone production, leading to the theory on how the high frequency of competitions would reduce one's sensitivity to the subsequent match (Wingfield, et al., 1990). Another study states that this alteration is speculative, although it proves indeed that testosterone, along with winning experiences, leads to long-lasting changes in the brain (Oyegbile & Marler, 2005).

2.4) Sports & Testosterone

a) The Audience Effect

After a sports match, teams' fans respond to the result in the same way as players, they either explode with joy or go down on their knees defeated. If the team wins, even the next day, they will wear the team's colors, talk as a "we won", feel stronger and prouder. On the other hand, fans of the losing team will feel like losers, depressed and frustrated (Cialdini, et al., 1976). Here they face cognitive and behavioral changes, with the endocrine system being partly responsible (Bernhardt, et al. 1998).

When a fight or a match is happening, not only the players will have their testosterone rising, but whoever is watching as well - the audience effect. Furthermore, in a scenario of team A playing against team B and team A wins, bystanders who were rooting for team A will have a high peak of testosterone production by the end of the game, and the bystanders rooting for team B will have a sudden diminishing on the production of testosterone (Bernhardt, et al., 1998).

Since the outcome of any match is only decided at the last second, it makes the rise or the drop in testosterone to be sudden and drastic instead of lathering up along the game (Bernhardt, et al. 1998).

b) Habits of consumption during sports matches

“Sport is a site of the negotiation of gendered identity” (Guttmann, 1992). Although there is a quick increase in women’s interest in watching sports, they are usually seen as an “exaltation of masculinity".

When examining the ESPN Zone Chicago, men consumed the typical bar food when watching games. By typical bar food they mean food that can be gulped down, held in only one hand while drinking and socializing with friends. Moreover, a “manly meal” for this kind of event was described as high in calories and fat, with red meat and bread in the combination. As just mentioned, alcohol is an almost obligatory sidekick for watching a good match in bystanders’ minds, in particular, beer. Furthermore, the pack includes a third element: cigars. Cigars were also considered by respondents as something consumed by the ones watching a match, as they are associated with “Wall street players, Hollywood media tycoons” (Sherry, et al., 2004) - the men of power and success.

2.5) Testosterone and Classical Conditioning

Graham and Desjardins (2010) found out that on male rats, after being repeatedly exposed to wintergreen oil during sexual experiences with female rats, testosterone would immediately rise after simply sensing the odor of the wintergreen oil afterward.

2.6) Hormones and Consumer Behavior

For women, a relation was detected between the menstrual cycle and her behavior in consumption. During the ovulation phase, meaning after the estrogen high pick, women tend to pay more attention to men and unconsciously have a higher urge for products that enhance their femininity (such as fashion and beauty related) and social standing (Durante, et al., 2014). Furthermore, during the luteal phase, they crave instead for rewarding food (Saad & Stenstrom, 2012) as the chocolate cliché.

Women showed to be more cautious and less trusting for online purchases compared to men, and better able to resist temptations and postpone gratification (Meyers-Levy & Loken, 2014).

a) The digit ratio

In terms of consumer behavior, it has been proved by Aspara and Van den Bergh (2014) that a masculine digit ratio, as stated previously, had an association with a fondness for typical masculine products as well.

b) Consumption for partner

Moreover, an investigation was conducted on courtship-related consumption by males (Nepomuceno, et al., 2016) and not only higher testosterone was associated with higher levels of consumption, but also confidence had a moderator role. This study was highly important to confirm that trait variables may affect testosterone influence and give biased results.

c) Gender roles on consumer behavior

The first theory of gender differences - the social-cultural theory - highlights the influence of differences in biologically physical capacities between males and females and the consequent roles they adopted, which in turn gave origin to social-cultural beliefs. Some examples are the women's ability to bear and nurse children and men's speed and strength, which historically ended up creating division of labor. Moreover, it creates a cycle where young boys and girls learn by imitation through socialization and reinforcement when punished, for example by what are considered as "weaknesses" for boys. The continuous process of imitation and reinforcement combined with social expectations lead to people taking pride in their naturally stereotyped behaviors between genders. In its turn, people behave according to their internalized self-image, subject to gender roles. The ones with strong gender identities have higher self-esteem when they conform to the corresponding gender standards (Witt & Wood, 2010). Consequently, applying to consumption behavior, both genders prefer brands with personalities that match their own gender identity (Grohmann, 2009).

The second theory - evolutionary theory - focuses on the impact of the adaptive mechanisms of ancestors to environmental challenges, along with natural selection that left a human brain specialized in solving problems (Tooby & Cosmides, 2005), acknowledging as the previous theory, not only biology but also culture in shaping the development of a human (Kenrick & Luce, 2000). By focusing on the male mechanisms of aggressiveness and risk-taking, Fischer and Mosquera (2001) and Ellis et al. (2012) published arguments on how aggression and risk-taking enhanced not only physical abilities for men but promoted as well their social status and wealth of resources, which is base for their self-esteem and perception of attractiveness (not for females). Supporting this idea, Griskevicius et al. (2009) discovered that triggering status motives would make the aggression escalate.

Some researchers on the topic see it as a mistake to consider human behavior being only dependent on evolution or culture. Instead, their viewpoints to the interaction between genes, environment, preferences, the psychological processes, and indeed cultural inputs (Gangestand, et al., 2006; Kenrick, et al. 2010; Norenzayan & Heine, 2005). As shown by Gnezzy et al. (2009), women from some isolated tribes have more competitive behaviors than men, meaning culture, apart from genetics, indeed has an impact.

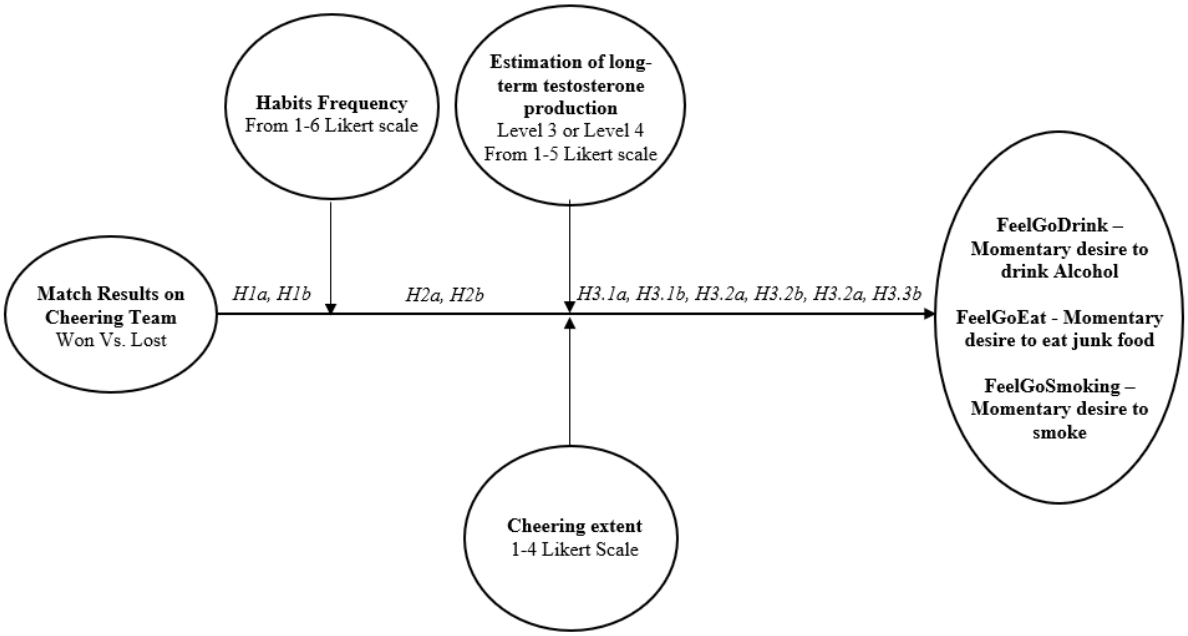
2.7) Retrieving & Hormones

The processing of memory can be divided into 3 stages: encoding of the memory, storage in the brain and retrieval. Retrieval or Recalling is to remember a past event after it went through the first two stages. During memory retrieval, there is a replication of the neural activity of the event that is being remembered. It is believed that the hippocampus and two regions of the amygdala are involved in the process of recalling. As seen previously, the amygdala has a role in the endocrine system and modulates the activity in the hippocampus. This is why the process of recalling brings out similar emotions compared to the original event and, therefore, similar hormone levels (Tulving & Thomson, 1973). Furthermore, it is supported by the previously mentioned fact that testosterone can rise or drop simply by mental associations in classical conditioning.

3) Conceptual Model and Hypothesis

This analysis audits the effect of long-term and short-term levels of testosterone in consumption desires. The main study will empirically delve into the impact of immediately decreasing testosterone vs. increasing testosterone (through recalling effect + audience effect) on consumption patterns., along with the moderator effect of long-term testosterone production estimation.

Conceptual Model (FIG.4)



Hypothesis:

1. The impact of match results

H1a: *Men who face a winning result in a match will have an equal mean level of consumption desire compared to men who face a losing result.*

H1b: *Men who face a winning result in a match will have a different mean level of consumption desire compared to men who face a losing result.*

These hypotheses have the goal of understanding whether match results impact a man's choice. If the means are equal, it would tell us that the specific habit in study was not related to the sports outcome.

2. The impact of match results considering the respondent's habits

H2a: *Given the same routine frequency, men who face a winning result in a match will have an equal mean level of consumption desire compared to men who face a losing result.*
H2b: *Given the same routine frequency, men who face a winning result in a match will have a different mean level of consumption desire compared to men who face a losing result.*

These hypotheses are crucial to understand how the results before vary according to the respondent previous-manipulation habits. It is not surprising if someone who never smokes continues not to want to smoke, as well as frequent smokers admit that they feel like smoking at the moment. It is the disparity between routines and momentary desires that show the possibility of a testosterone impact.

3. The impact of match results considering the respondent's long-term levels of testosterone and extent to which he cheers for his sports team

H3.1a: *The mean of a man's response to a match result varies with the interaction of long-term testosterone production, cheering extent and the manipulation scenario.*
H3.1b: *The mean of a man's response to a match result is not subjected to the interaction of long-term testosterone production, cheering extent and the manipulation scenario.*

H3.2a: *The mean of a man's response to a match result varies with the interaction of long-term testosterone production and the manipulation scenario.*
H3.2b: *The mean of a man's response to a match result is not subjected to the interaction of long-term testosterone production and the manipulation scenario.*

H3.3a: *The mean of a man's response to a match result varies with the interaction of the cheering extent and the manipulation scenario.*
H3.3b: *The mean of a man's response to a match result is not subjected to the interaction of the cheering extent and the manipulation scenario.*

These hypotheses are meaningful to ascertain the different impact extents of some factors on the main interaction. Maybe the importance that a man gives to the team winning or losing will impact his cortisol level (and therefore testosterone), as well as his normal testosterone levels, if too low or too high, may react in a different degree to the manipulation stimuli.

4) Methodology and Data Collection

4.1) Research Method

After taking into consideration the secondary data assembled for the literature review and building respective research questions and hypotheses, primary data was gathered to find its answers.

Having an online survey built for it, one experimental study was carried out with empirical puposes: a pilot test for the main study and followed by the main study. The reason why a pilot study was developed is so that in case there were any mistakes, they could be fixed before the actual survey launch. Opting for online surveys was in interest of having lower costs and collecting the results promptly in the short-term. Still, its distribution was not only done through link sharing on social media but also by printing Qr Codes of the surveys and issuing them across the streets. For respondents, being able to complete the survey at their own pace works as an incentive compared to other methods, but it also faces the risk of leading to several drop outs or even neglect real answers. Although the latter can be detected with attention checks, it is harder to detect when there are misunderstandings in interpretations of questions and to force someone to finish their survey when they left it incomplete. Furthermore, as most questions in a survey are closed-ended, it may lead to the lack of crucial insights on the study subject. However, none of these would weigh more than the decisive pinpoint that made the online survey format to be chosen: anonymity. Since some very personal questions were asked, a safe environment needs to be created with an anonymous feeling.

The online survey was constructed using Qualtrics Survey Software, due to its friendly-user frame for collecting data and further analysis, as it allows downloading the information in a format directly adaptable to SPSS.

4.2) Sampling

For the study, it was endorsed the Purposive Sampling Method (Dudovskiy, J.)- a non-probability sampling method where the sample selection is relied on the researcher's judgement when choosing who to participate. The inclusion criteria of this judgement were as follows: (1) male and (2) at least 18 years old. It would, therefore, be unnecessary to ask females or teenagers to be respondents, to then be laid-off right at the beginning screening questions. As clarified in the literature review, males are the most appropriate target to be studied as they are the ones with predominant testosterone. In age matters, although studying teenagers could give

interesting insights, they were not convenient for a short-term data collection as, for being minors, it would be required to gather their parents' authorization to fill in the survey.
Initially, for the main study, it was assembled: 243 answers. These were then filtered to 212 ,by excluding invalid profiles, unnoticed attention checks and incomplete answers. As bias in this sampling, it must be considered the low-response rate and the greater part of respondents being in the same age group (18 to 29 years old).

4.3) Research Instruments

All things considered, the procedures handled among the different studies are described as follows.

Pilots of Main Study:

A Pilot study was conducted before the launching of the main study to verify if there weren't any mistakes or misleading questions/options. Having that said, 13 participants answered the pilot study. A small interview was then conducted with them to hear their feedback and make respective alterations on the survey design. Finally, their answers were erased before disclosing the survey's final version.

Main Study:

This main study was constructed in English using Qualtrics, and was distributed from the beginning of November until the middle of the month. Its purpose was to simulate two opposite scenarios and analyze men's reactions, comparing estimated levels of testosterone production and respective behaviors in consumption and associations with brands.
The survey for the first scenario obtained a total of 117 answers, from which 100 were valid, whereas in the second survey, 126 answers were collected from which 112 were valid. Most invalid questions were from respondents who were female, under 18 years old or quitted the survey before they were finished, expectedly due to the survey extent or because some of the questions were regarded as too personal.

4.4) Design and Procedure

The design of the study was constructed as a 2 (Cheering Team's Match result: Won Vs Lost) x 2 (Testosterone production levels: level 3 & 4 from likert scale of 1-5) and 2 (Cheering Team's Match result: Won Vs Lost) x 4 (Cheering effect: 4 point likert scale) between subject's

design. The following applies for the dependent variables *FeelGoDrink*, *FeelGoEat* and *FeelGoSmoking,* later explained.

Table 1. - Manipulation Scenarios

		a)	b)	c)	d)	e)	f)	g)	h)	i)	j)	k)	l)
Cheering Team's Results	Won	x	x			x	x	x	x				
	Lost			x	x					x	x	x	x
Testosterone Production	3*	x		x									
	4*		x		x								
Cheering Effect	1					x				x			
	2						x				x		
	3							x				x	
	4								x				x

*level in 1-5 likert scale, result from robustness test, later explained.

By checking respondents' answers on the two manipulation scenarios against their estimation of testosterone production (apart from the assumption of testosterone rising or decreasing), it is possible to better study the hormone's impact.

Having that said, the survey was developed into the following sections:

1) *Introduction*

   The introductory section gave the respondents a general insight on the purpose of the study, stating it was on consumer behavior, but not explicitly on testosterone production.. The reasoning was that testosterone levels may be a sensitive topic for several men, and most would not admit certain habits if they knew what was really being evaluated. Therefore, only after the survey was finished, participants would be given the complete information.

2) *Screening Questions & Demographics*

   In this first section, participants are asked about their gender, age and frequency of watching sports. These served as screening questions since only male respondents above 18 years old and who watch sports at least 1-2 times a month were accepted.

3) *Testosterone Long-term Production estimation - Long-term physical & psychological traits, and habits*

   This section collects the necessary data to predict whether the respondent was: exposed to healthy levels of testosterone in the prenatal phase; currently producing testosterone for the long term; and adopting habits that promote or inhibit testosterone production in the long-term. More specifically, respondents were questioned about frequency of talking about their feelings, making the decisions, feeling stressed, feeling depressed, quality of sleep and time of awakening, relationships and their dynamics, nurturing children, digit ratio, competitiveness, and whether they are leading a team or any subordinate.

4) *Consumption habits*

   On a fourth part, respondents are asked on their frequency of drinking alcohol, smoking and eating unhealthy food to compare with further answers after the manipulation.

5) *Watching Sports*

   This section is now focused on detecting the relationship that the respondent has with sports teams, more specifically on how strongly the respondent cheered for his team.

6) Manipulation

   Stimulus A - the cheered team won - was presented in the second main study, and Stimulus B - the cheered team lost - was presented in the third main study.

4.5) Stimuli Development

Following the literature review reasoning, according to the Audience Effect, a sports match result was used as stimuli for a situation that would provoke short-term alterations in testosterone levels.

These stimuli were made through memory recall, as each respondent, whether from the second or the third study, needed to recall the last time their most dear team has respectively won or lost. As proven before, recalling certain moments makes the brain reproduce the same body state of that time, including short-term hormone production. The degree of the impact it has among respondents is not clear, as it cannot be measured, and it should be taken into account

as a possible bias. Still, in order to minimize it, each survey provides a very detailed description of the situation to be recalled, including expected feelings and sensations, in order for the participant to focus on those and hopefully impact their hormone production at that time. Finally, it is important to notice on how this study is based on the observation of the results, meaning that, by being conducted empirically, no conclusions can be driven.

First Survey Stimuli

Now we ask you to please recall the last time your team won a big game. Take a few seconds to remember and visualize the moment of the decisive score, the final whistle and the rush of joy that you felt. You are so happy, you feel like jumping and partying with your family and friends for the huge victory you have been waiting for. You don't think you are going to even be able to sleep at night.

Second Survey Stimuli

Now we ask you to please recall the last time your team lost a big game. Take a few seconds to remember and visualize the moment of the decisive score, the final whistle and the rush of frustration that you felt. You are so sad because you were really hoping for a victory this time, and all of your friends that are on the opposite team are celebrating against your team. You don't think you are even going to be able to sleep at night.

4.6) Variables Description

4.6.1) Independent Variables

Testosterone production: as assembled as a result of other several variables. As it was not possible to measure real circulating testosterone through saliva testing, a few questions were asked concerning physical traits, psychological traits and habits that impact or are affected by testosterone levels. This way, by recoding them and attributing points to every answer according to whether it was associated with higher or lower testosterone production, it was possible to generate a new variable - a prediction of testosterone production probability - by summing all points.

Variables Code

The variables in consideration and their respective recoding.

Table 2. - Variables recoding

Variables	Values
Age	>=70 = 1; 60-69 = 2; 50-59=3; 40-49=4; 30-39=5; 18-29=6
Talk Feelings	Always, I like to unburden my mind in a daily basis = 1; Often, whenever I feel like talking about it =2; Sometimes, when something is needed to be said =3; Rarely, only in extreme situations = 4; Never =5
Decision Making	I always prefer others to make the decisions =1; I prefer that people make the decisions for me most of the time = 2; Sometimes I make the decision, other times I prefer that others make it for me =3; I prefer to make the decisions most of the time = 4; I always want to make the decisions = 5.
Stress	I feel stressed all the time = 1; I never feel stressed at all=5
Depressed	Very often/Always= 1; Sometimes= 3; Never/Rarely= 5.
Longterm Relationship	No = 1; Yes = 2
Nurturing time	More than 2 hours = 1; 1 hour – 2 hours = 2; Less than 1 hour = 3
Leadership	No=1; Yes=5

Taking into account that the total minimum points were 13 and the maximum were 67, it was created a 5 point likert scale with the following respective recoding:

Table 3. - Testosterone Production Estimation recoding

Variable	Values
Testosterone Production Estimation	[13, 24[=1; [34, 35[=2; [35, 46[=3; [46, 57[=4; [57, 68[=5

It was then realised that no respondent was in level 1, on the 5 point likert scale shown in variables description. Moreover, only 1,9% of participants are in level 2 and 4,3% in level 5, as shown in table 2 in the appendix 2. For Robustness Testing approval and to avoid biases, respondents in level 2 were aggregated with the ones in level 3, and the ones in level 5 were respectively joined with level 4. This therefore lead to 44,8% of respondents being in level 3 and 55,2% in level 4 (table 3 in the appendix 2).

WinLost (Match Results on Cheering Team) - respondents were exposed to either a winning or losing result for their cheering team's match.

Variable Code

Table 4. - WinLost recoding

Variables	**Values**
WinLost	Win=0; Lose=1

Cheering effect - this variable was measure through a 4 point scale created on purpose for this study (1 - watch some matches but I don't mind missing an important one; 2- I only watch the most important matches; 3 - I watch the most important matched and some of the others less important; 4 - I watch all of my team's matches). The option of not cheering for any team was not included since it indicates that the respondent would not watch any game, and this was excluded in the beginning screening questions.

DrinkFreq (Frequency of Drinking Alcohol) * - in order to assess the frequency of consumption of alcohol, respondents were asked to select one of the options within the scale from a 6 point likert scale (1-never, 2-once in a while, 3-once a week, 4-"2-3 times a week", 5-once a day, 6-more than once a day).

EatFreq (Frequency of Eating Unhealthy & Delicious Food) - in order to assess the frequency of consumption of junk food, respondents were asked to select one of the options within the scale from a 6 point likert scale (1-never, 2-once in a while, 3-once a week, 4-"2-3 times a week", 5-once a day, 6-more than once a day).

SmokingFreq (Frequency of Smoking) - in order to assess the frequency of consumption of tobacco, respondents were asked to select one of the options within the scale from a 6 point likert scale (1-never, 2-once in a while, 3-once a week, 4-"2-3 times a week", 5-once a day, 6-more than once a day).

4.6.3) Dependent Variables

FeelGoDrink - In order to assess the momentary wanting of consuming alcohol, respondents were asked to select one of the options presented that best applied to the affirmation "I feel like grabbing a beer or another alcoholic drink", within the scale from a 7 point likert scale (1-strongly disagree to 7-strongly agree) adapted from Vagias (2006).

FeelGoSmoking - In order to assess the momentary wanting to go smoke, respondents were asked to select one of the options presented that best applied to the affirmation "I feel like smoking", within the scale from a 7 point likert scale (1-strongly disagree to 7-strongly agree) adapted from Vagias (2006).

FeelGoEat - In order to assess the momentary wanting of eating unhealthy food, respondents were asked to select one of the options within the scale from a 7 point likert scale (1-strongly disagree to 7-strongly agree) adapted from Vagias (2006).

5) Analysis and Results

5.1) Sampling Characterization

As mentioned before, in the first section of the surveys, only two questions on demographics were found relevant to be made: gender and age. These served as well as screening questions, since only male respondents above 18 years old were accepted.

The valid sample had a total of 212 male participants: 51,90% between 18 and 29 years old; 2,40% between 30 and 39 years old; 22,60% between 40 and 49 years old; 15,10% between 50 and 59 years old; 3,80%between 60 and 69 years old; and 4,20% above 69 years old.

5.2) Variable Reliability

As several variables were used to obtain the further independent variable - estimation of testosterone production in the long-term - it is important to verify the extent to which every sub-variable contributes to the main one.

Bivariate correlations

Table 5. - Correlations of Testosterone Estimations Sub-variables

Variables	Pearson Correlation	Sig (2-tailed)
Age	0,230	0,001
Talk Feelings	0,400	0,000
Decision Making	0,247	0,000
Sleep Quality	0,334	0,000
Longterm Relationship	-0,297	0,000
Relationship Dynamics	0,422	0,000
Leadership	0,563	0,000
CompetingFreq	0,632	0,000
WinnerFreq	0,658	0,000
Competitive	0,676	0,000

After changing the criteria of points attribution for relationship status, it was shown to have a positive significant correlation with testosterone production with a Pearson value of 0,289.

Table 6. - Correlations of Testosterone Estimations Sub-variables

Variables	Pearson Correlation	Sig (2-tailed)
Age	0,230	0,001
Talk Feelings	0,400	0,000
Decision Making	0,247	0,000
Sleep Quality	0,334	0,000
Longterm Relationship	0,289	0,000
Relationship Dynamics	0,422	0,000
Leadership	0,563	0,000
CompetingFreq	0,632	0,000
WinnerFreq	0,658	0,000
Competitive	0,676	0,000

The variables which did not have a significant correlation were: *awakening hours, digit ratio, depression frequency, stress frequency* and *children nurturing time*.

Regression Analysis

Having that said, to have a more precise estimate of testosterone production, linear regressions were conducted, independently, for every single ”sub” variable. Then, the results were compared to the multiple regression of them all. All of the variables which were not significant in the linear regression alone (consistent with correlations) appeared as significant when computing a multiple regression, with exception of the Digit Ratio. Still, it was considered for the analysis.

5.3) Results and Discussion

The following analysis was done taking into consideration the Floodlight Analysis from Spiller, et al. (2013), using simple tests to evaluate the effects of the several moderators independently on our main dependent variable.

1. The impact of match results

H1a: *Men who face a winning result in a match will have an equal mean level of consumption desire compared to men who face a losing result.*

H1b: *Men who face a winning result in a match will have a different mean level of consumption desire compared to men who face a losing result.*

Independent-Samples t-test

To verify the impact of the manipulation (team wins vs team loses) on both groups, and compare their desire to drink alcohol, smoke and or eat unhealthy food at that moment, an independent-samples t-test was conducted.

For these three variables, the t-test results show a significant mean difference between the two groups: MFeelGoDrink, win(0) = 3,54 vs. MFeelGoDrink, lose(1) = 2,54; t(210)=4,618; p<0,001; MFeelGoSmoking, win(0) = 2,75 vs. MFeelGoSmoking, lose(1) = 2,18; t(210)=2,187; p=0,03; MFeelGoEat, win(0) = 3.90 vs. MFeelGoEat, lose(1) = 2,75; t(210)= 4,533; p<0,001.

Table 7. - Independent-samples t-test between manipulation scenarios and the three dependent variables

	Win (0)		***Lost (1)***		
Variables	***Mean***	***SD.***	***Mean***	***SD.***	***t-test***
FeelGoDrink	3,54	1,684	2,54	1,482	4,618**
FeelGoSmoking	2,75	2,081	2,18	1,720	2,187*
FeelGoEat	3,90	1,982	2,75	1,711	4,533**

*p<0,05; **p<0,001

These results demonstrate that means are higher for participants who were exposed to the scenario of their team winning the game, meaning the ones whose testosterone would be

manipulated to increase at the moment of the test. As so, having the cheered team winning a match and, therefore, increasing testosterone could have a positive impact in the momentary desire for drinking alcohol, smoking and eating unhealthy food. In other words, the null hypothesis is rejected.

2. 2. The impact of match results considering the respondent's habits

H2a: *Given the same routine frequency, men who face a winning result in a match will have an equal mean level of consumption desire compared to men who face a losing result.*
H2b: *Given the same routine frequency, men who face a winning result in a match will have a different mean level of consumption desire compared to men who face a losing result.*

Two-way MANOVA - Pre-manipulation habits

A two-way MANOVA was conducted to compare the manipulation results with previous respondents' habits. This testing model was chosen instead of a repeated measures ANOVA, because the pre-manipulation questions' point scales were not the same as the post-manipulation questions.

DrinkFreq*WinLost

Table 8. - Two-way MANOVA between manipulation scenarios and Drinking alcohol frequency pre-manipulation for the dependent Variable FeelGoDrink (Feeling like drinking alcohol)

	Win (0)		***Lost (1)***	
	Mean	***SD.***	***Mean***	***SD.***
DrinkFreq (1)	1,50	0,527	_____	_____
DrinkFreq (2)	3,58	1,853	1,77	0,899
DrinkFreq (3)	4,00	0,000	2,87	1,863
DrinkFreq (4)	3,75	1,682	3,50	1,142
DrinkFreq (5)	4,50	0,527	_____	_____
DrinkFreq (6)	_____	_____	4,00	0,000

On this MANOVA testing: F (*DrinkFreq*WinLost)* = 4,731; *p*=0,01. We reject the null hypothesis.

Observing the means evolution and the respective plots in the appendix (Graph 1), the means of FeelGoDrink increase with usual drinking alcohol frequency, with exception of MDrinkFreq(4)(Win,0)=3,75 which is slightly lower than the antecedent mean (MDrinkFreq(3)(Win,0)=4,00). For any drinking frequencies, means are always greater for the participants who were exposed to the winning scenario, compared to the ones who were exposed to a losing match.

The highest difference in Means along usual drinking frequencies is, facing a winning scenario, between respondents who never drink alcohol and the ones who drink once in a while (MDrinkFreq(1)(Win,0)=1,50 vs. MDrinkFreq(2)(Win,0)=3,58). The high difference between respondents who never drink alcohol and the ones who drink once in a while (MDrinkFreq(1)(Win,0)=1,50 vs. MDrinkFreq(2)(Win,0)=3,58) comes to show that, probably, people who drink once in a while, usually do so in celebration moments - reward effect. Moreover, Participants who drink once in a while in a losing scenario, present a very low mean, close to the respondents in a winning scenario who never drink ((MDrinkFreq(2)(Lose,1)=1,77 vs. MDrinkFreq(1)(Win,0)=1,50). The fact that participants who drink once in a while in a losing scenario present a very low mean, close to the respondents in a winning scenario who never drink, comes to reinforce the previous idea, on how this group who drinks only once in a while has the perception of drinking alcohol to celebrate.

On the other hand, respondents who drink alcohol more than once a day, in a losing scenario, present a Mean of FeelGoDrink very close to the Mean of respondents of the winning scenario who only drink once in a while: (MDrinkFreq(6)(Lose,1)=4,00 vs. MDrinkFreq(2)(Win,0)=3,58). On the other hand, for respondents who drink alcohol more than once a day, since, in a losing scenario, they present a Mean of FeelGoDrink very close to the Mean of respondents of the winning scenario who only drink once in a while, drinking alcohol does not seem to work as a reward so much, but for comfort purposes instead.

SmokeFreq*WinLost

Table 9. - Two-way MANOVA between manipulation scenarios and Smoking frequency pre-manipulation for the dependent Variable FeelGoSmoking (Feeling like smoking)

	Win (0)		***Lost (1)***	
	Mean	***SD.***	***Mean***	***SD.***
SmokeFreq (1)	1,64	1,445	1,42	0,942
SmokeFreq (2)	1,67	0,488	1,50	0,535
SmokeFreq (3)	_____	_____	_____	_____
SmokeFreq (4)	_____	_____	_____	_____
SmokeFreq (5)	5,00	0,000	6,00	0,000
SmokeFreq (6)	5,40	1,041	4,17	1,606

On this ANOVA testing: F (*SmokeFreq*WinLost)* = 4,711; p = 0,012. We reject the null hypothesis.

Observing the means evolution and the respective plots in the appendix (Graph 2), the means of FeelGoSmoking for a respondent who never smokes or smokes once in a while are similar, even among winning or losing manipulation scenarios: SmokeFreq(1), MFeelGoSmoking(win,0)=1,64, MFeelGoSmoking(lose,1)=1,42; SmokeFreq(2), MFeelGoSmoking(win,0)=1,67, MFeelGoSmoking(lose,1)=1,50. Since respondents who smoke once in a while have reacted the same way as respondents who never smoke, these results show that watching a match where the cheered team wins or loses is not the motive nor the situation where occasional smokers choose or feel like to smoke.

For respondents who smoke once a day, they presente much greater means compared to the latter groups of respondents: SmokeFreq(3), MFeelGoSmoking(win,0)=5,00, MFeelGoSmoking(lose,1)=6,00. For participants who smoke more than once a day, the ones who are faced with their team losing the match present a lower mean than the previous group, but in the winning case, the mean of feeling like smoking increases slightly compared to smokers who take only one cigar a day: SmokeFreq(4), MFeelGoSmoking(win,0)=5,40, MFeelGoSmoking(lose,1)=4,17. The changes in behavior and wanting to smoke for respondents who smoke once a day and the ones who do so more than once a day may be due to habit perspective and whether they are trying to resist smoking or not. In other words, smokers who only smoke one cigar a day, usually they are trying to control their habit and choose carefully their time of the day to smoke. Smoking may work more as a comfort getaway and stress relief for this group, more than a celebration method. For participants who smoke

more than once a day, they may see a cigar more as a reward and something that they deserve along the day.

FoodFreq*WinLost

Table 10. - Two-way MANOVA between manipulation scenarios and eating frequency pre-manipulation for the dependent Variable FellGoEat (Feeling like eating something unhealthy & delicious)

	Win (0)		***Lost (1)***	
Variables	***Mean***	***SD.***	***Mean***	***SD.***
FoodFreq (1)	1,00	0,000	_____	_____
FoodFreq (2)	3,00	1,715	2,50	1,606
FoodFreq (3)	4,75	2,337	2,13	1,070
FoodFreq (4)	3,75	1,517	3,33	1,950
FoodFreq (5)	_____	_____	_____	_____
FoodFreq (6)	5,50	0,513	_____	_____

On this ANOVA testing: F (*FoodFreq*WinLost)* = 7,690; p<0,001.We reject the null hypothesis.

Observing the means evolution and the respective plots in the appendix (Graph 3), the means of FeelGoEat have a tendency to increase as the frequency of eating unhealthy delicious food increases as well, with two exceptions: respondents from the winning scenario eat unhealthy food 2-3 times a week and respondents in the losing scenario that eat this type of food once a week break the increasing pattern with a slight drop comparing to the previous level's mean (win(0), MFeelGoEat(FoodFreq,4)=3,75 vs MFeelGoEat(FoodFreq,3)=4,75; lose(1), MFeelGoEat(FoodFreq,3)=2,13 vs MFeelGoEat(FoodFreq,2)=2,50. For the same FoodFreq level, FeelGoEat means are always higher in the winning scenario of the manipulation.

The drops in the FeelGoEat means' growing tendency may be statistical casualties or can indeed have a real significance. If the latter is the case, it may be due to a resistance to the habit, just like in smoking. This means that respondents who eat unhealthy and delicious food once a week are trying not to eat this kind of food on a daily basis and be conscious of their consumption patterns. In other words, they choose their moments to take pleasure in eating,

and winning a match may not be their favourite moment for them to have their "cheat" meal. Participants who only eat unhealthy once in a while are not particularly focused on not eating junk food, it just comes naturally and eating this type of food usually is exclusive to holidays and special celebrations. Therefore, they don't feel as much cravings and, either the team wins or loses, there is no classical conditioning for comfort or the reward effect of food. Like before, since the winning scenario always has the highest means of the dependent variable for every FoodFreq, it reinforces the reward effect of food.

Nevertheless, there is still a lack of understanding on the "if" and "how" these results may vary with long-term testosterone production (the levels of testosterone the participant had before the manipulation) and team cheering interaction.

Two-way ANOVA with MedianSplit

To have a better perspective between low and high levels of consumption among these three habits, it was decided to perform the same test but this time using a median split.

Table 11. - Two-way ANOVA between manipulation scenarios for the dependent FellGoDrinking, taking into account the respondent's drinking habit for the manipulation's team, under median split.

FeelGoDrink

	Win (0)		Lost (1)	
Variables	Mean	SD.	Mean	SD.
Drinking below Median	1,50	0,527	_____	_____
Drinking above Median	3,77	1,615	2,54	1,482

Table 12. - Two-way ANOVA between manipulation scenarios for the dependent FellGoSmoking, taking into account the respondent's drinking habit for the manipulation's team, under median split.

FeelGoSmoking

	Win (0)		Lost (1)	
Variables	Mean	SD.	Mean	SD.
Smoking below Median	_____	_____	_____	_____
Smoking above Median	2,750	0,190	2,179	0,179

Table 13. - Two-way ANOVA between manipulation scenarios for the dependent FellGoEat, taking into account the respondent's drinking habit for the manipulation's team, under median split.

FeelGoEat

	Win (0)		Lost (1)	
Variables	Mean	SD.	Mean	SD.
Eating below Median	2,75	1,736	2,50	1,606
Eating above Median	4,67	1,736	2,85	1,751

On this ANOVA testing with Median Split: It was not possible to have an F value for DrinkingMs*WinLost and SmokingMs*WinLost; F (FoodMs*WinLost) = 9,593; p=0,002, therefore we reject the null hypothesis.

Using the Median Split has shown in a clearer way that participants who don't drink alcohol in a frequent manner (below the median) have a desire to drink in celebration situations, but not in losing scenarios. As seen before, this is opposed by the group who drinks above the median, which now does so both when their team loses or wins. Even though the mean urge to drink is higher in the winning scenario than in the losing scenario , they drink more in a losing scenario than the previous group in a winning scenario.

For the desire of smoking, there is a slight difference between losing and winning, where the latter shows a higher mean.

Eating below the median frequency presents a significantly lower mean than eating above the median frequency. This comes to reinforce the idea that witnessing a losing or winning game along with eating habits do indeed have an impact on the desire to eat junk food.

3. The impact of match results on considering the respondent's long-term levels of testosterone and extent to which he cheers for his sports team

H3.1a: *The mean of a man's response to a match result varies with the interaction of long-term testosterone production, cheering extent and the manipulation scenario.*

H3.1b: *The mean of a man's response to a match result is not subjected to the interaction of long-term testosterone production, cheering extent and the manipulation scenario.*

H3.2a: *The mean of a man's response to a match result varies with the interaction of long-term testosterone production and the manipulation scenario.*

H3.2b: *The mean of a man's response to a match result is not subjected to the interaction of long-term testosterone production and the manipulation scenario.*

H3.3a: *The mean of a man's response to a match result varies with the interaction of the cheering extent and the manipulation scenario.*

H3.3b: *The mean of a man's response to a match result is not subjected to the interaction of the cheering extent and the manipulation scenario.*

Three-Way MANOVA - Main independent variables

To find whether long-term testosterone production, cheering effect and manipulation scenarios would have an interaction effect on the dependent variables, a two-way MANOVA was conducted: FeelGoDrink, FeelGoSmoking, FeelGoEat; Win (0) vs. Lost (1); Medium testosterone (3) vs. High testosterone (4); Cheering effect (4 point scale, 1-4).

Table 14. - Three-way MANOVA between manipulation scenarios and moderators: Cheering - the extent to which a man supports or is a fan of his team; TestosteroneGroups - quantity of testosterone production on a daily basis.

Variables	***FeelGoDrink (Sig.)***	***FeelGoSmoking (Sig.)***	***FeelGoEat (Sig.)***
WinLose*TestosteroneGroups	0,000**	0,124	0,000**
WinLose*Cheering	0,000**	0,008**	0,006**
TestosteroneGroups*Cheering	0,000**	0,178	0,201
WinLose*TestosteroneGroups*Cheering	0,098	0,613	0,987

The three-way interaction has shown not to be statistically significant for any of the dependent variables. However, two-way interactions using the three independent variables have come to

be statistically significant in some cases. On feeling like drinking alcohol, every two-way interaction is statistically significant (p<0,001). On feeling like wanting to go smoking, the manipulation scenarios' interaction with cheering effect is significant (p=0,008), but long-term testosterone levels' interaction with any of these previous two independent variables has shown not to be statistically significant. Wanting to smoke is not related to testosterone normal long-term production. When it comes to feeling like eating, two-way interactions between manipulation scenarios (win vs lose) and the other two independent variables are statistically significant (p=0,006), but the interaction alone on the latter two independent variables (testosterone levels; cheering effect) is not statistically significant. Win or losing a match (sudden rise or sudden drop in testosterone) has a higher impact on wanting to eat then the long-term testosterone levels or cheering effect. We can reject the null hypothesis for drinking and eating.

Two-Way MANOVA

Although the interaction obtained in the Three-way ANOVA for *TestosteroneGroups*Cheering* was statistically significant for FeelGoDrink, since the manipulation scenarios were not being taken into account, it was not of interest to further investigate its impact on the manipulation results. Therefore, the following matters were focused on.

1. ***WinLose*TestosteroneGroups***

Table 15. - Two-way MANOVA between manipulation scenarios for the three dependent Variables (FellGoDrink, FellGoSmoking, FellGoEat) taking into account the respondent's daily testosterone production (TestosteroneGroup)

	Win (0)				***Lost (1)***			
	TestosteroneGroup (3)		***TestosteroneGroup (4)***		***TestosteroneGroup (3)***		***TestosteroneGroup (4)***	
Variables	***Mean***	***SD.***	***Mean***	***SD.***	***Mean***	***SD.***	***Mean.***	***SD.***
FeelGoDrink	2,85	1,479	3,98	1,668	2,43	1,548	2,64	1,420
FeelGoSmoking	2,72	1,589	2,77	2,355	2,00	1,695	2,36	1,742
FeelGoEat	2,64	1,530	4,70	1,820	2,48	1,513	3,02	1,863

As shown in Graph 4 and Graph 5 in the appendix 4, the results for FeelGoDrink (immediate desire to drink alcohol) and FellGoEat (immediate desire to eat unhealthy food) reveal a similar behavior between the groups of respondents, when taking a general look at the graph design.

After being exposed to the manipulation scenarios, the feeling of wanting to drink alcohol or eating unhealthy food is lower for the participants with medium testosterone (TestosteroneGroup=3: MFeelGoDrink(win,0)=2,85, MFeelGoDrink(lose,1)=2,43; MFeelGoEat(win,0)=2,64, MFeelGoEat(lose,1)=2,48) compared to the ones with high testosterone (TestosteroneGroup=4, MFeelGoDrink(win,0)=3,98, MFeelGoDrink(lose,1)=2,64; MFeelGoEat(win,0)=4,70, MFeelGoEat(lose,1)=3,02).

Moreover, the difference in the means of desire to drink alcohol between the respondents exposed to the winning team and the respondents exposed to the losing team is largely greater for the ones with high testosterone (TestosteroneGroup=4) than the ones with medium testosterone (TestosteroneGroup=3): ΔMFeelGoDrink(TestosteroneGroup=4) = 1,34 vs. ΔMFeelGoDrink(TestosteroneGroup=3) = 0,42 ; ΔMFeelGoEat(TestosteroneGroup=4) = 1,68, ΔMFeelGoEat(TestosteroneGroup=3) = 0,16.

Taking reference from the Graph 6 on the Appendix 4, for the variable on the sudden wanting to smoke (FeelGoSmoking), its *p* value showed not to be statistically significant since the difference in means between testosterone groups on the winning team scenario was extremely small: MFeelGoSmoking(TestosteroneGroup,3) = 2,72 vs. MFeelGoSmoking(TestosteroneGroup,4) = 2,77; ΔMFeelGoSmoking(WinLose,0) = 0,05. We cannot reject the null hypothesis for smoking.

*2. WinLose*Cheering*

Table 16. - Two-way MANOVA between manipulation scenarios for the dependent FellGoDrink, taking into account the respondent's cheering level for the manipulation's team.

FeelGoDrink

	Win (0)		***Lost (1)***	
Variables	***Mean***	***SD.***	***Mean***	***SD.***
Cheering(1)	3,63	1,691	1,62	1,008
Cheering(2)	3,14	1,375	2,60	1,128
Cheering(3)	2,33	1,952	1,50	0,535
Cheering(4)	5,00	0,725	3,63	1,680

Table 17. - Two-way MANOVA between manipulation scenarios for the dependent FellGoSmoking, taking into account the respondent's cheering level for the manipulation's team.

FeelGoSmoking

	Win (0)		***Lost (1)***	
Variables	***Mean***	***SD.***	***Mean***	***SD.***
Cheering(1)	3,17	2,379	1,50	1,016
Cheering(2)	2,00	1,328	2,40	1,582
Cheering(3)	3,00	2,236	1,50	0,535
Cheering(4)	3,25	2,337	2,75	2,314

Table 18. - Two-way MANOVA between manipulation scenarios for the dependent FeelGoEat, taking into account the respondent's cheering level for the manipulation's team.

FeelGoEat

	Win (0)		***Lost (1)***	
Variables	***Mean***	***SD.***	***Mean***	***SD.***
Cheering(1)	2,83	1,984	1,75	1,320
Cheering(2)	3,86	2,060	3,50	1,519
Cheering(3)	5,33	0,488	2,00	1,069
Cheering(4)	4,50	1,701	3,00	1,901

In the three dependent variables' plots, as seen in the appendix 5 (Graph 7,8 & 9), the respondents who were exposed in the manipulation to the losing team, present a drop in all means for cheering level 3 - watch most important matches and some of the others less important. There is no consistency of behavior in terms of means patterns among cheering effect levels and manipulation scenarios, except for a recurrent drop in the mean value for respondents on conditions *Cheering(3)& Lost(1).*

Even though these two independent variables' interaction *WinLose*Cheering* was shown to be statistically significant for the three dependent variables, when analysing the evolution of the means, there are values that do not match the expectation of an ascending behavior as the cheering effect increases. However, a pattern can be identified among the three plots on this non-linearity issue: there is a drop in wanting to drink alcohol, eating junk food and smoking for respondents who were exposed to the losing team and whose cheering level was equal to 3, meaning that they watch most important matches and some of the others less important. It is important to note that the number of respondents in this group should not be considered as a bias, since it has a similar size compared to the others. Having that said, an interesting speculation can be taken out from this: What is suspected here is that respondents who watch important games and others less important, are less sensitive to the match outcome. Furthermore, respondents on cheering effect level 4 (they watch all the matches) do not appear to have this drop. Much on the contrary, they show the highest means of all groups in terms of cheering effect levels. The reasoning is that this group corresponds to the team "fanatics",

meaning they attribute more importance to the match score and vibrate intensively in every match. They also present a lower mean compared to the group with a below cheering level because, maybe, the ones who watch less games, since it is not all the time, give more importance to each of them. As shown in the literature review, a man's perception of something can influence his testosterone rising mechanism overtime.

Conclusions

Winning a match has a positive impact in the momentary desire for drinking alcohol, smoking and eating unhealthy food, although it is not linear and it depends on the habits of each person.

Alcohol may have a reward effect or a comfort effect, depending on the frequency that a man drinks it and whether he feels as a winner or a loser. In terms of classical conditioning on testosterone, for men who drink very frequently (more than once a day), it is expected that this hormone is low before they drink and comes to neutral levels when they intake alcohol. Following the menstrual cycle for women, "Comfort food" is for women what Alcohol is for men (who drink more than once a day). On the opposite scenario, for men who only drink alcohol once in a while, when they do so, it is expected that their testosterone increases to above normal levels, even in neutral scenarios, making them feel fervent.

For smokers who only take one cigar a day, it is expected that, because they may be trying to control their vice, they feel guilty and choose carefully their moment to smoke. Usually, that moment is a stressful one, when they cannot longer hold their discipline and give in to the temptation. It is then expected that nicotine decreases cortisol, and, consequently, there may be a rise in testosterone. It is not conclusive if, before these men smoke, their testosterone is neutral or low due to the stress (high cortisol = lower testosterone), so, it is not possible to guess whether by smoking, their testosterone levels increase above normal levels or if they go from below-normal to normal. However, it is predictable that people who are trying to stop smoking feel highly stressed throughout the day, and therefore may have lower levels of testosterone. Having that said, in terms of classical conditioning, for this group of daily smokers, taking a cigar in a non-stressful situation is probably going to increase testosterone, even if it is normalised already. On the other hand, for extremely frequent smokers, as their nicotine intake is more recurrent, it is normal to forecast several high and lows of cortisol. Although it is known that testosterone is inhibited by high cortisol and since these people have several high and lows, it is not sure whether testosterone increases right away on the "lows" or cortisol, or if it stays at an inferior level. If the latter is true, then smoking has no classical condition effect on testosterone. If it is false, then smoking would make testosterone rise in any situation.

Watching a match brings a classical reward association with food. Furthermore, the match result has a higher impact on wanting to eat than the respondent's long-term testosterone levels estimation or cheering effect.

When winning the match, men are more prone to have eating, drinking and smoking cravings.

It is speculated that men who are constantly exposed to stimuli become less sensitive to these, so the ups and lows in the cravings for smoking, eating and drinking are less prominent compared to men who are less exposed to these stimuli. However, it depends on the importance that men give to these stimuli: if these are extremely important, even if constantly presented, men's response does not become less sensitive and shows with the highest ups and lows of all men groups.

Theoretical Implications

The current study contributes to literature on consumption behavior (Zitzmann, M., 2006). More explicitly, the present dissertation adds to the understanding on how men react in terms of wanting and desires to winning or losing a match , for smoking, drinking alcohol and eating junk food (Bernhardt, et al., 1998).

It explores the moderating effect of importance and perception on reaction levels and, as previously mentioned, consequent wantings. This comes to complement (Carré, et al., 2018). Likewise, the dissertation also dives into the moderating effect of: the respondent's habits on drinking alcohol, smoking and eating junk food on the final manipulation results for a fair comparison; the respondent's daily estimation of testosterone production.

Finally, the present dissertation traverses a parallelism between changes in consumer behavior for women and men when their hormones oscillate, in other words, when there is a reward effect or a comfort effect following drops and rises (Nyby, J.G, 2008; Griskevicius, et al., 2013).

Managerial Implications

This dissertation, if not empirical, could give a few important implications regarding management and strategies, especially on advertising. Brands could try to be associated with celebration moments so they would be induced in classical conditioning with testosterone rises as a reward effect, avoiding at the same time to be consumed for "comfort" purposes, as there

might be a negative feeling connection. This way they would reinforce a positive brand image and, hopefully, an increase in consumption.

Public Policy Implications

This study provides important implications for public policy, especially in terms of drinking alcohol. Sport matches' results can alter one's behavior and may lead to dangerous situations and consequences.

Limitations

The first clear limitation is the fact the survey was not under full randomization. This means that people were selected randomly to answer either scenario Win or Lose, but instead there should have been one study that would direct everyone randomly afterwards to the scenarios. It is something to be done further in a future study.

A second limitation is the number of participants. What was mentioned as "statistical casualty" may be a result of a lack of participants. This study could be noticeably more reliable if there were one thousand respondents instead.

The third limitation upfront that may bring a significant bias to this study is the development of long-term testosterone estimation, solely based on questions, being the first reason for conducting this study under an empirical analysis. Starting with the sub-variables chosen, the extent on which each of them impact testosterone is not clear, as some of them have a stronger effect on these hormone levels than others, and it was not possible to assess. Still, to diminish the bias, several questions were asked, so even if a man would "fail" in one habit, it would not necessarily mean that he would have low testosterone, since it is a set of factors. Nonetheless, it is important to take into account that this variable is an estimation and may be far from the truth. Although several aspects were taken into account before assuming the testosterone level of the respondent, there would be more precision if it could be directly tested through saliva analysis. Moreover, in terms of the variables used for this estimation, some that were good predictors were also hard to measure and therefore not included, such as strength and spatial cognition.

Future Research

From this theme

- Whether women with the digit ratio similar to men (meaning that they were exposed to higher quantities of prenatal testosterone than the norm) still produce higher quantities testosterone today and how that impacts their behavior as consumers versus men and versus women with their typical digit ratio. Will they behave similar to men? Will they show no differences from other women? Do they represent a third kind of consumer?

- Today, men are encouraged to talk about their feelings as a way to process daily conflicts. Maybe there is indeed a drop in testosterone, but is it possible that after the issues are solved and they are feeling great again, the testosterone rises again? Does testerone go down because men perceive talking as not masculine? If talking is normalized, is it possible that men do not suffer a drop in testosterone at all?

- As it is easier to evaluate differences in behavior with sudden changes in testosterone levels, Sport matches can be put on the pedestal of effective cases for future studying on testosterone, and should be used more often in the future for next studies. In fact, following the literature review, it would be expected that scoring points in the middle of the game also has a certain impact on testosterone. This might work as a bias for the present dissertation, but might be an interesting point to differentiate in future studies.

From this dissertation

- Although it was decided to ignore the interaction obtained in the Three-way ANOVA for TestosteroneGroups*Cheering, which was statistically significant for FeelGoDrink, it may be an interesting consideration to further research to understand the degree of influence that testosterone levels have on cheering for a sport's team and vice-versa.

- Even though participants' age was collected, its distribution among the groups was not clear to be considered as a moderator for the analysis. In the future, it would be important to gather several respondents from each age group, in order to test the aging effect on the previous tests.

8) Appendices

Appendix 1: Main Survey

Start of Block: INTRODUCTION

Thank you for entering this survey.

Answering with honesty is extremely important for the development of the research for a Master Thesis, on the course of Management with specialization in strategic marketing.

In the following sections, you will find some questions regarding your personality, daily life and your perceptions of products and respective brands for an analysis in terms of consumer behavior.

Please note that all responses will be anonymous.

End of Block: INTRODUCTION

Start of Block: SCREENING QUESTIONS

Q1 How old are you?

- 18-29
- 30-39
- 40-49
- 50-59
- 60-69
- >69

Q2 What is your gender?

- Male
- Female
- Other/Prefer not to say

Skip To: End of Survey If What is your gender? = Other/Prefer not to say

Skip To: End of Survey If What is your gender? = Female

Q3 How frequently do you watch sports?

- Never
- 1-6 times a year
- 1-2 times a month
- Once a week
- 2-5 times a week
- Everyday

Skip To: End of Survey If How frequently do you watch sports? = Never

End of Block: SCREENING QUESTIONS

Start of Block: PERSONALITY, PHYSICS & HABITS

Q4 To each degree do you talk about your feelings (about your day or about life in general) to a close person?

- Never.
- Rarely, only in extreme situations.
- Sometimes, when something is needed to be said.
- Often, whenever I feel like talking about it.
- Always, I like to unburden my mind in a daily basis.

Q5 How frequently do you make the decisions?

- I always want to make the decisions.
- I prefer to make the decisions most of the time.
- Sometimes I make the decision, other times I prefer that others make it for me.
- I prefer that people make the decisions for me most of the time.
- I always prefer others to make the decisions.

Q6 How much stress do you feel in a daily basis?

	1	2	3	4	5	
I never feel stressed at all	○	○	○	○	○	I feel stressed all the time

Q7 How often to you feel depressed?

- Never/rarely
- Sometimes
- Very often/Always

Q8 How do you classify your quality of sleep?

- Very poor
- Poor
- Sometimes poor, sometimes good
- Good
- Extremely good

Q9 What type of "awakener" are you in the morning?

- I usually get up before 8 am.
- I usually get up between 8 am and 10 am.
- I usually get up after 10 am.

Q10 Place your hand straight with the palm facing upwards. Now focus on your index finger (2nd) and your ring finger (4th). Please select the option that applies to you.

- My index finger is bigger than my ring finger.
- My index finger and my ring finger are the same size.
- My index finger is smaller than my ring finger.

Q11 Are you currently in a long-term relationship?

- Yes
- No

Skip To: End of Block If Are you currently in a long-term relationship? = No

Q12 In your current relationship dynamics, select the option with which you identify yourself the most.

	1	2	3	4	5	
Obedient	○	○	○	○	○	Dominant / Decision Maker

Q13 If you have children, how much time in average do you spend **nurturing** them per day?

- Less than 1 hour
- 1 hour - 2 hours
- More than 2 hours

End of Block: PERSONALITY, PHYSICS & HABITS

Start of Block: JOB ENVIRONMENT

Q14 In your job/ studies, do you often assume a leadership role?

- Yes
- No

Skip To: Q21 If In your job/ studies, do you often assume a leadership role? = No

Q15 How many people do you usually supervise in your job?

_____

Q16 In your job/ studies, how frequently do you find yourself in a competing state?

- Never
- Once or twice a year
- Once a month
- Once a week
- Everyday / Almost everyday

Skip To: Q24 If In your job/ studies, how frequently do you find yourself in a competing state? = Never

Q17 In the previous competing situations, how frequently do you feel as a winner?

- Never
- Almost never
- A few times
- Once a week
- Everyday / Almost everyday

Q18 To which extent do you consider yourself as competitive?

	1	2	3	4	5	
Not at all competitive	○	○	○	○	○	Very competitive

End of Block: Job environment

Start of Block: Sports

Q19 How frequently do you drink alcohol?

- Never
- Once in a while
- Once a week
- 2-3 times a week
- Once a day
- More than once a day

Q20 How frequently do you smoke?

- Never
- Once in a while
- Once a week
- 2-3 times a week
- Once a day
- More than once a day

Q21 How frequently do you eat delicious but unhealthy food?

- Never
- Once in a while
- Once a week
- 2-3 times a week
- Once a day
- More than once a day

Page Break

Q22 How strongly do you cheer for your sport team(s)?

- I watch some matches but I don't mind missing an important one.
- I only watch the most important matches.
- I watch the most important matches and some of the others less important.
- I watch all of my team's matches.

Page Break

RESPONDENT A – WINNING SCENARIO

Q23 Now we ask you to please recall the last time your team **won a big game**. Take a few second to remember and visualize the moment of the decisive score, the final whistle and the rush of joy that you felt. You are so happy, you feel like jumping and partying with your family and friends for the huge victory you have been waiting for. You don't think you are going to even be able to sleep at night.

Q24 **In the present moment,** select the option that applies best. "I feel like grabbing a beer or another alcoholic drink".

- Strongly disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Agree
- Strongly agree

Q25 **In the present moment,** select the option that applies best. "I feel like eating some delicious and unhealthy food".

- Strongly disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat
- Agree
- Strongly agree

Q26 **In the present moment,** select the option that applies best. "I feel like smoking".

- Strongly disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Agree
- Strongly agree

End of Block

Thank you so much for taking the time to fill in this survey. The real goal of these questions is to assess your prenatal testosterone production and to understand the effect of short-term testosterone changes in your behavior as a consumer. If you would like to see the results of this master thesis when it is published, send an email to catarina.almeida.norte@gmail.com. Again, you attention is highly appreciated.

**

RESPONDENT B – LOSING SCENARIO

Page Break

Q23 Now we ask you to please recall the last time your team **lost** a big game. Take a few second to remember and visualize the moment of the decisive score, the final whistle and the rush of frustration that you felt. You are so sad because you were really hoping for a victory this time, and all of your friends that are on the opposite team are celebrating against your team. You don't think you are going to even be able to sleep at night.

Page Break

Q24 **In the present moment,** select the option that applies best. "I feel like grabbing a beer or another alcoholic drink".

- Strongly disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Agree
- Strongly agree

Q25 **In the present moment,** select the option that applies best. "I feel like eating some delicious and unhealthy food".

- Strongly disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat
- Agree
- Strongly agree

Q26 **In the present moment,** select the option that applies best. "I feel like smoking".

- Strongly disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Agree
- Strongly agree

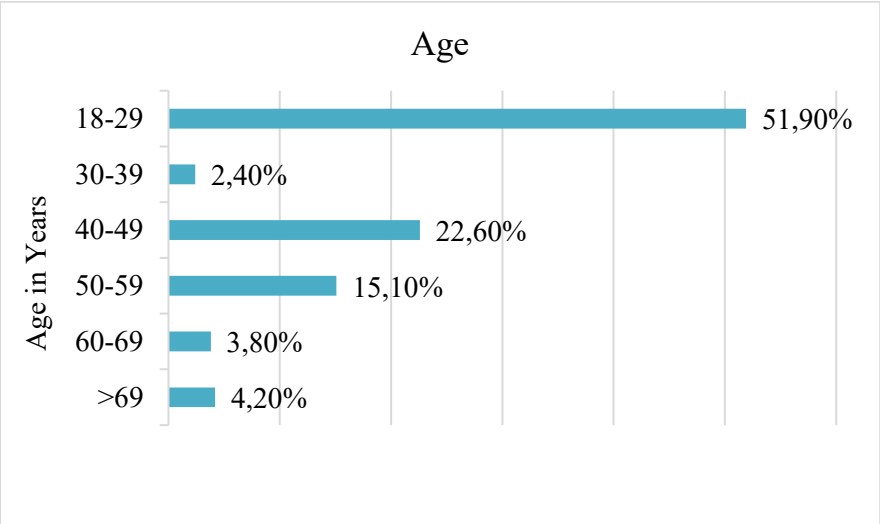
End of Block

Thank you so much for taking the time to fill in this survey. The real goal of these questions is to assess your prenatal testosterone production and to understand the effect of short-term testosterone changes in your behavior as a consumer. If you would like to see the results of this master thesis when it is published, send an email to catarina.almeida.norte@gmail.com. Again, you attention is highly appreciated.

Appendix 2: Sample Characterization

Main survey sample characterization

Table 1.



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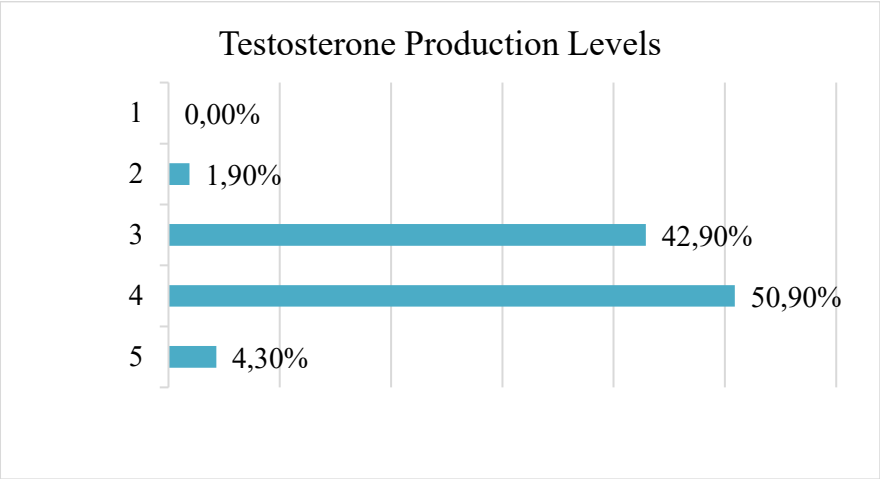

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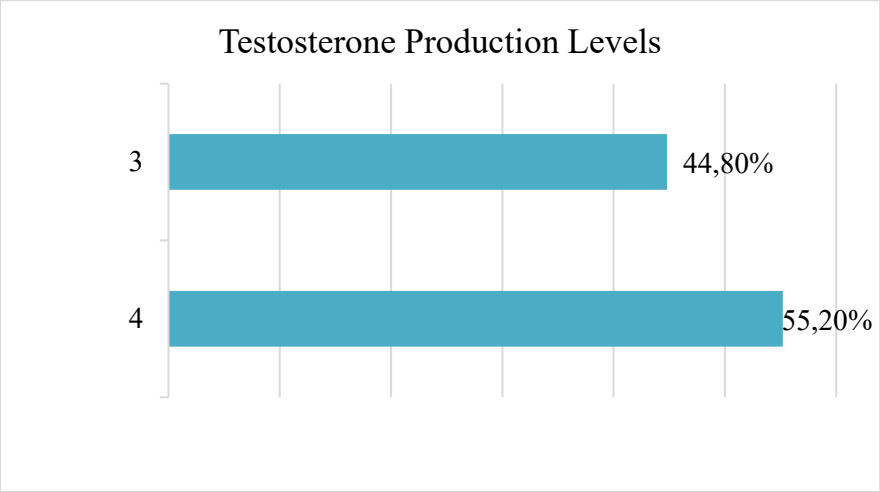
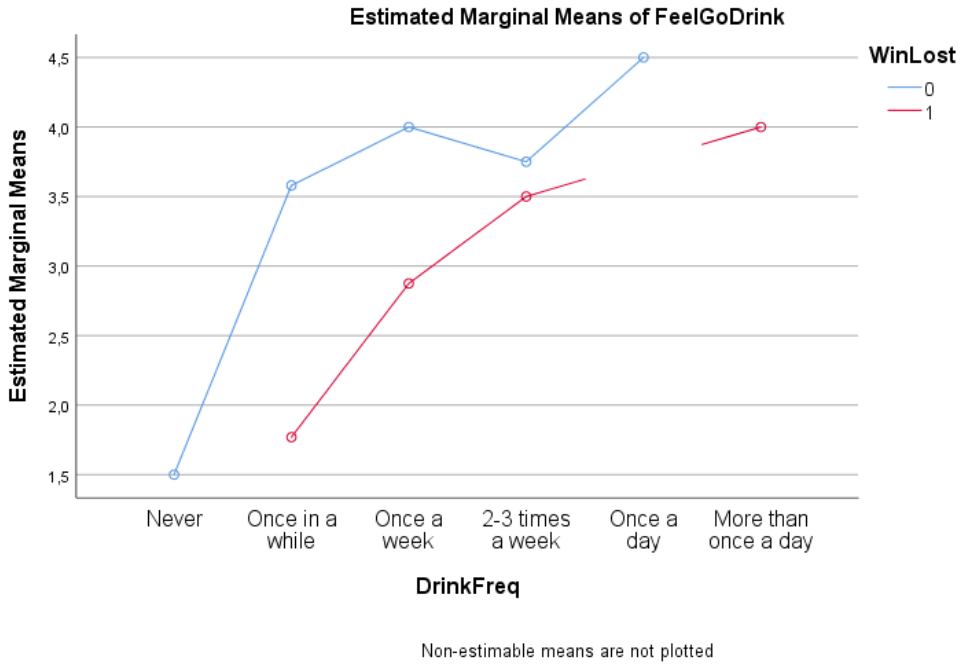
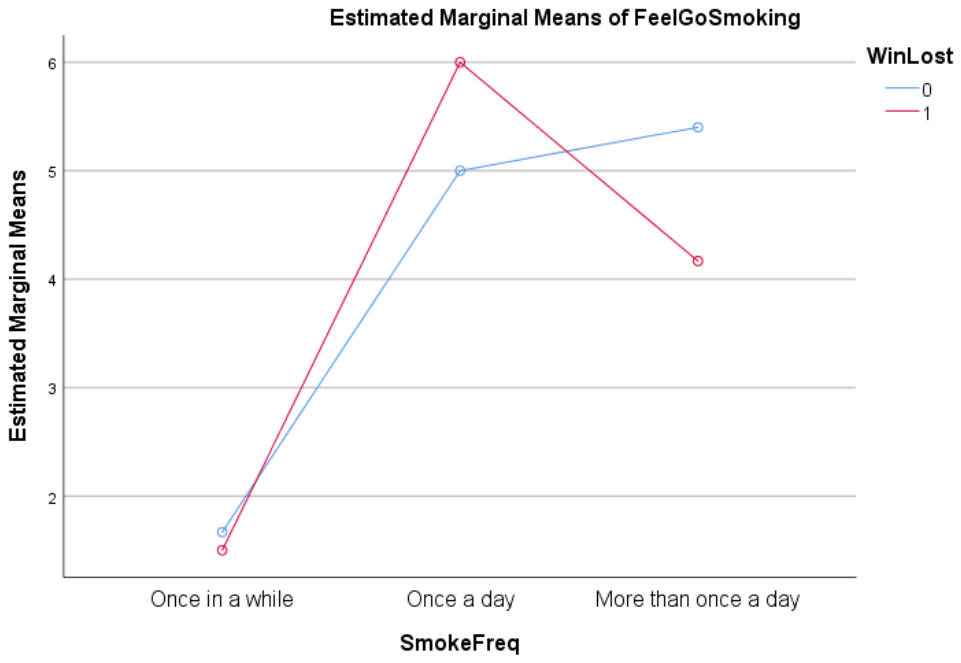


Appendix 3: Profile Plots - 2 (Manipulation scenarios: Win Vs Lose) x 6 (Consumption/Habit Frequency) MANOVA

Graph 1.



Graph 2.



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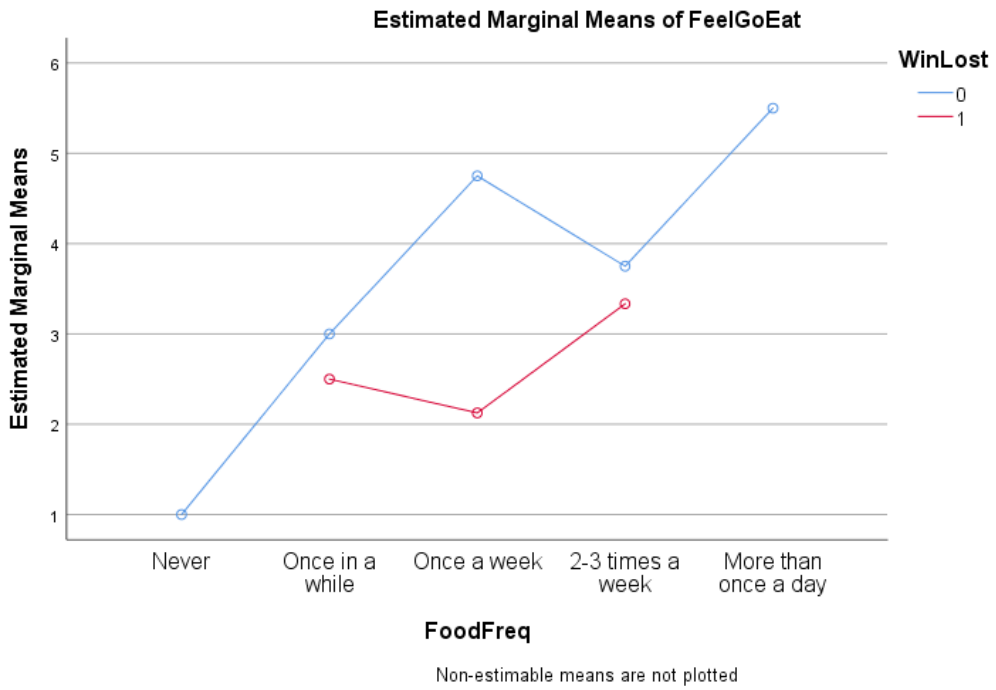
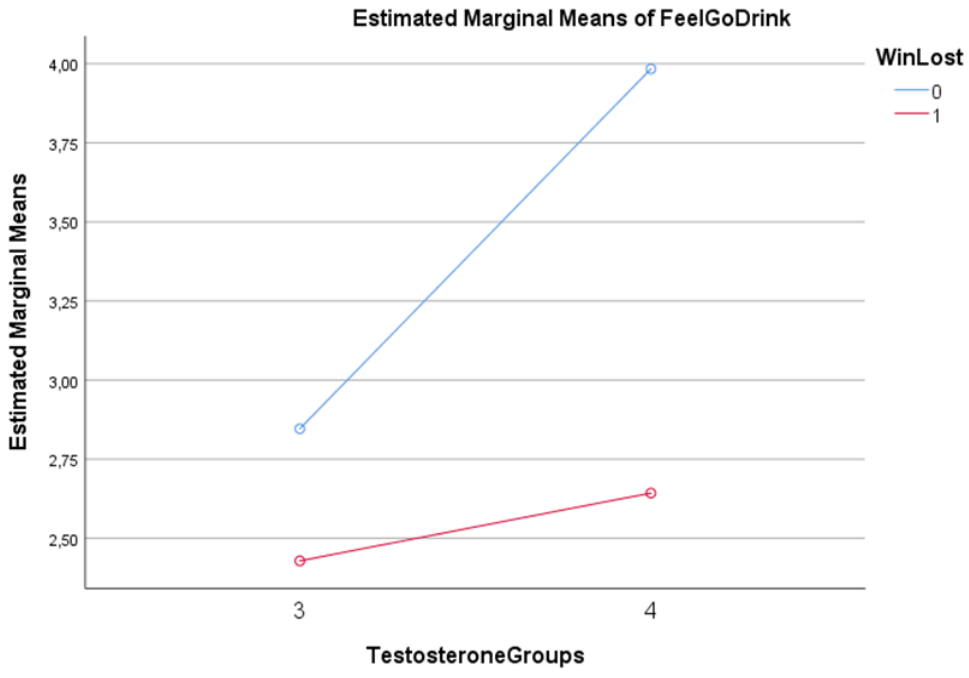
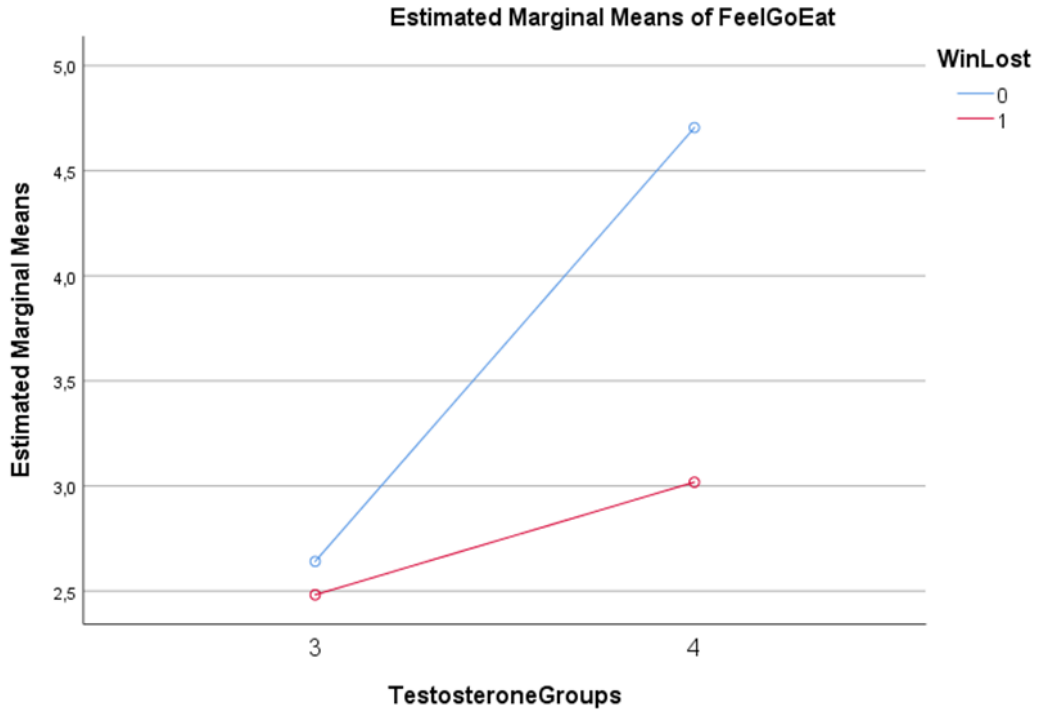


Appendix 4: Profile Plots - 2 (Manipulation scenarios: Win Vs Lose) x 2 (Testosterone Production level) MANOVA

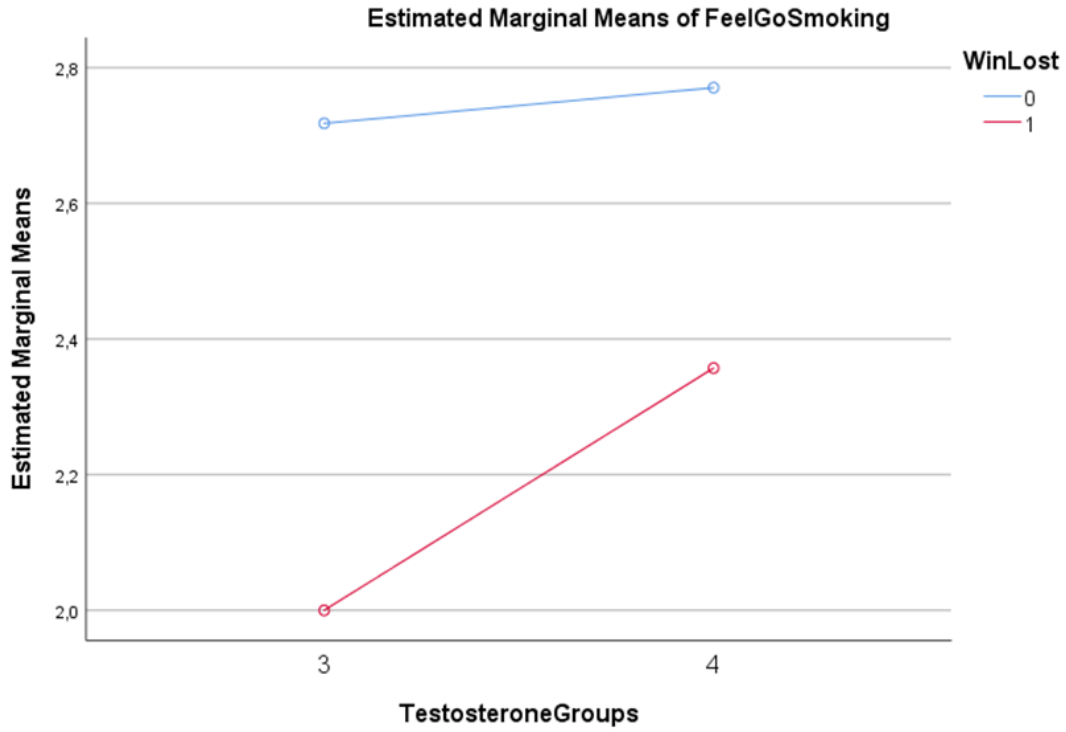
Graph 4.



Graph 5.

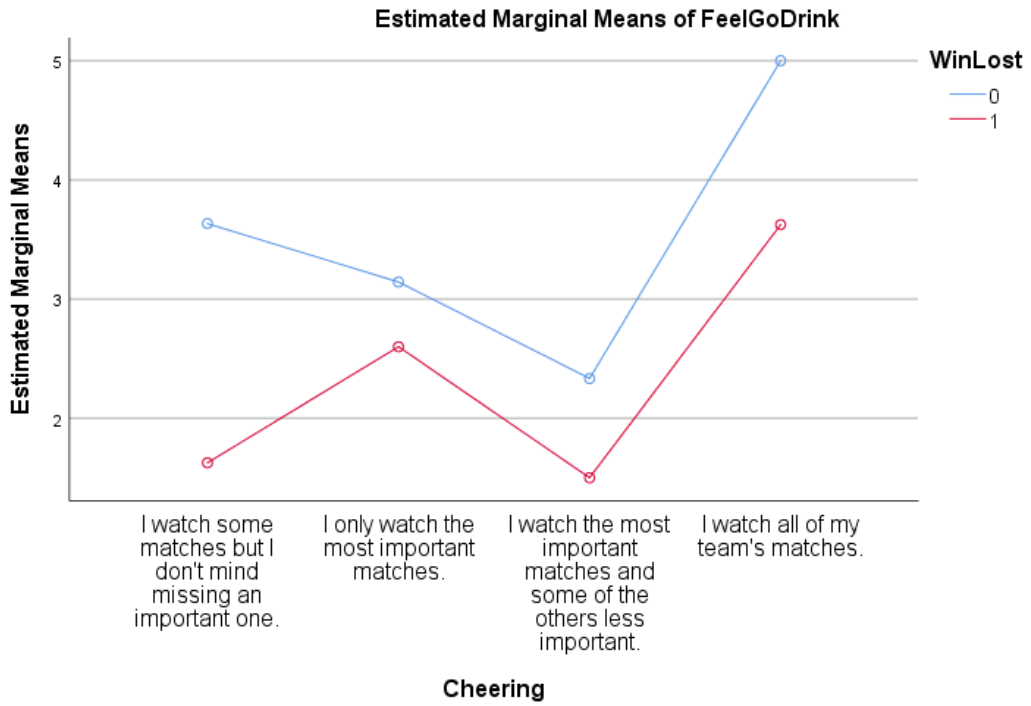


Graph 6.

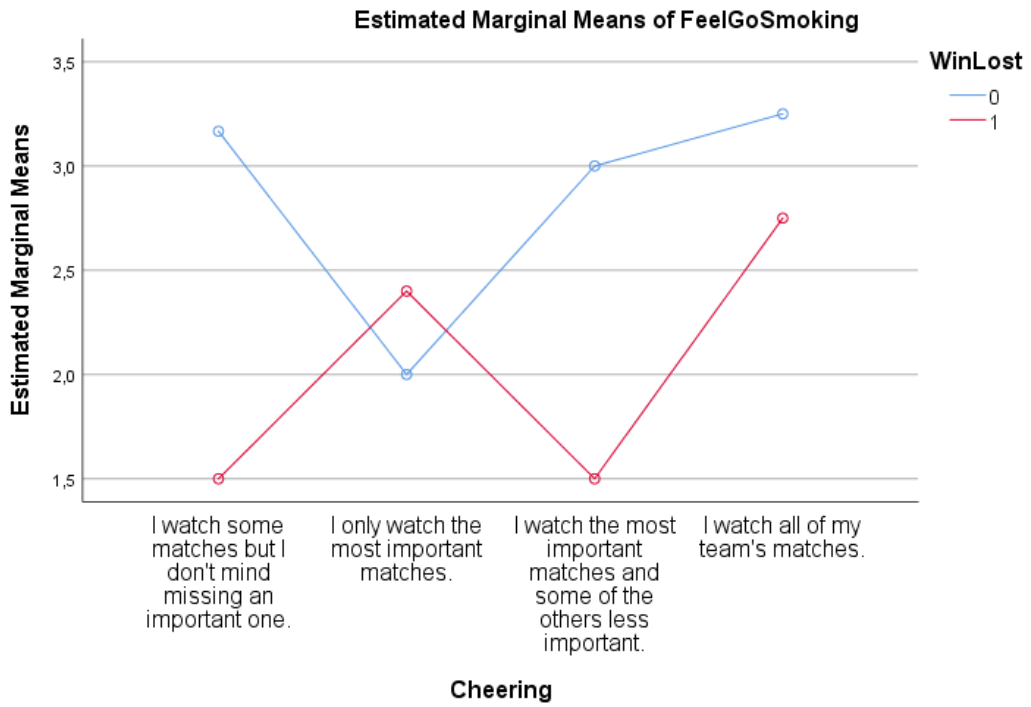


Appendix 5: Profile Plots - 2 (Manipulation scenarios: Win Vs Lose) x 4 (Cheering extent for the manipulations' team) MANOVA

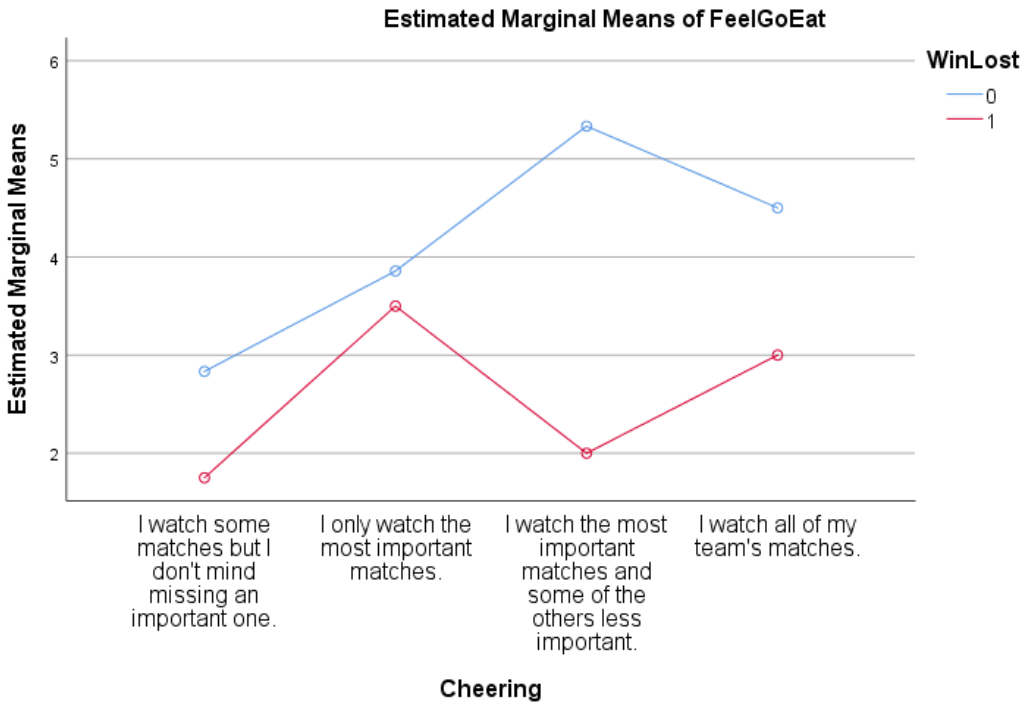
Graph 7.



Graph 8.



Graph 9.


Estimated Marginal Means of FeelGoEat
WinLost
0
1
Estimated Marginal Means
6
5
4
3
2
I watch some matches but I don't mind missing an important one.
I only watch the most important matches.
I watch the most important matches and some of the others less important.
I watch all of my team's matches.
Cheering

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