UNIVERSITY OF SINOS RIVER VALLEY - UNISINOS
ACADEMIC RESEARCH AND GRADUATE UNIT
GRADUATE PROGRAM IN ADMINISTRATION
DOCTORATE LEVEL

VINICIUS ANTONIO MACHADO NARDI

I am the target! Effects of food safety risk perception on consumer behavior: the moderation role of prototype perception and visual attention to safety labels

PORTO ALEGRE
2019

Vinicius Antonio Machado Nardi

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A thesis presented as a partial requirement to obtain the title of Doctor of Business Administration, from the Graduate Program in Administration of the University of Sinos River Valley – UNISINOS

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N223i Nardi, Vinicius Antonio Machado.
I am the target! Effects of food safety risk perception on consumer behavior: the moderation role of prototype perception and visual attention to safety labels / Vinicius Antonio Machado Nardi – 2019.
90 f. : il. ; 30 cm.

Tese (doutorado) – Universidade do Vale do Rio dos Sinos, Programa de Pós-Graduação em Administração, 2019.
"Orientador: Prof. Dr. Wagner Junior Ladeira"

1.Alimentação. 2. Comportamento do consumidor 2. Escolhas alimentares. 3. Segurança dos alimentos. 4. Percepção de risco. I. Título.

CDU 658

Dados Internacionais de Catalogação na Publicação (CIP)
(Silvana Teresinha Dornelles Studzinski – CRB 10/2524)

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Aprovado em 17 de dezembro de 2019.

BANCA EXAMINADORA

Celso Augusto de Matos – Universidade do Vale do Rio dos Sinos (UNISINOS)

Fernando de Oliveira Santini – Universidade do Vale do Rio dos Sinos (UNISINOS)

Rafael Teixeira – College of Charleston

Andrea Guazzini – Università Degli Studi di Firenze

Diego Costa Pinto – Universidade Nova de Lisboa

AGRADECIMENTOS À CAPES

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

OBRIGADO!

Vou começar pelo fim. Pelo fim pelo qual iniciei tudo isso. Começo por minha esposa Jacyara e minhas filhas Mikaela, Francesca e Lorenza. Dar um passo a mais sempre foi uma forma de romper limites e ampliar as possibilidades. A ciência, por si só, é uma dádiva que permite criar caminhos. Percorrê-los é uma opção individual mas saber que é possível é transformador. Obrigado pela compreensão, suporte e motivo. Por serem razão, causa e esperança. Por serem amor em sua forma mais plena. Por vocês e pra vocês.

Toda trajetória inicia com um primeiro passo...e esse foi dado muito tempo atrás. Agradeço aos meus pais Moacir e Iana, tia Ivana e avós Maria e Darci (in memoriam) por terem recheado estantes de livros e gibis. Por terem me desafiado desde sempre a ser inquieto e não me contentar com respostas definitivas.

Nessa trajetória fui presenteado com pessoas incríveis. Deixo meu agradecimento especial ao prof. Dr. Wagner Ladeira, por sua orientação e suporte. Não apenas por ser inspiração como docente mas especialmente como ser humano. Aos professores Rafael e Diego, pelas discussões e inquietações. Pelos estímulos e energia constantes. Vocês foram incríveis em todos os momentos e em vocês agradeço a todos os mestres que tive ao longo desses anos de estudo.

Aos meus colegas de doutorado no Brasil, em especial ao Daniel, ao William e ao Felipe. Obrigado pelo convívio e atitude transformadora. Aos profissionais desta instituição transformadora que é a Unisinos, representados pela competente e carismática Ana Zilles, meu mais profundo obrigado por existirem.

Aos amigos que as incontáveis celebrações da vida me deram. Aos meus sogros e cunhados. Aos membros da família estendida – Putti e família, Neiton e família, Marlon e família. Vocês foram vitais pra oferecerem oxigênio pro cérebro no meio de tantas dúvidas.

Aos meus amigos e colegas de Embrapa, em especial à Lisiani, à Flávia e ao Ênio. Pela empatia, força e companheirismo. Vocês foram vitais pra cada passo. Aos pesquisadores Alexandre e Marcelo, por servirem de inspiração e auxílio com sua atenção e conhecimento.

Ao professor Andrea Guazzini e aos amigos do departamento de Psicologia Social da Università Degli Studi di Firenze, em especial Federica, Sara, Stephania e Enrico. Obrigado pelo convívio intenso e precioso no período do sanduíche. Vocês estão na minha história.

Por fim a todos aqueles que acreditam na ciência como forma de transformação social. Simbolicamente, agradeço a todos por meio dos professores e estudantes que voluntariamente participaram dos estudos experimentais dessa tese. Obrigado por contribuírem com este sonho.

THANKS!

I will start at the end. By the end, I started all this. I start with my wife Jacyara and my daughters Mikaela, Francesca, and Lorenza. Taking a step further has always been a way of breaking boundaries and expanding possibilities. Science, by itself, is a gift that allows us to create paths. Walking through them is an individual option, but knowing what is possible is transformative. Thanks for your understanding, support, and reason. For being the reason, cause, and hope. For being love in its fullest form. For you and because you.

Every trajectory starts with a first step, and that was taken a long time ago. I thank my parents Moacir and Iana, aunt Ivana and grandparents Maria and Darci (in memoriam) for stuffing bookshelves and comics. Because they have always challenged me to be restless and not content with definitive answers.

In this trajectory, I was presented with amazing people. I leave my special thanks to prof. Dr. Wagner Ladeira, for your guidance and support. Not just for being an inspiration as a teacher but especially as a human being. To the teachers Rafael and Diego for their discussions and concerns. By the constant stimuli and energy. You have been fantastic at all times, and I thank all the masters I have had throughout these years of study.

To my doctoral colleagues in Brazil, especially Daniel, William, and Felipe. Thank you for your conviviality and transformative attitude. To the professionals of this transformative institution that is Unisinos, represented by the competent and charismatic Ana Zilles, my sincerest thanks for existing.

To the friends that life and the countless celebrations of life have given me. To my in-laws and brothers-in-law. To extended family members - Putti and family, Neiton and family, Marlon and family. You were vital in offering oxygen to the brain amid so many doubts.

To my friends and colleagues from Embrapa, especially Lisiani, Flávia, and Enio. For empathy, strength, and companionship. You were vital to every step. To the researchers, Alexandre and Marcelo, for being an inspiration and help with their attention and knowledge.

To Professor Andrea Guazzini and friends of the department of Social Psychology of the Degli Studi di Firenze University, in particular, Federica, Sara, Stephania, and Enrico. Thank you for the intense and precious conviviality in the sandwich period. You are in my story.

Finally, to all those who believe in science as a form of social transformation. Symbolically, I thank you all through the teachers and students who voluntarily participated in the experimental studies of this thesis. Thank you for contributing to this dream.

*L*earning is the only thing the mind never exhausts, never fears, and never regrets.

(Leonardo da Vinci)

Eu sou o alvo! Efeitos da percepção de risco de segurança alimentar no comportamento do consumidor: o papel de moderação da percepção do protótipo e atenção visual aos rótulos de segurança

RESUMO

Como a percepção de risco de segurança alimentar (FSRP) influencia o comportamento do consumidor (CB)? Em quatro estudos experimentais, combinando uma pesquisa experimental on-line e rastreamento ocular, esta pesquisa amplia achados anteriores ao demonstrar que o FSRP causa efeitos adversos na intenção de comprar alimentos e no processo de tomada de decisão - especialmente para produtos alimentícios com riscos específicos médios-altos (no estudo 1). Além disso, esta pesquisa considera a teoria da atenção visual (no estudo 2) e o modelo protótipo-desejo (no estudo 3) para mostrar que os consumidores que prestam atenção alta (vs. baixa) aos símbolos de segurança de segurança e têm uma positiva (vs. negativa) avaliação de pacientes com doenças transmitidas por alimentos mudará seu processo de tomada de decisão e reduzirá os efeitos adversos do FSRP na CB, proposições confirmadas no estudo 4. Este estudo contribui com a literatura que investiga a escolha de alimentos, demonstrando que diferentes produtos alimentares possuem diferentes níveis de percepção de risco- e que esse fator modera o efeito negativo do FSRP no CB. Além disso, a pesquisa mostra o papel crucial das certificações de segurança para mitigar o impacto negativo do FSRP no CB em alimentos percebidos como de alto risco - e a inexistência desse efeito em alimentos de médio/baixo risco percebido. Finalmente, o estudo amplia o escopo da contribuição do modelo protótipo-desejo para o campo da escolha de alimentos e revela um resultado surpreendente: indivíduos com alta percepção de semelhança com pacientes com doenças transmitidas por alimentos aumentam significativamente sua atenção visual durante a escolha – quase triplicando a atenção visual aos símbolos de segurança. Juntos, os resultados sugerem que os gestores podem reduzir o impacto negativo do FSRP (i) reforçando fatores para melhorar a atenção visual às etiquetas de segurança e (ii) incentivando o consumidor a aprimorar a percepção positiva do protótipo sobre doenças transmitidas por alimentos pacientes - aumentando sua percepção de similaridade do protótipo.

Palavras-chave: Escolhas alimentares; Percepção de protótipo; Segurança dos alimentos; Atenção visual; Percepção de risco

I am the target! Effects of food safety risk perception on consumer behavior: the moderation role of prototype perception and visual attention to safety labels

ABSTRACT

How do food safety risk perception (FSRP) influence consumer behavior (CB)? In four experimental studies, combining an online experimental survey and eye-tracking, this research extends prior research in demonstrating that FSRP causes adverse effects on the intention to buy food and in the decision-making process - especially to medium-high specific food products risk perception (in study 1). Additionally, this research considers the visual attention theory (in study 2) and the prototype-willingness model (in study 3) to show that consumers who take high (vs. low) attention to safety labels and have a positive (vs. negative) perception of foodborne disease patients will change their decision-making process and reduce the adverse effects of FSRP on CB, propositions supported in study 4. This study contributes to the literature that investigates the food choice by demonstrating that different food products have different levels of risk perception – and this factor is an essential moderator in the negative effect of FSRP on CB. Also, the research showing the crucial role of safety labels to mitigate the negative impact of FSRP on CB in specific high-risk foods – and the inexistence of this effect on medium/low-risk foods. Finally, the study broadens the scope of the contribution of the prototype-willingness model to the food choice field and reveals a surprising result: individuals with a high perception of similarity with foodborne illness patients significantly increase their visual attention during the choice – and almost triple the visual attention to safety labels. Together, the results suggest that managers may be able to reduce the negative impact of FSRP by (i) reinforce bottom-up factors to improve the visual attention to safety labels and (ii) nudge the consumer to enhance the positive prototype perception about foodborne disease patients - increasing their perception of prototype similarity.

Keywords: Food choices; Prototype Perception; Food Safety; Visual Attention; Risk Perception

FIGURE LIST

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SUMMARY

1 INTRODUCTION

> *"... foodborne pathogens are an important cause of diarrheal disease, which is estimated to cause 2.2 million deaths every year" (WHO, 2014)*

The history of this study starts with an unexpected, challenging, and hitherto unusual event. It was the summer of 2014, and our family was faced with skin lesions that appeared for no apparent reason, bringing anguish and marks. After months of intense investigation, the great villain was revealed: gluten. However, even after disposing of all products with the substance from our refrigerator and cabinets, the problem persisted. Where were we going wrong?

In front of a package of rice, we read the label that would start the solution of our family case and also this thesis: "May contain gluten traces." This journey revealed that thousands of foodborne disease patients shared this pain. People that suffer and die because of the presence of unexpected substances in foods. Worse: people who often don't even recognize this problem. Such as other ills in contemporary society, food contamination is far from being just a local problem gaining exponential contours with the strengthening of global supply chains.

Food safety is recognized as a part of food security, which occurs when people have physical, social and economic access to sufficient, safe and nutritious food to meet their food needs and preferences, ensuring a healthy and active life (Godfray et al., 2010; Redmond & Griffith, 2004; Unnevehr, 2007). In this way, food safety - that is, the availability of food without physical, chemical, or biological contaminants - is a central issue in the study of global food chains (Manning & Soon, 2016; Marucheck, Greis, Mena, & Cai, 2011). Cases of disease outbreaks in Europe (Bocker, 2002), contamination of pet food in Europe and North America (Roth, Tsay, Pullman, & Gray, 2008) and the contamination of formula for infants with melanin in China (Yang, Huang, Zhang, Thomas, & Pei, 2009) attracted the attention of managers and researchers, resulting in a series of studies and managerial actions to mitigate this problem (Auler, Teixeira, & Nardi, 2017). However, recent cases such as the contamination with Escherichia coli in the Chipotle Mexican Grill restaurants in the United States (2015), the identification of plastic residues in chocolate Mars (2016) and the crises in food chains - especially Brazilian milk and meat (2017), have indicated that the management of food safety in food supply chains - increasingly complex and global - is still far from consistent. Unsafe food causes more than 200 diseases, and each year, approximately 600 million people get sick from eating contaminated food - and 420,000 die from it ("Food Safety," 2019). It is no

coincidence that food safety is one of the biggest consumer concerns in a global society (Wu, 2017; Moreira, Garcia-Díez, de Almeida & Saraiva, 2019).

In this context, inspection and control practices have directed public and private policies to mitigate contamination risks. Private food standards (such as GlobalGAP, International Food Standard, and Forest Stewardship Council) investigate different points in the food chain to identify potential threats and not let them reach the consumer's table (Clarke, 2010). Similarly, countries have adopted non-tariff barriers to stimulate safe food production and procurement (Grundke & Moser, 2019; Jongwanich, 2009). In 2017, for example, Asian countries limited imports of chicken and eggs from the US due to detected cases of bird flu. Russia (the Brazilian second-largest importer of beef and pork meat) also acted through the Federal Sanitary and Phytosanitary Surveillance Service (Rosselkhoznadzor) in 2017/2018 to suspended imports in November 2017 due to the presence of ractopamine in animal products from meat plants. The import just was resumed a year later, causing billionaires losses to the meat production chain.

A decisive factor in the improvement of production/logistics structures in the food supply chain is the consumer (Hatanaka, Bain, & Busch, 2005; Henson & Reardon, 2005). Through the acquisition of safe food and negation in the purchase of products that do not hold this attribute, consumers can nudge (Thaler & Sunstein, 2008) win-win contexts that help consumers to eat better (Chandon & Wansink, 2012) and supply chains to be reliable. However, organizational and institutional efforts to engage the consumer in this proposition have generated limited changes in demand (Bocker & Hanf, 2000; Park, Jin, & Bessler, 2008; Yadavalli & Jones, 2014). In this sense, the role of food safety risk perception (FSRP) as a predictor of consumer behavior (CB) - an integrative concept used to indicate the dependent variables decision-making process and intention to buy (Jost, 2017; Li, Gordon & Gelfand, 2017) - has received less attention on the management literature (Nardi, Auler & Teixeira, 2020).

The risk perception is the evaluation of an individual on the probability and potentiality that a particular situation has of causing him or her harm to health or his well being (Slovic, 1987). In the specific context of food choices, perceived risk is characterized by a personal belief in the potential damage caused by the ingestion of food (Roth et al., 2008; Schroeder, Tonsor, Pennings, & Mintert, 2007). Consumers often use psychological, social, institutional, and cultural factors to recognize food risks (Slovic, 1993), generally subject to bias such as optimism (Frewer, Shepherd, & Sparks, 1994), knowledge (McCluskey & Swinnen, 2004) or trust (Amin, Azad, & Samian, 2013). Preliminary findings regarding the consequences of

perceived risk indicated adverse effects on the intention (Rodriguez-Entrena & Sayadi, 2013; Sodano, Gorgitano, Verneau, & Vitale, 2016) and food consumption (Klerck & Sweeney, 2007; Yeung, Yee, & Morris, 2010). The negative effect is moderated by contextual factors such as origin (animal vs. vegetal food) and involved technology (such as organics, genetically modified food) (Bearth, Cousin, & Siegrist, 2016; Mullan, Wong, & Kothe, 2013; Van Kleef et al., 2007). However the influence of risk perception on the consumer decision-making process (Sitkin & Pablo, 1992) and its impacts on consumption were confirmed in the previous literature, fewer studies investigated - especially with experimental approaches - the specifical role of FSRP in the CB, especially considering the heterogeneity of specific risk perception for different categories of food, the primary objective of this study.

The second target is to understand the role of visual attention to safety labels on FSRP-CB relationships. Preliminary studies on the food context were conducted to understand the effects of bottom-up marketing strategies – such as certifications and traceability labels – on the healthy food choice (Chandon, 2013; Kozup, Creyer, & Burton, 2003; Newman, Burton, Andrews, Netemeyer, & Kees, 2018; Nikolova & Inman, 2015; Vadiveloo, Morwitz, & Chandon, 2013; Wansink & Chandon, 2006) and the visual attention to the product (Chandon, Hutchinson, Bradlow, & Young, 2009). However, less attention has been given in the safety arena, especially to understanding the interaction between these factors on FSRP and its consequences on the CB.

Finally, in the risk-behavior literature, considerable attention has been devoted to top-down psychological factors that interact in the central relation, especially the prototype perception (Gibbons & Gerrard, 1995). The influence of prototype perception on decision-making process was explored in preliminary studies that sought to explain why individuals engaged in/abstained from certain behaviors (Blanton, Burrows, & Jaccard, 2016; Gibbons, Gerrard, Blanton, & Russell, 1998; Reyna & Farley, 2006), especially in contexts involving risk perception and actions (Gibbons, Gerrard, Cleveland, Wills, & Brody, 2004; Ohtomo & Hirose, 2007; Thornton, Gibbons, & Gerrard, 2002). In the specific context of food consumption, acquisition occurs most often in an "automatic" mode, assuming a reduction of the cognitive processes to achieve behavior (Ajzen & Sexton, 1999). In this way, the prototype perception of foodborne disease patients can be awakened and moderate the effects generated by FSRP on the CB. Investigate this effect is the third target of this research.

This research, build on four streams of literature – food safety (Grunert, 2005; Lobb, Mazzocchi, & Traill, 2007), risk perception (Slovic, 1987), visual attention (Pieters & Wedel, 2004) and prototype perception (Gibbons & Gerrard, 1995), shed light on the interplay between

this variable on the food choice context. By doing so, we contribute to the literature by (i) establish a theoretical link between FSRP, specific food product risk perception (SFPRP) and CB (ii) identify the moderating role of visual attention on the main effects and (iii) show the role of prototype perception such as moderator in the relation between FSRP and CB. In the same sense, our findings can be used by managers to (i) suggest communication actions in food supply chains (especially traceability and certification), which could promote a collective improvement of the safety environment; and (ii) subsidiary strategies to make the consumer a safety driver (through actions such as non-consumption or safe choices), a determinant factor for the improvement of the institutional environment and consequent decrease of food insecurity events, reducing foodborne diseases and losses from these situations.

2 THEORETICAL BACKGROUND

Consumer behavior in food choice is a decisive factor in ensuring food safety and social welfare. Through their habits, consumers induce strategies in agricultural supply chains (Ambe & Badenhorst-Weiss, 2011) and promoting the development and sustainability of markets. We can perceive this power in contexts such as organic food (de Maya, Lopez-Lopez, & Munuera, 2011) or local foods (Kumar & Smith, 2018). In both cases, the growing demand for these products stemming from individual micro-decisions in the purchase of food has established new practices and market opportunities

Given its relevance to the structuring of the food production ecosystem, food choice has been intensively investigated through different areas of knowledge, such as nutrition - whose attention is directed to the understanding of social and behavioral factors that influence decision (Nestle et al., 1998), the dissemination of knowledge about specific product attributes (Wardle, Parmenter, & Waller, 2000)) and its social consequences as obesity (Drewnowski & Specter, 2004) and lifestyle factors (Sjoberg, Hallberg, Hoglund, & Hulthen, 2003)– and psychology - mainly devoted to understanding emotional and cognitive factors in food choice (Gibson, 2006; Oliver & Wardle, 1999) -. Within the marketing field, substantial research has focused on identifying predictive factors for food acquisition and consumption. In this sense, the bottom-up – such as symbols and visual saliency (Allen, Gupta, & Monnier, 2008; Milosavljevic, Navalpakkam, Koch, & Rangel, 2012)– and top-down factors – such as self-esteem, mood and social comparison (Ferraro, Shiv, & Bettman, 2005; Gardner, Wansink, Kim, & Park, 2014; McFerran, Dahl, Fitzsimons, & Morales, 2010), served as a basis for analysis of consumption behaviors.

Despite the intensive investigation about predictive of food choice, little attention was devoted to the role of FSRP in this context. As Table 1 shows, safety was briefly explored in the consumer behavior literature, limited to theoretical and survey approaches. Studies with experimental analysis, in this context, dedicated particular interest to other topics, such as social influences, healthy, and price.

Table 1 – Selected food choice literature on the marketing domain

Study	Method	Theory base	Explored food question	Key findings
(Grunert, 2005)	Theoretical	Means-end	Consumer perception of safety	Perception of food safety affect consumer food choice
(Ferraro et al., 2005)	Experimental	Terror Management Theory	Self-Esteem influence on food choice	Mortality salience led to more indulgent food choices
(Pieniak, Verbeke, Scholderer, Brunso, & Olsen, 2008)	Survey	Theory of planned behavior	Risk perception effect on fish consumption	Increased risk perception negatively influences subjective health and fish consumption
(Allen et al., 2008)	Experimental	Self-congruity theory	Food taste perception	Consumers who endorsed the values symbolized by the product evaluate the product more favorably.
(McFerran et al., 2010)	Experimental	Not declared	Social influence on food choice	Consumers were more persuaded by a heavy (vs. thin) server on their food choices
(Milosavljevic et al., 2012)	Experimental	Visual attention theory	Visual properties	Visual saliency influences food choices more than preferences. The bias increases with cognitive load
(Ma, Ailawadi, & Grewal, 2013)	Econometric analysis of	Protection motivation theory	Healthy food choices	Personal characteristics (higher education and nutrition interest) impact

	secondary data (panel data)			calories, sugar and carbohydrates consumed
(Wansink & Chandon, 2014)	Literature review	Consumption norm theory	Food consumption quantity	Food consumption quantity research on the marketing domain concentrates on sensory and emotional cues.
(Gardner et al., 2014)	Experimental	Temporal construal level and mood theory	Influence of mood on food choices	A positive attitude leads to a higher preference for healthy foods.
(Nikolova & Inman, 2015)	Econometric analysis of secondary data (panel data)	Not declared	Nutritional labels and healthy food choice	Point of sale nutritional systems induce healthier food choices
(Chen, 2016)	Survey	Protection motivation theory	Risk perception effect on food choices	Product safety perception is a significant predictor of consumer protection motivation which subsequently influences food choices
(Vabo, Hansen, Hansen, & Kraggerud, 2017)	Focus group	Grounded Theory	Food safety	Food safety is a driver of food choice of consumers in an affluent protectionist market
(Haws, Reczek, & Sample, 2017)	Experimental	Lay Theory	Price and Healthy impact on food choice	Consumer perception of healthy = expensive food is a powerful influence on consumer decisions.

(Hasford, Kidwell, & Lopez-Kidwell, 2018)	Experimental	Interdependence theory	Social influence on food choice	Relationships are a powerful influence on food consumption

While receiving little attention on the marketing domain, food safety is a central theme in other fields. Such studies contributed by assessing food safety from the perspective of the food risk management tripod - assessment, communication, management (Charlebois & Summan, 2015; Van Kleef et al., 2007; Yeung & Morris, 2001). Figure 1 shows the central positioning of this investigation. Although of recognized importance, the present study does not aim to assess the identification and characterization of risks. The contribution of this research lies in the interface between risk perception - with the exchange of information and opinion among stakeholders - and effective management - the selection and implementation of appropriate strategies for risk communication and mitigation -.

Figure 1. Research main positioning

Although limited, preliminary efforts have investigated and integrated the concept of "food safety risk perception" into the perspective of consumer choice. Next, such studies will be highlighted, and the domain and boundaries of this theoretical perspective will be explained.

2.1 FOOD SAFETY RISK PERCEPTION: DOMAIN AND BOUNDARIES

FSRP is the individual's perception of the presence of an attribute (safety) in food and the probability and severity of the health consequences of its consumption (Schroeder et al., 2007). Studies have applied this concept to represent an individual's belief regarding the amount of health risk related to food (Tonsor, Schroeder, & Pennings, 2009). Consumers often use psychological, social, institutional, and cultural factors to recognize risks in food (Slovic, 1993) moderated by optimistic bias (Frewer et al., 1994), rationally ignorant consumer hypotheses (McCluskey & Swinnen, 2004) and cognitive dissonance (Zangwill, 1963). Because various definitions have been employed in the literature, I present Table 2 to help summarize the breadth of the conceptualization of FSRP. These definitions share the common idea that FSRP is a person's perception of the potential risk associated with food safety questions.

Table 2 - Food safety risk perception approaches

Source	**Concept**
(Yeung & Morris, 2001)	"Perception of food safety risk is one such psychological interpretation which influences the attitudes and behavior of consumers concerning the purchase of food product."
(Mahon & Cowan, 2004)	"Perception of negative health impacts on consumers, associated with a decline in food safety, associated with microbiological, chemical, or technological factors."
(Schroeder, Tonsor, Pennings & Mintert, 2007)	"Perceptions about food safety risk are what the individual believes would be the amount of health risk."
(Lobb, Mazzocchi & Trail, 2007)	"(…) health risks posed by food consumption."

(Verbeke, Frewer, Scholderer, & De Brabander, 2007)	"(…) psychological factors determine a person's response to different hazards, including those in the area of food safety."
(de Jonge, van Trijp, Goddard, & Frewer, 2008)	"(…) indicates the extent to which consumers worry and are suspicious about the safety of food."
(Mazzocchi, Lobb, Traill, & Cavicchi, 2008)	"(…) evaluating the perceived risks associated with food purchasing and consumption is important for the provision of effective policy communication in this area."
(Ueland et al., 2012)	"Risk perception of foods is associated with adverse consequences of food consumption and is most commonly influenced by the cognitive processing of information provided by third parties and deliberations related to one's situation."
(Shim & You, 2015)	"Risk perceptions of food safety are determined not so much by the nature of food hazard per se as by the social and psychological characteristics surrounding the hazard and risk."

Although attempts to delimit a field of research may seem futile (Varadarajan, 2010), is essential to define the boundaries of the area, since this question is unclear in the literature, with different approaches (Grunert, 2005; Ortega, Wang, Wu, & Olynk, 2011; Schroeder, Tonsor, Pennings, & Mintert, 2007; Schroeder et al., 2007; Wu, 2015; Yin, Li, Xu, Chen, & Wang, 2017). The FSRP research field include studies that analyze the consumer's perception of risk about food safety (absence of chemicals, physical, technological and biological components capable of presenting risks to consumer health) (Liu, Pieniak, & Verbeke, 2014), capable of representing physical or psychological damage to consumers (Dholakia, 1997; Jacoby & Kaplan, 1972). Thus, studies that only assessed lifestyle risks were not included in this perspective. On the other way, studies that evaluated FSRP (especially risk possibility and

severity) but attributed another name such as "food hazard concern" (Kendall et al., 2018) or “level of confidence” (Goddard et al., 2013) are inside the field. Finally, studies related to chemistry and biology that analyze effective risks and studies that evaluate food quality in terms of nutritional value (Jeffery, Baxter, McGuire, & Linde; Witkowski, 2007) and food security - related to the quantitative availability of food for the population (Fletcher & Frisvold, 2017; Gaines, Robb, Knol, & Sickler, 2014) - are outside the scope. Figure 2 shows the domain of FSRP.

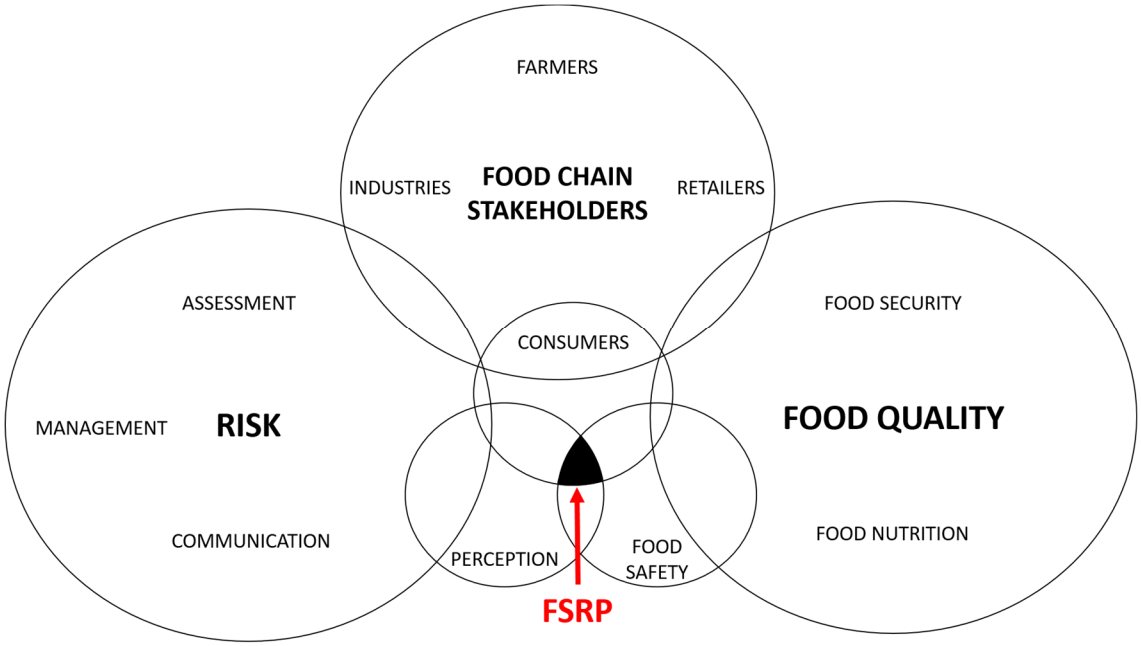


Figure 2. FSRP – Domain and boundaries

FSRP is vital for food safety because it plays a crucial role in determining consumer attitudes (Chen, 2017; Schroeder et al., 2007; Wu, Zhong, Shan, & Qin, 2013). Consumer attitudes refer to the predisposition towards a specific object, reflecting behavioral, normative, and control beliefs that are directly related to the consumer’s intention and, consequently, his or her behavior - that is, the food choice (Ajzen, 1991; Ajzen & Fishbein, 1973; Thompson, Haziris & Alekos, 1994). In this context, we suggest that FSRP can cause effects on consumer behavior, an integrative concept used to indicate the dependent variables decision-making process and intention to buy (Jost, 2017; Li, Gordon & Gelfand, 2017). Additionally, we predict that this central relation can be moderated by specific bottom-up (such as the food category or safety labels) or top-down factors (such as the prototype perception). The conceptual

framework guiding the investigation is summarized in Figure 3. The hypotheses rationale will be explained in the next sections.

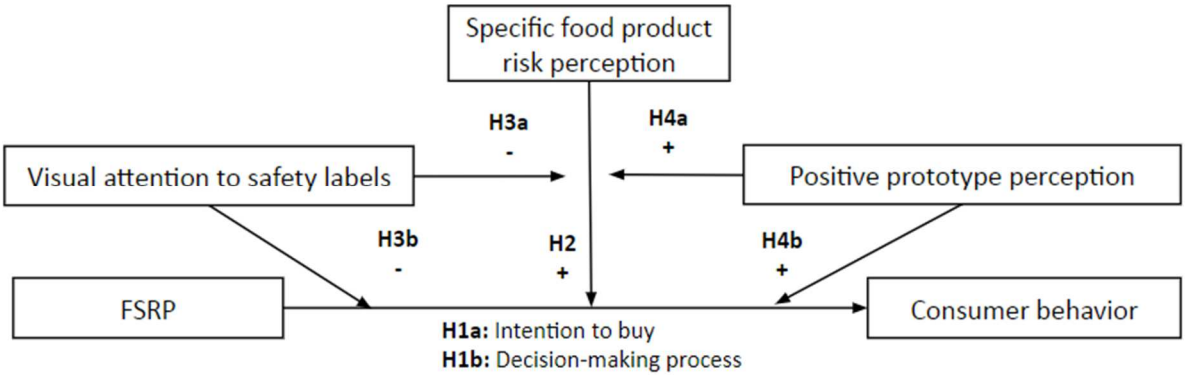


Figure 3. Research framework with all hypotheses

2.2 THE EFFECTS OF FSRP ON CONSUMER BEHAVIOR

The perception of the risk involved in the consumption of food determines the consumer's attitudes and intentions - recognized predictors of food consumer behavior (Chen, 2017; Schroeder et al., 2007; Wu et al., 2013). In this sense, the investigation about the effects of risk perception on food intention to buy motivated several studies (Bai, Tang, Yang, & Gong, 2014; Nganje, Kaitibie, & Taban, 2005), especially on the topic of genetically modified (GM) foods. These studies have linked consumer attitudes to the risks and benefits associated with production processes (Bredahl, Grunert, & Frewer, 1998). The continuous replication of this theoretical model has been adopted in food consumption studies, especially at the intersection between marketing and operations (Grunert, 2002; Moon & Balasubramanian, 2003), consolidating itself through an expanded TCP model - the SPARTA model.

The SPARTA model (Lobb et al., 2007; Stefani, Cavicchi, Romano, & Lobb, 2008) by incorporating perceived risk into predictive factors of intent and behavior expanded TCP specifically to the context of food safety. According to preliminary findings in the literature, perceived risk demonstrated consistent negative effects, increasing the original predictive power of TCP by about 6% (Lobb et al., 2007; Prati, Pietrantoni, & Zani, 2012). Similarly, its negative effect on food consumption was found in different cultural contexts (Mazzocchi et al., 2008).

The FSRP, however, is not homogeneously formed. Its estimation is affected by different factors such as trust (Rodriguez-Entrena & Sayadi, 2013; Sapp & Downing-Matibag, 2009), knowledge (Liu et al., 2014; Zingg, Cousin, Connor, & Siegrist, 2013) or sociodemographic characteristics (de Jonge et al., 2008; Zepeda, Douthitt, & You, 2003) Because it is a subjective factor, the perception of food risks is especially subject to overestimation - as in the case of genetically modified foods - (Amin et al., 2013; Chen, 2011; Durant & Legge, 2005) or underestimation - as in the case of organic foods (Aertsens, Verbeke, Mondelaers, & Van Huylenbroeck, 2009; Altug & Cetin, 2007; Magkos, Arvaniti, & Zampelas, 2003). These distortions in risk assessment are critical determinants of the consequences of risk perception, mainly intentions and behaviors.

Preliminary findings regarding the consequences of risk perception indicated robust negative effects on the intention (Rodriguez-Entrena & Sayadi, 2013; Sodano et al., 2016) and effective food consumption (Klerck & Sweeney, 2007; Yeung et al., 2010). However, although negative impacts on consumption have been endorsed in the previous literature for specific contexts such as fish consumption (Pieniak et al., 2008; Vanhonacker, Altintzoglou, Luten, & Verbeke, 2011), chicken consumption (Lobb, Mazzocchi, & Traill, 2006), rice (Barrena & Sanchez, 2010) and milk (Joubert & Poalses, 2012) studies that were evaluated the effect of FSRP on CB are concentrate in self-report measures (Ha, Shakur, & Do, 2019; Schroeder et al., 2007). Thus, based on preliminary findings indicating that the FSRP causes negative effects on consumption in addition to the limited evidence collected at the experimental approach, it is proposed that,

H1a: *Food safety risk perception have a negative effect on food intention to buy*

Additionally, preliminary studies have revealed that risk perception not only affects rational and stated decisions (as in the case of purchase intent), but similarly alters the decision-making process of the individual. The decision-making is a process that begins with problem identification and has such an outcome as the selection of an alternative. In this trajectory, the individual evaluates their possibilities and generates alternatives of choice, investing time and attention to the process. Although efforts used rational explanations to understand the decision (i.e., the maximixation and optimization of results), non-rational approaches put light on the limitations (such as knowledge, memory, an time) of the human brain to make decisions one (Kahnemann, 2011). This investigation will adopt the non rational approach to investigate the

decision-making process, recognizing the difficult of a person to get in mind all variables that influence the food choice context.

Efforts to understand the effect of risk perception on the decision-making process is recurrent in areas such as occupational safety and health, military, and sociology, due to the constant occurrence of risk situations (de-Juan-Ripoll et al., 2018). Notably, a long tradition of finance studies has exposed how decision-making changes in financial risk-return conditions (Lim et al., 2018; Weber & Milliman, 1997). In the context of food decisions, however, these investigations are limited. (Agnoli, Capitello, & Begalli, 2016).

In line with what has happened in other contexts, is expected that FSRP affect the decision-making process, diminishing individuals' perception of control and altering their thinking ability - making the process less rational. In this sense, recent studies have explored biometric measurements to identify the neural mechanisms underlying the process of choice, revealing an increase in activation in areas implicated in automatic answers (Megias et al., 2015). In this context, we purpose,

H1b: *Food safety risk perception have a negative effect on the decision-making process*

But are the general effects of perceived risk in choosing food homogeneous? Possibly not. Such as exposed, risk perception is a multilevel phenomenon, and in lower levels (such as the level of product categories or specific food products), the effect can be shift. In this sense, the decision making process of consumption choices in under uncertainty situations has been previously investigated by studies that evaluated individual decisions in conditions such as investment decisions (Baek & King, 2011), services (Sun, Keh, & Lee, 2012) and ethical consumption (Hassan, Shaw, Shiu, Walsh, & Parry, 2013). In all of these cases, contextual aspects such as the type of investment, the nature of the service or the product being consumed had a moderating influence on the relationship between risk and choice. In the same sense, specific aspects of food (such as vegetal vs. animal origin or life cycle) were identified as moderating the relationship between intention and eating behavior (Bearth et al., 2016; Mullan et al., 2013; Nardi et al., 2020; Van Kleef et al., 2007). For these reasons, such assumptions are expected to be sustained in the relationship between FSRP and CB, giving moderating effects to the specific risk of each food, aspect which will be explored below.

2.3. THE MODERATION ROLE OF SPECIFIC FOOD PRODUCT RISK PERCEPTION

In line with studies that have recognized the discrepancies between experts and lay perceptions of risks (Fife-Schaw & Rowe, 2000), it is known in the literature that even for specific consumer groups, the risk perception for food is not homogeneous. Preliminary studies have shown that consumers heterogeneously perceive different risk factors (such as pesticides, salmonella, or saturated fats) as to the likelihood and severity of affecting their health. Such efforts led to the use and replication of the recognized food risk index, especially to explore risk perception in the food field (FifeSchaw & Rowe, 1996).

The continuous replication of food risk index shows that the risk category (lifestyle, technological, microbiological, and farm-oriented production) were consistently diverse in terms of perception and acceptance (McCarthy, Brennan, Ritson, & de Boer, 2006). However, while acknowledged for its reliability and validity (Cunha, de Moura, Lopes, Santos, & Silva, 2010), research in this field is limited to broadly assessing how different consumer groups perceive potential risks such as the hormone residues, the microbiological risks or the genetically modified food. In this sense, preliminary researches not considering possible comparisons between different food products for the same individual. In this study, we adopt a non-fixed taxonomy to consumers because each can act differently according to some conditions such as the situation, the moment, or especially the food product (Dagevos, van Ophem & Gaasbeek, 2002).

It is recognized that each food has specificities related to the criteria used by the individual to define its perception, such as the control perception and the level of identifiability of potential contaminants (Kraus & Slovic, 1988). In this sense, although it may be related to general FSRP, it is expected that specific factors of each food may affect the main relationship between FSRP and consumer behavior, because each individual has different food perceptions (Dagevos et al., 2002). For this reason, recent research has suggested that the origin of a food (animal vs. vegetable) and the life cycle (the rate of degradation of food by biological factors and environmental conditions), for example, moderate the effects of FSRP on purchase intention (Coary & Poor, 2016; Nardi et al., 2020; Rodriguez-Entrena & Sayadi, 2013). In this sense, for example, Yeung et al. (2010) showed that FSRP caused a substantial reduction in purchase likelihood for meat (r=-0.450) in the United Kingdom. Similarly, De Steur et al. (2010) revealed that the negative effect is weaker (r=-0.229) when the evaluated product is rice.

In this context, it is, therefore, a reasonable purpose that by reducing the level of analysis for the product category, the same individual has a different risk perception for foods such as milk and meat (animal origin and short life cycle) and rice or beans (vegetal origin and long-cycle life). What is more, ultimately, even within the same category (convenience food, organic food, or functional food), distinctions occur according to the specific food product. Such logic is similar to that used to investigate the consumer trust of food safety (Berg et al., 2005; Lobb et al., 2007). In this sense, different levels of analysis were used to show that in general, consumers can trust in the safety of food, but simultaneously, they can be less confident in lower levels of abstraction (at the level of food categories or food-specific product). For these reasons, the negative effect of FSRP on the CB is expected to be moderated by the specific food product risk perception. In other words, the results are expected to be more significant when the specific risk of the food is high. In this sense, it is proposed:

H2: *The negative relationship between food safety risk perception and consumer behavior is weaker (vs. stronger) for low (vs. high) specific food product risk perception*

However, to reduce the negative effects of risk perception, organizational practice has adopted different strategies. Public and private certification initiatives (Almeida, Pessali, & de Paula, 2010; Becot, Nickerson, Conner, & Kolodinsky, 2012) and traceability (Saak, 2016; Wowak, Craighead, & Ketchen, 2016) play a central role in efforts to ensure food safety on the way between farm and fork (Manzini & Accorsi, 2013; Newell et al., 2010). Such initiatives stem from technological advances such as the development of humidity and temperature sensors and the development of integrated control systems and concerns arising from the global exposure of agri-food supply chains. Traditionally analyzed from the perspective of consumers and their decision-making process on food choices, the effects of these initiatives, however, are still inconclusive (Brach, Walsh, & Shaw, 2018; Loureiro & Umberger, 2007; Ortega, Wang, Wu, & Olynk, 2011; Yeh, Hartmann, & Hirsch, 2018) prevailing non-experimental studies. To explore this question, one interesting way is to analyze visual attention (and their consequences) to safety labels. This question will be explored below.

2.4 THE VISUAL ATTENTION TO SAFETY LABELS HYPOTHESIS

Rational responses of individuals to questionnaires may lead to the conclusion that FSRP is a determining factor in the food choice process. Preliminary studies have shown how this is pointed out as one of the main drivers of choice, along with perceived behavioral control, past behavior, and subjective norms (Nardi et al., 2020). However, except in extreme conditions - such as the presentation of spoiled food with poor preservation conditions - safety goes unnoticed in everyday choices, mainly due to factors such as recurrence, time pressure, and automation of decision making. Try to remember the last time you went to the market to buy milk or a cereal bar. You may not have noticed all the information on the packaging or thought about how safe it was to consume that food, right? In this context, preliminary studies in behavioral economics (Thaler & Sunstein, 2008) suggest that small nudges may adjust consumer choices in line with their personal and collective interests.

Preliminary studies on behavioral economics investigated the impacts of symbols and textual claims on consumer behavior. Such efforts investigated the potential of these elements in the direction of consumption choices (Grunert, Wills, & Fernandez-Celemin, 2010; van Trijp, 2009) and the possible individual differences arising from demographic factors for understanding and responding to these factors (Cowburn & Stockley, 2005; Van Trijp & Van der Lans, 2007). In the specific context of food choices, these efforts require reflection from the perspective of dual processing models (Kahneman, 2011).

Understanding elements related to a specific food attribute - be it healthiness or safety - usually requires a slow and deliberate cognitive process (recognized in theory by system 2). However, this is not the circumstance experienced when consumers are choosing food. In the context of food choices, consumers usually use reactive and intuitive processes (system 1) to process their decisions. For this reason, over the years, communication strategies have been consolidated that use visual elements to attract consumers fastly. This symbology, coupled with the communication process and consolidation of the certifying authorities, can be understood as a form of a nudge (Thaler & Sunstein, 2008).

Aiming to “nudge” the decision-making process for food choice, public and private certification (Almeida et al., 2010; Nickerson, Jorgenson, & Boley, 2016) and traceability initiatives (Saak, 2016; Wowak et al., 2016) has been widely used and investigated (Manzini & Accorsi, 2013; Newell et al., 2010). However, analyzed from the consumer choice perspective, the effects of these initiatives - investigated in the context of product choice and healthy eating - still inconclusive (Brach et al., 2018; Yeh et al., 2018). Preliminary studies in which

participants were encouraged to pay attention to health-related claims or nutrition labels suggested that such elements may affect the perception of a product's healthiness and be converted into purchasing behavior (van Herpen, Seiss, & van Trijp, 2012). However, experiments conducted in real-life supermarket settings have shown that under certain conditions, consumers had low motivation for seeking nutritional information (Grunert & Wills, 2007). In this context, studies that have evaluated food safety are limited.

While limiting efforts in the field of food safety, the use of insights from behavioral economics has spread rapidly in recent years, helping policymakers to nudge people to make healthier and more sustainable choices (Sousa Lourenço, Ciriolo, de Almeida, & Troussard, 2016). Thus, it is expected that in the field of food choice, consideration of the choice architecture and recognition of heuristics and biases in the decision-making process will be decisive factors to direct consumers towards options that increase their well-being and produce the effect on food choice. In this context, the visual attention to safety labels can reveal a significant contribution.

Visual attention is an essential element in the consumer research area (Chandon et al., 2009; Theeuwes, 2010). The visual attention effect, such as predictive of the consumer behavior – especially on the purchase intention (Hong, Misra, & Vilcassim, 2016) and consumer choice (Chandon et al., 2009)– is recognized in the literature. On the other side, efforts were directed to understand what determines visual attention. This approaches focusing on bottom-up factors - such as visual complexity (Pieters, Wedel, & Batra, 2010), perceived amount of information and time pressure (Pieters & Warlop, 1999) and visual area of package informations (Pieters, Rosbergen, & Wedel, 1999; Siegrist, Leins-Hess, & Keller, 2015)– and top-down factors – such as consumer motivations for shopping (Babin, Darden, & Griffin, 1994), brand familiarity (Alba & Hutchinson, 1987), knowledge (Lindstrom, Berg, Nordfalt, Roggeveen, & Grewal, 2016) and memory performance (Keller, 1987). Especially in top-down factors, the influence of health consciousness was recognized recently was a positive predictor of visual attention in the food arena (Ran, Yue, & Rihn, 2017).

In this sense, the use of visual symbols that give a product attributes such as quality, safety or differentiation has been widely used by the food industry (Yin et al, 2019). Used largely on a voluntary basis, safety labels translate productive practices used in the farm to fork path for the purpose of. For producers, on the one hand, especially in developing countries, certifications are gateways to entry into the international food market (Wongprawmas & Canavari, 2017). On the other hand, for consumers, they reduce information asymmetry and make it possible to understand the differentials of each food.

In line with previous findings, it is possible to suggest that visual stimuli – such as safety labels – and top-down factors – such as FSRP - can interact and cause consequences to CB. In this way, although not yet recognized by the literature, it is possible to suggest that the negative effects of risk perception on consumer choice can be reduced by the consumer attention visual attention to safety labels. Then,

H3a: *The negative relationship between food safety risk perception and consumer behavior is weaker (vs. stronger) for high (vs. low) visual attention to safety labels*

In the same way, visual attention to safety labels may interact not only with the overall risk identified in food consumption but also with the specific risk identified in each type of food, reducing the moderating effects of food safety on the FSRP-CB relationship (de Jonge, van Trijp, Renes, & Frewer, 2007; Nesbitt et al., 2009). This is because consumers with high levels of attention to safety symbols will tend to feel safe in purchasing food, whatever the intrinsic risk they perceive in that product, thus diminishing/nullifying the rejection of the food. In this way, it is possible that visual attention to safety labels can support the maintenance of consumption levels, especially for products with high specific perceived risk in high-risk institutional environments (Wongprawmas, Canavari, & Waisarayutt, 2015). For this reason, I purpose:

H3b: *The moderation effect of risk perception of specific food product on the negative relationship between food safety risk perception and consumer behaviors is weaker (vs. stronger) for high (vs. low) visual attention to safety labels*

As seen, the negative effects of FSRP on CB is a complex phenomenon that has been faced by companies with bottom-up strategies such as safety labels (Janneke de Jonge, Van Trijp, Renes, & Frewer, 2010; Frewer, 2012; Frewer et al., 2016; Lagerkvist, Hess, Okello, & Karanja, 2013). However, this practice needs to consider both top-down aspects (Van der Laan et al.). In this context, the element "possibility" as a determinant of risk perception, has received significant contributions from studies of social psychology, especially with the use of the prototype-willingness model (PWM) (Gerrard, Gibbons, Stock, Lune, & Cleveland, 2005; Gibbons & Gerrard, 1995). These efforts shed light on the role of prototype perception on

individual choices, especially in contexts with risk perception. This proposition will be explored below.

2.5 THE MODERATING ROLE OF PROTOTYPE PERCEPTION

The prototype-willingness model was conceived from efforts that sought to understand social influence in human behavior, considering the decision-making process and its limited rationality (Gibbons & Gerrard, 1995; Thornton et al., 2002). According to the model, individuals construct mental images - prototypes - about the type of subject that performs (the actor), avoids (which is absent), or is subject to a particular behavior/action. From this psychological process, the individual makes volitional and unintentional decisions, especially in the circumstances involving risks (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). For this, the theory considers the duality of the mental processes that are realized for decision making.

The preliminary literature has recognized through different concepts that decision making can be effected through (i) a system based on affection and heuristics, automatic, unconscious, impulsive, intuitive and reactive, or (ii) a rational, logical, deliberative and planned (Chaiken & Trope, 1999; Shafir & LeBoeuf, 2002). In this sense, while other models such as the theory of planned behavior (Ajzen, 2002; Ajzen & Madden, 1986), directed their efforts to processes involving the rational system, the prototype-willingness model sought to broaden the understanding in choices that, although volitional is unintentional, especially those in which the individual can put your health at risk (Gibbons et al., 2010; Gibbons, Houlihan, & Gerrard, 2009). These contributions are especially relevant to the context of food choices since although the individual sometimes acts rationally in choice, his recurrent decisions are automatic and intuitive (Ares, Gimenez, & Deliza, 2010; Hendrickson, Rasmussen, & Lawyer, 2015; Jacquier, Bonthoux, Baciu, & Ruffieux, 2012).

The prototype perception involves the perception of similarity - how much the individual judges to be similar to the individual who adopts/abstains from a specific behavior - and the evaluation of the prototype - the positive/negative perception that an individual possesses of the type of subject that behaves of particular mode - factors highly related (Rivis, Abraham, & Snook, 2011; Rivis, Sheeran, & Armitage, 2006). Especially to the food safety choices context, it is expected that the increase of positive evaluation of the patient of the

foodborne disease - and consequently the increase of the similarity perception - will increase the negative effect of FSRP-CB. In this way, it is suggested that:

H4a: *The negative relationship between food safety risk perception and consumer behavior is weaker (vs. stronger) for negative (vs. positive) prototype perception*

In the same way, by forming mental images or prototypes of people who perform certain behaviors or are affected by a certain risk, the perception that specific foods may harm their health tends to be heightened. In this way, the positive perception of the prototype (increased perception of similarity) with the patient of the foodborne disease may moderate the effects of specific food risk on the negative relationship between FSRP and CB. In other words: consumers that perceived themselves as being "targets" of contamination and choosing foods with high specific risk will tend to present more significant restrictions on the purchase of that item. In this sense:

H4b: *The moderation effect of risk perception of specific food product on the negative relationship between food safety risk perception and consumer behaviors is weaker (vs. stronger) for negative (vs. positive) prototype perception*

Presenting the set of theoretical arguments, the research hypotheses, and the research model, in the next chapter, I will present the set of experimental studies used for its investigation.

3. EMPIRICAL STUDIES

Online experimental surveys and choice experiments are often used in the food decision context to analyze consumer behavior face to some stimulus (Peschel, Orquin, & Loose, 2019). Specific in the food safety area, preliminary studies used this approach to investigate the effects of risk perception (Petrolia, 2016; Yin et al., 2017) and labeling strategies (Loureiro & Umberger, 2007; Ortega et al., 2011) consumer choices. To investigate the purpose of the relation in the research model, this study combining an online experimental survey, choice experiments, and eye-tracking measures. In this sense, eye tracking measures – such as saccades, fixations, and pupil diameter - allows us to recognize how individuals perceive certain visual stimuli in a particular context or task.

The current research uses four experimental studies. Preliminary, a pre-test with eight products identified the level of specific perceived risk in different food products. Using the pre-test results, study 1 - an online experimental survey -, explore the main effect of FSRP on consumer behavior (intention to buy food) for low (sugar), medium (honey), and high (cheese) risky foods, providing evidence for H_{1a} and H_2. Study 2 reinforces the findings of study 1, investigating the effect of FSRP on the decision-making process (H_{1b}), the moderation role of specific food product perceived risk (H_2), and evaluate the moderating role on visual attention to safety labels, testing the hypotheses H_{3a} and H_{3b}. Study 2 used a choice experiment with eight food products to demonstrate the effects of visual attention to safety labels on the FSRP-CB relationship. Study 3 reinforces the evidence for H_{1b} and H_2 and show the moderating role of prototype perception on the FSRP-CB relationship (H_{4a} and H_{4b}). Finally, study 4 (the confirmatory study), aims to test all the predictions with a different experimental approach. Using the multilevel analysis of risk perception in a laboratory-controlled experiment, I checked the theoretical model and confirm the role of top-down (prototype perception) and bottom-up (safety labels stimuli for visual attention) factors in consumer behaviors under food safety risk perception.

3.1 PRE-TEST

The risk perception of food varies according to its specific characteristics, such as origin, involved technology, or sensory appeal (Bearth et al., 2016). In this sense, to measure the level of perceived risk in different foods, an online pre-test was performed. Each participant

answered two questions regarding each of the eight foods exposed, chosen because of heterogeneity as to origin and life cycle (sugar, salami, dulce de leche, tea, honey, cheese, pork ham, and grape juice): “What is the possibility of this food being contaminated?" and " How serious could be the consumption of this contaminated food?”. The sum of the answers to these two questions constitutes the "specific food product risk perception index” of each food. Data were collected online in September 2018, without public restrictions. One hundred forty-one responses were obtained. Of these, six were excluded due to the presence of missing values. The final sample obtained was 135 respondents.

In line with previously investigations (Dagevos et al., 2002; van Dijk, Fischer, & Frewer, 2011), the analysis of variance homogeneity revealed the existence of three distinct product groups ($Q^2 = 320{,}865$, $p > .001$) about the product perceived risk: low-risk food (sugar, honey, tea), medium risk food (grape juice, milk sweet) and high-risk food (salami, pork ham, and cheese). Additionally, results presented in table 3 show no significant difference in risk perception according to gender, except for salami and pork ham, with females attributing higher perceived risk to these products. Such assumptions serve as the basis for the design of the experimental studies of this investigation.

Table 3 – Specific food product risk perception index

Food	Probability	Severity	Risk Perception Index	S.D
Sugar	1,32	2,73	3.90^{a}/ 3.81^{b} ($.790^{c}$)	1.35^{a}/ 1.70^{b}
Honey	1,82	2,92	4.10^{a}/ 4.70^{b} ($.134^{c}$)	1.76^{a}/ 2.24^{b}
Cheese	2,88	3,95	6.47^{a}/ 6.75^{b} ($.431^{c}$)	1.44^{a}/ 2.03^{b}
Tea	1,42	2,33	3.55^{a}/ 3.65^{b} ($.751^{c}$)	1.69^{a}/ 1.88^{b}
Grape Juice	1,87	2,79	4.60^{a}/ 4.47^{b} ($.758^{c}$)	1.70^{a}/ 2.21^{b}
Milk sweet	2,40	3,33	5.82^{a}/ 5.43^{b} ($.338^{c}$)	1.73^{a}/ 2.28^{b}
Salami	3,08	4,01	6.47^{a}/ 7.17^{b} ($.047^{c}$)	1.72^{a}/ 1.87^{b}
Pork Ham	2,87	4,11	5.95^{a}/ 7.03^{b} ($.002^{c}$)	1.53^{a}/ 1.91^{b}

Note: a=Males; b =Females; c =T-Value

3.2 STUDY 1 – THE IMPACT OF FSRP ON THE CB: THE MODERATION OF SPECIFIC PRODUCT RISK PERCEPTION

The objectives of Study 1 were to test whether the FSRP influence the CB (H_{1a}) - in this case, the intention to buy food (ITBF). Additionally, the study test the moderating role of specific risk perception of each food product in the central relation (H_2). In line with the theorizing, I predicted that FSRP reduces the CB and the high levels of specific risk perception on food production increase this effect. That is: participants would demonstrate the lowest intention to buy for food when (i) they perceived a high general food safety risk perception and (ii) the specific food product have high levels of particular risk perception according to the pretest performed. Figure 4 presents the framework of study 1.

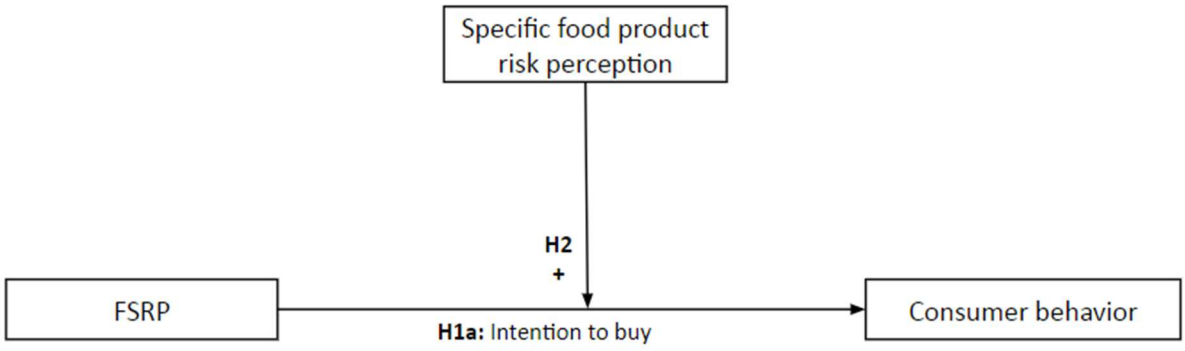


Figure 4. Conceptual framework of study 1

3.2.1 Participants and procedures

Three hundred consumers (65.8% female) were recruited through online public announcements. Each participant received a voucher to compete for a $20 prize for participating in a memory study. Participants were randomly assigned to one of four conditions (FSRP: high versus low | Safety labels: presence versus absence) between subjects. Initially, to activate FSRP priming, I used two different stimuli (Murray, Derrick, Leder, & Holmes, 2008). Participants in high FSRP condition were asked to narrate a fact that occurred in their lives that someone has disappointed it. Subsequently, they were asked to write a paragraph with the words "hospital - hurricane - epidemic - hungry - misery - salmonella - bankruptcy." In a contrary sense, participants in low FSRP condition were asked to narrate a fact that occurred in their life when someone made them happy. Subsequently, they were asked to write a paragraph with the

words "home - wave - carnival - dinner - wealth - school - door." After performing the activity, figure 4 was shown, and the participants were asked to answer two questions regarding the probability and severity of the risks, namely: “How likely are you to believe that someone is contaminated by ingesting one of these foods? ”and“ How bad will it be for someone to eat one of these contaminated foods” (the priming effect check).

Figure 5. Priming check image - Study 1

Finally, participants realize the main task - a three-round bid auction. Each participant was aleatory exposed to one between two groups (Safety labels: presence versus absence) to analyze three differently rated products in the pretest: sugar (low specific risk perceived food), honey (medium risk-specific perceived food), and cheese (high specific risk perceived food). Figure 6 presents the six images used in the task.

Safety labels group	Control group

Figure 6. Task images - Study 1
* Portuguese legends in accord to original

3.2.2 Measures

The questionnaire starts with the core dependent variable of ITBF, collected on an adapted four-item, ten-point scale "Buying this food for my home is good," "Buying this food for my home is good," "I would like to buy this product in the future," "I plan to buy this product in the future" (Bian & Forsythe, 2012). Next, we collected the subjective norms and trust in the supply chain ("People/organizations that matter to me think I should buy this product," "people/organizations that influence my decisions think I should buy this product") of participants (Ajzen, 1991; Lobb et al., 2007). To check the food-specific level of risk

perception, participants answer a five-item, ten-point risk perception scale (Danelon & Salay, 2012) for each product evaluated. For all analyses that included this control variable, the pattern of results remained unchanged. For data analysis, this study uses moderation analysis with PROCESS macro 3.3, Model 1; bootstrap 5.000 (Hayes, 2017).

3.2.3 Results

First, the requirement of reliability is satisfied because the loadings of each measurement are higher than 0.7, without the need to suppress items with weak loadings. Table 4 presents the measurement model results.

Table 4 - Measurement model results

Product/Construct	CR	AVE
Cheese		
Intention to buy	.936	.921
Subjective norms	.843	.820
FSRP	.854	.793
Honey		
Intention to buy	.924	.890
Subjective norms	.922	.962
FSRP	.892	.949
Sugar		
Intention to buy	.932	.888
Subjective norms	.932	.910
FSRP	.904	.886

Notes: CR = Composite reliability; AVE: average variance extracted

When evaluated all products, it's possible to perceive the main effect of FSRP on ITBF (-.116, $p<.05$). Partial testing of intention to buy for each product, however, yields distinct results, confirming the moderation suggested in H_2. That is: the specific risk of food products generate effects on the main relation between FSRP and CB

A global analysis in both experimental conditions (Safety labels: presence versus absence) show the differences in the FSRP-CB relationship between specific food product risk perception. For sugar, a low-risk product, the first model present the no-significant effect of FSRP on CB, considering the effect of controls (R=.069, ns). Equal, no significant effect was detected for honey, a medium risk product. Different results are finding for cheese, a high-risk product. The direct effect of FSRP on intention to buy is identify by model 1 (R^2 = .095, B= -.185, p<.05).

Also, pairwise comparisons reinforce these findings. For sugar, it was not possible to perceive statistical significance regarding the effects of safety label on ITBF, either for participants with low FSRP ($M_{absence}$=5.89; $M_{presence}$=6.17, T=ns) or high FSRP ($M_{absence}$=5.21; $M_{presence}$= 5.44, T= ns). For honey, the effects were different: while a significant increase in ITBF was noticed when they realized low FSRP ($M_{absence}$=5.08; $M_{presence}$=6.12, T=1.943, p<.05) the same effect was not identified in high FSRP consumers ($M_{absence}$=5.08; $M_{presence}$=5.28, T=ns). Finally, for cheese (a high-risk product), the effects were significant in both scenarios. Low FSRP participants significantly increased ITBF when exposed to cheese with safety labels ($M_{absence}$=5.63; $M_{presence}$=6.43, T=1.925, p<.05) and the same effect was perceived when evaluated participants who in high FSRP condition ($M_{absence}$=5.19; $M_{presence}$=5.88, T=1.517, p<.10). Figure 7 presents the results for the scenarios tested.

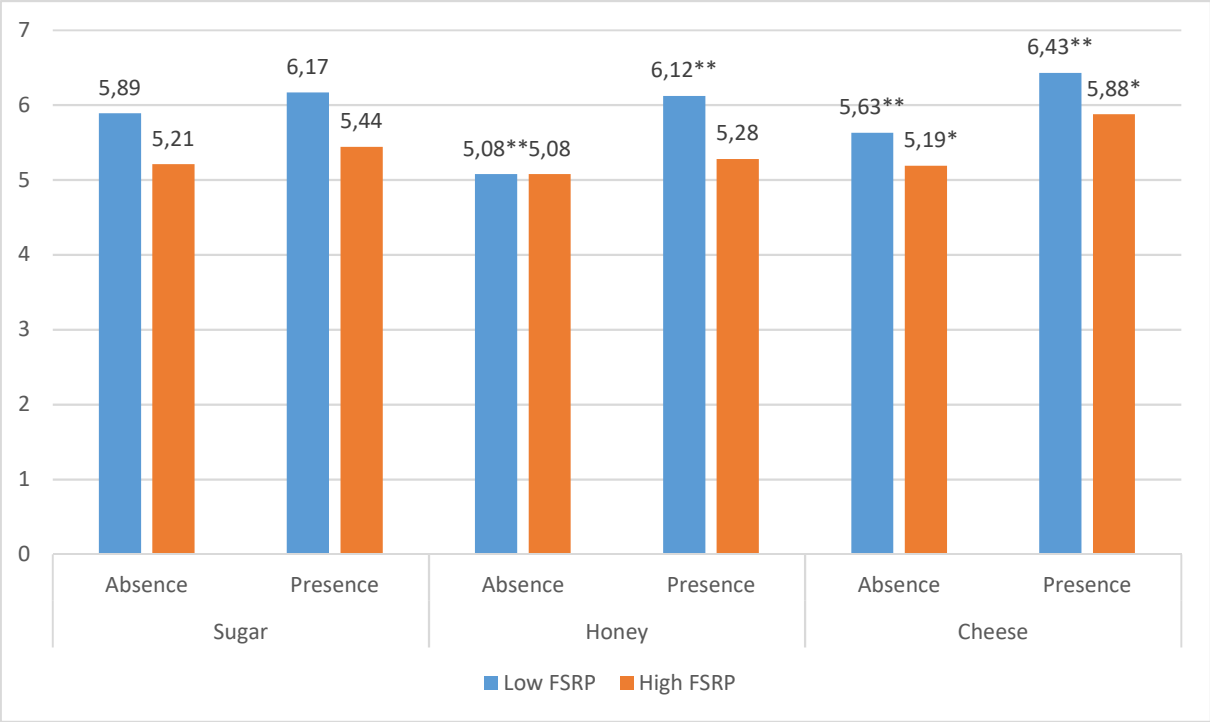


Figure 7. Consumer intention to buy
Note: *= p<.10; **=p<.05

3.2.4 Discussion

The results of Study 1 demonstrated that the negative response to risk food is related to the interaction of (i) general food safety risk perception and (ii) specific food product perceived risk. In this sense, a closer examination of the predicted model revealed that the efforts to increase the safety though certification reduces the negative effect of FSRP on the intention to buy for food products, especially for medium-high specific risk perception food products (honey and cheese). For this reason, study 1 results show a non-significant effect on FRSP-ITBF between sugar (a low-risk product) with/without safety labels. Not surprisingly, the highest purchase intent out of all experimental conditions was for cheese (a high specific risk food) with safety labels on low-risk perception (M=6,43). On another side, the intention to buy cheese as reduced in 19,79% when consumers perceived high risk in food consumption and are presented for no-safety food. These results suggest that the practices to increase safety labels in the food supply chain are decisive to mitigate the negative effects of FSRP in high-risk products category.

This effect may be generated by perceived control (Ajzen, 1991). That is: When exposed to a product with high specific risk (cheese), consumers significantly increase their perception of control over the situation through certification, a fact that predicts greater intention to buy. On the other hand, when exposed to a product that has low specific risk (sugar), consumers have a high perception of control even in non-certified foods, which explains the non-significant effects of certification on purchase intent. However, the process of food choice is not always based on rational attributes. Study 2 aims to evaluate the model having as its differential the analysis of the decision-making process (by measuring the participants' visual attention during the school process).

3.3 STUDY 2 – EFFECTS OF FSRP ON THE CB: THE MODERATION ROLE OF VISUAL ATTENTION

Study 1 examined the effects of FSRP and specific food product risk on CB. The objective of study 2 is to test (i) the effects of FSRP on the CB using a different outcome (the decision making process) and (ii) the moderating role of visual attention to safety labels in the central relationship. That's it: (a) whether FSRP influences consumer behavior, especially the decision-making process (H_{1b}); (b) the visual attention to safety labels on food products

moderate the relation between FSRP and CB (H_{3b}) (c) whether the visual attention to safety labels decrease the moderation effect of food-specific product risk perception in the central relation (H_{3a}).

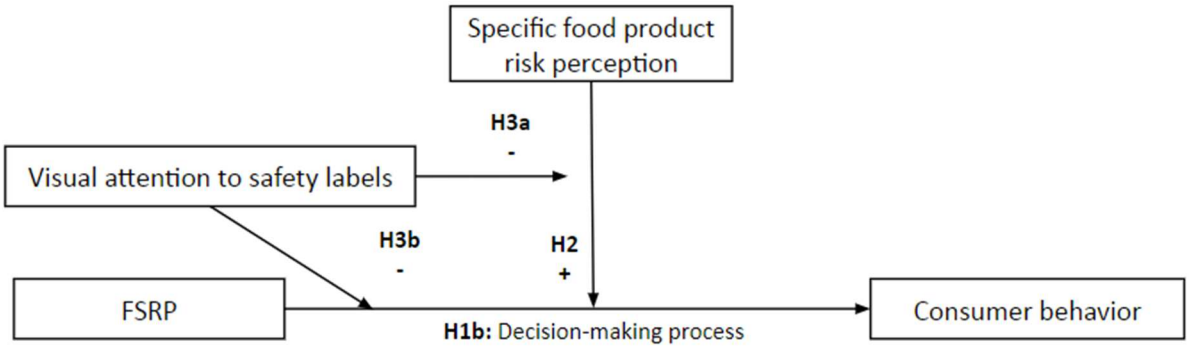


Figure 8. Model of study 2

3.3.1 Participants and procedure

Eighty-two undergraduate students at Brazilian universities volunteer participated in the experiment. Participants were divided into three (FSRP: Low vs. High vs. control) different experimental conditions. To stimulate the FSRP, I used the priming effect, such as in Study 1. Although, in study 2, the priming effect was manipulated through a video. "Low FSRP" participants watched a video highlighting improvements in the food chain, with the implementation of traceability and certification (video available on https://youtu.be/o_XGB5_uP5g). On another side, participants in the "High FSRP" condition watched a video highlighting recent episodes of food chain food disruption in the region (video available on https://youtu.be/7ySYaqBcIu8). Finally, participants in the "control" condition watched a video in which the subject addressed was the price of the basic food basket in the country (https://youtu.be/58enM1K0_Ro).

The study was conducted using an eye-tracker (Tobbi X3-120) that measured the visual attention during the execution of a task (choosing food for immediate purchase). The eye-tracker was mounted under the computer screen, and participants were not required to wear any device. Each participant followed these steps (1) read and sign a consensual form; (2) sit in front of a computer screen for a calibration process; (3) watched a video that highlighted risk, safety, or food-neutral factors; (4) answer a questionnaire about personal beliefs and FSRP (the priming check); (5) answer the experimental task; (6) complete a post-experiment survey about

socio-demographic characteristics. Except the step 1, all other steps were performed into the Tobii Pro Studio software, version 3.4.8.

For all the participants, an image with the eight foods assessed in the pre-test was presented in random order (see figure 9 for an example). No decision time limit was established, with each participant being required to press the right mouse button to proceed when they had made their choice.

Figure 9. Choice experiment

3.3.2 Measures

First, I evaluate the check of the priming effect (the independent variable), using a single item risk perception question "How do you analyze the safety you have when consuming food compared to 10 years ago?". The answers were given on a 7-point scale (1 = much riskier, 4 = equal, 7 = much safer). After that, I evaluate the specific food product risk perception (the moderator variable) by the choice made by the participant, considering the groupings defined by the pretest. That it: participants that chosen the tea, honey and sugar – the less risky food group - receive the grade 1; participants that chosen grape juice or milk sweet – the medium risky food group – receive the grade 2; finally, participants that chosen the salami, pork ham or cheese – the high-risk group – receive the grade 3.

To evaluate the dependent variable (the consumer decision-making process), I measured the decision length and the pupillometry during the task - as in previous research (Brasel & Gips, 2008; Laeng, Sirois, & Gredeback, 2012; Pieters, Warlop, & Hartog, 1997). These

measures make it possible to access the non-rational process of food choice from the cognitive effort deployed to the decision and the time invested in this process. Because no time limit was established for the choice, each participant had their data evaluated based on the time elapsed to perform the task.

Finally, I measured participants' visual attention to safety labels (the moderation variable) by the total fixation duration to safety labels, such as preliminary studies on food choice context (Ares, Mawad, Gimenez, & Maiche, 2014; Van der Laan et al.). To control for any pre-existing group differences, the following variables were measured and controlled for the data analysis. First, the existence of food restriction (allergies, intolerances) and second, the past health problems with food consumption. We control our results by other sociodemographic characteristics that can influence the relation (gender, age, income, and the presence of children or elderly in the family group).

3.3.3 Results

Initially, the effectiveness of the applied priming was tested. The results indicate that the priming was effective, pointing a significant difference (F = 2,743, p <.05) between the different experimental conditions. The group that was introduced to the “Low risk” video had a higher perception of reliability in food consumption compared to previous years (M=4.64) compared to the group that participated in the “High risk” condition (M=3.38). Additionally, participants of the control condition had intermediate perceptions between the extremes (M=3.92).

To examine pre-existing group differences, we performed a series of ANOVAs and chi-square tests. First, we evaluate the difference of demographic variables using the experimental condition as the dependent variable. No difference presented for all demographics: gender (chi-square 3.652; ns); age (chi-square 58.72, ns); and income (chi-square 12.72, ns). Then, we performed an ANOVAs analysis with the experimental group as the independent variable and control variable as the dependent. No group difference was identified: food restriction ($F_{(1, 80)}$ = 0.311; *ns*) and past experience ($F_{(1, 76}$ = 2.453; *ns*). After that, I analyze the main effect of an independent variable on the food choice process. Table 5 present the results of study 2.

Table 5 – Mean attitude and changes across conditions

	Condition						
	Neutral condition		Low-risk condition		High-risk condition		
Attitude variable	M	SD	M	SD	M	SD	F
Initial Pupil Size	3,87	0,75	4,50	0,83	4,02	0,77	4,69*
Pupil size during the task	3,54	0,68	4,21	0,75	3,91	0,74	5,52**
Change of pupil size (%)	8,04	5,07	6,20	6,72	3,09	5,37	5,100**
Total Fixation duration on task	12,73	4,93	14,28	5,83	17,33	8,30	0,102
Total Fixation duration on safety labels	0,21	0,44	0,25	0,46	0,13	0,26	0,643
Time duration for choice	0,28	0,10	0,31	0,11	0,39	0,18	3,913*

* = p<.05; ** = p<.01; *** p<.001

Results from one-way ANOVAs reinforce the preliminary findings that FSRP had a main effect on food choice – now, altering the food choice process. In this case, I found the main effect on the change of pupil size ($F = 5.10$; $p < 0.001$) comparing the first measure and the measure during the task. The effect is consistent during all the choice task, such as shown in figure 10.

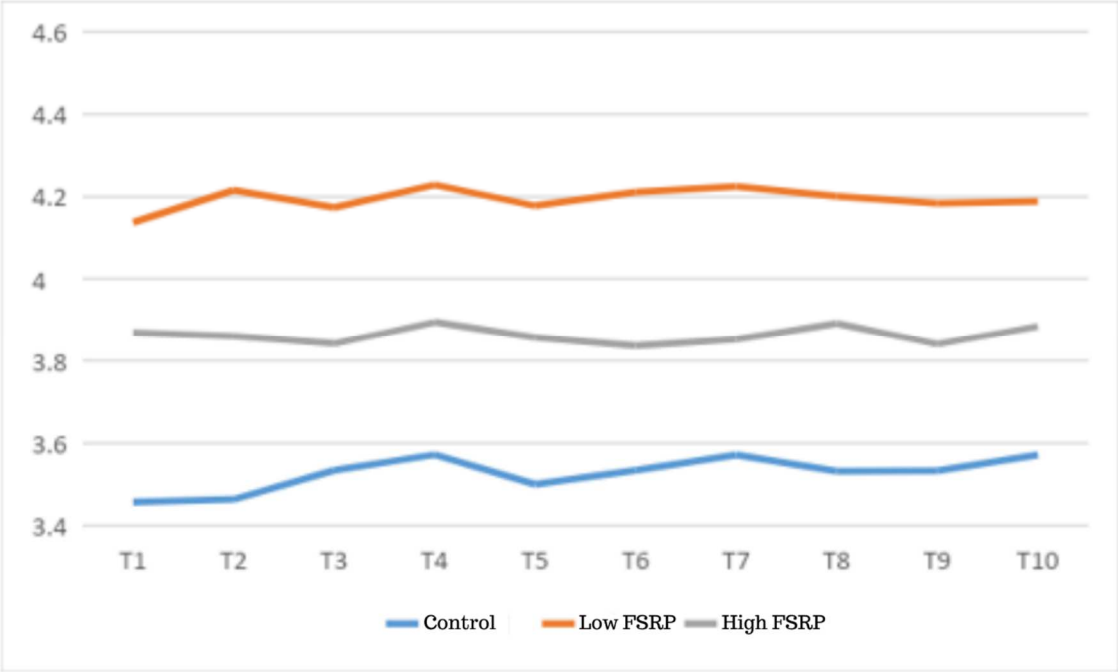


Figure 10. The effects of risk perception on visual attention during the task
Note: The x-axis represents the percentage of time elapsed

Moreover, as shown in Figure 11, although the visual attention was reduced, participants in high risk condition significantly increases their expended time to choice ($M_{LowFSRP}$= 0.31; $M_{HighFSRP}$ = 0,39; $M_{control}$ = 0.28; F= 3.913, p<.05). That is, at the same time that the participants reduced their attention during the whole period of the task, the time that took to complete it was significantly bigger.

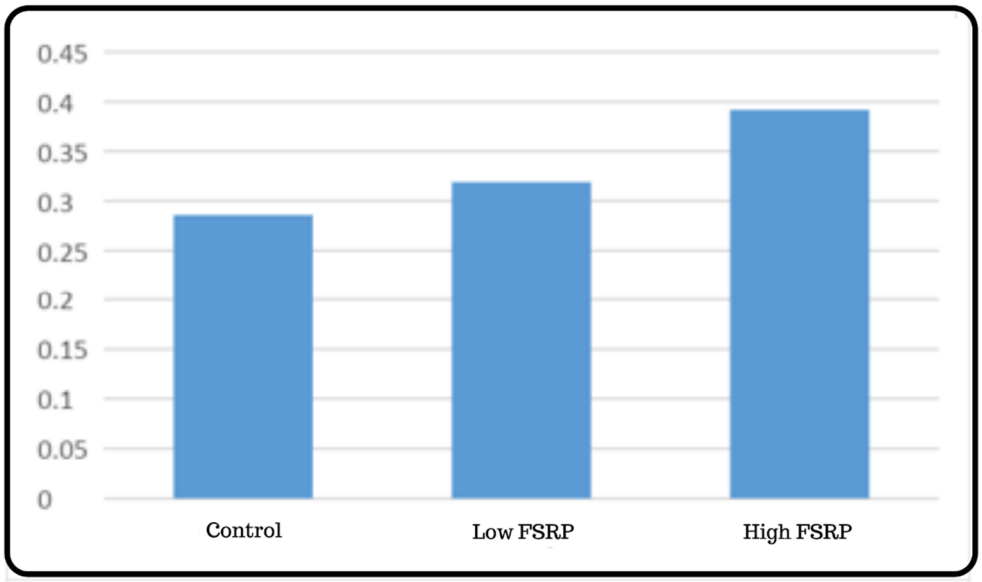


Figure 11. The effects of risk perception on the choice task duration

The following analysis aimed to identify whether the moderating effects on the FSRP-CB relationships identified in study 1 were consistent when analyzed, such as the dependent variable the decision-making process. For this, the moderation model provided by Hayes (Model 1, Bootstrap 5000) was used, having as the independent variable the FSRP, as dependent variable the pupillometry and as moderating variable the food chosen by the participant. The results were aligned with the expectative generated from study 1. The model was significant (R = .282, p <.05) with the interaction also being significant (F = 3.48, p <.05). The conditional effects of risk perception on pupillometry pointed to the interaction of specific food risk. That is, the effects were only perceived when the participant chose food with high specific risk, confirming the results identified in H_1. The same effect, however, was not identified when analyzing the outcome time for product choice (F = 0.03, ns).

Finally, I test the role of visual attention to safety symbols as moderator (i) of the moderating effects of specific food product risk perception on the FSRP-CB relationship according to H_{3a} and (ii) on the FSRP-CB direct relationship, according to H_{3b}. To this end, we

used the model proposed by Hayes, 2018 (respectively model 3 and model 2, bootstrap 5000). Table 6 shows the overall results obtained for the hypothesis test.

Table 6 – Parameters of study 2

	Model 3 (H_{3a})	Model 2 (H_{3b})
Relationship	R^2=.124**	R^2= .124**
FSRP → CB	.-217**	.-217**
FSRP → CB * FP	-.282*	-.282*
FSRP → CB * FP * VASL	-.367	-.353*

Note: *= p<.10; **=p<.05; ***=p<.01. FSRP = Food safety risk perception; CB = Consumer behavior; FP = Specific food product risk perception; VASL = visual attention to safety labels

The hypothesis H_{3a} test did not confirm the expected effects on the moderating moderation of visual attention to safety symbols (R = .367, ns). On another hand, the analysis of model 2 results, confirming the hypothesis H_{3b} revealed distinct effects of risk perception on the decision-making process of food choice when considering the double moderation of (i) specific risk perception of the chosen food and (ii) visual attention to safety symbols. In this sense, it is possible to suggest that the effects only remain significant when there is a high risk of food and low visual attention to the symbols. That is, the negative effects of FSRP on CB in all levels of specific food product risk perception are mitigated by visual attention to safety symbols. Table 7 presents the parameters identified for the interaction test.

Table 7 – Parameters of double moderation

FP	VASL	Effect
3,75	0,000	-.2160
3,75	0,225	-.4928
3,75	0,620	-.9786
4,66	0,000	.3532
4,66	0,225	.0765
4,66	0,620	-.4094
6,83	0,000	- 1.710**

6,83	0,225	- 1.433**
6,83	0,620	.9480

Note: *= p<.10; **=p<.05; ***=p<.01. RP = Risk perception; FC = Food choice; FS = Food safety; VASL = visual attention to safety labels

3.3.4 Discussion

Previous research proposes that FSRP can generate negative effects on consumer behavior. Study 2 confirms the assumption showing the effect of FSRP on the decision-making process, reinforces the preliminary findings that show the significance of FSRP on the CB (H_1), and the moderation role of specific food product risk perception (H_2). Also, the results extend the preliminary findings by showing the moderation role of visual attention to safety labels to mitigate the negative effect when even the choice refers to a product with high specific perceived risk. In study 3, we further explore the central relationship and test the moderation role of prototype perception on FSRP-CB relationship (H_{4b}) and the moderation of specific food product risk perception in the primary relation (H_{4a}).

3.4 STUDY 3 – THE EFFECT OF FSRP ON THE CB: THE MODERATION ROLE OF PROTOTYPE PERCEPTION

Study 1 and 2 shows the main effect of FSRP on the CB (H_{1a} and H_{1b}), the moderation role of specific food product risk perception (H2) and visual attention to safety labels (H_{3a} and H_{3b}). The objective of study 3 goes behind, evaluating the moderation role of prototype perception on the FSRP-CB relationship (H_{4b}) and the possible moderation effect on the moderation role of specific food product risk perception on the central relation (H_{4a}). That is: I purpose that a positive prototype perception (that reinforces the prototype similarity) with foodborne disease patients will increase the negative effect of FSRP on the CB and will increase the impact of specific food product risk perception.

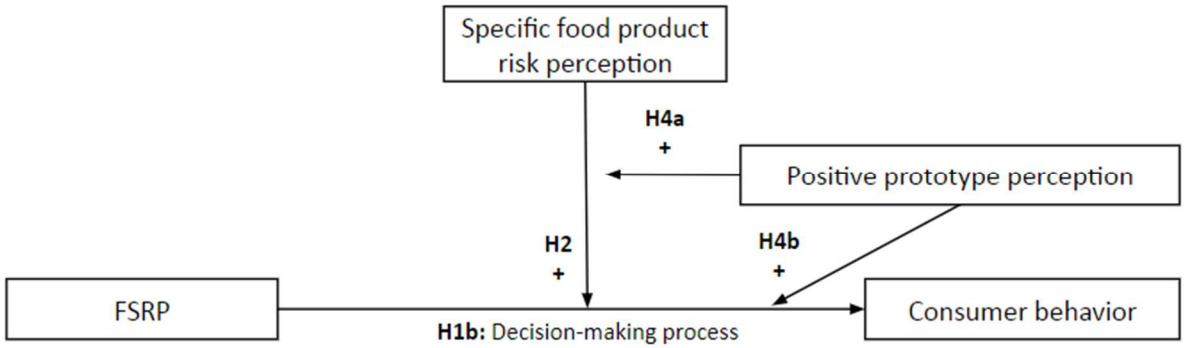


Figure 12. Model of study 3

3.4.1 Participants and procedure

One-hundred two undergraduate students (42.9% male, Mage 25.40, SD = 8.00) take part in the study as volunteers. Study 3 followed a 2 (FSRP: High vs. low) x 2 (Prototype perception: positive vs. negative) between-subjects experimental design.

Study 3 used the same Tobii eye tracker as in study 2 to collect the data. Equally, the initial procedures are the same adopted in study 2. Although after exposition to the risk perception manipulation (videos) and preliminary questionnaire (personal belief questions), participants are randomly assigned to the second manipulation: the prototype perception priming. Prototype perception was made salient using a fictional history about the profile of foodborne disease patients (see figure 13).

Condition **Fictional history**

Positive

Negative

Figure 13. Prototype perception priming
Note: *This stimulation was used because the similarity or distance about a student sample*

After completing the prototype perception manipulation, participants are exposed to the food choice task - the same used in study 2. Participants saw the same food products, and no time restriction is established for the decision process. All instructions, stimuli, manipulations, and questions were conducted in the Tobii Studio software.

3.4.2 Measures

Participants' FSRP, visual attention, and consumer behavior were measured in the same form of study 2. Additionally, the manipulation check for prototype perception consisted of the analysis of participants' prototype perception. After the manipulation exposition, participants answer 11-items (such as sophisticated, confused, immature, intelligent, popular) Likert scale (1 = less, 4 = medium, and 7 = much) about its evaluation of the described prototype (Gibbons & Gerrard, 1995).

3.4.3 Results

Initially, the effectiveness of the applied priming (FSRP and prototype perception) was tested. Such as expected, the double analysis confirms the manipulation effect. First, results from T-Test revealed the main effect of manipulation on FSRP (T = 2,977, p <.001). That is: the group that was introduced to the "Low FSRP" video had a higher perception of reliability in food consumption compared to previous years (M = 4.38) compared to the group that participated in the "High FSRP" condition (M = 3,15). Additionally, the prototype perception priming was also shown to be significant (T = 3,488, p <.001). Participants who were presented with the positive prototype showed a more favorable evaluation (M = 6.71) than those presented with the negative prototype (M = 1.66).

To examine pre-existing group differences, we performed a series of ANOVAs and chi-square tests. First, we evaluate the difference of gender using the four experimental conditions as the dependent variable. No difference presented (chi-square 1.857; ns). Then, I performed an ANOVAs analysis with the experimental group as the independent variable and control variables as the dependent. No group difference was identified: age ($F_{(1, 90} = 1.740$; *ns*), income ($F_{(1, 101} = 1.211$; *ns*); food restriction ($F_{(1, 101)} = 2.116$; *ns*) and past experience ($F_{(1, 89} = .394$; *ns*). After that, I analyze the main effect of the independent variable on consumer behaviors. Table 8 present the results of study 3.

Table 8 - Mean attitude and changes across conditions

	Experimental condition								
	Low FSRP + Positive prototype		Low FSRP + Negative prototype		High FSRP + Positive Prototype		High FSRP + Negative Prototype		
Attitude variable	M	SD	M	SD	M	SD	M	SD	F
Initial Pupil Size	4,04	0,59	4,39	0,85	4,32	0,70	4,32	0,49	1,247
Pupil size during the task	3,91	0,54	4,17	0,78	4,10	0,65	4,04	0,51	1,729*
Change of pupil size (%)	2,27	5,60	4,83	6,84	4,10	5,93	6,74	5,88	2,222*
Total Fixation duration on task	15,32	7,38	16,17	10,78	13,42	6,00	10,52	3,38	2,89*
Total Fixation duration on safety labels	0,09	0,14	0,18	0,32	0,18	0,21	0,06	0,11	2,010*
Task Duration	0,38	0,21	0,38	0,20	0,29	0,11	0,24	0,07	4,48**

* = p<.05; ** = p<.01; *** p<.001

The analyses reveal the effects of the experimental conditions on consumer behavior (decision-making process) analyzed. Significantly, FSRP and prototype perception modify the pupil size during the task (F = 2.22, p <.05), the total fixations made on available products (F = 2.89, p <.05), the visual attention to safety symbols (F = 2.010, p <.05) and the total elapsed time for decision (F = 4.48, p <.01). The pairwise comparison suggests contributions for each of the results.

The findings of study 3 reinforced the FSRP effect in the decision-making process identified in study 2. That is: those who perceive the high FSRP make their decision in a short time but with a high level of attention (pupil size) than in the low FSRP condition (F = 1.729, p <0.05). Moreover, the effects of prototype perception reinforced these findings. Participants who were at high FSRP and negatively evaluated the prototype of food disease patient when compared with participants with low FSRP and positive evaluation of the prototype increased by almost three times (296%) the positive pupillometric size (T = 2,695, p <. 01; $M_{lowFSRPpositive}$ = 2.27; $M_{highFSRPnegative}$ = 6.74). Conversely, participants at high FSRP and negative assessment of the prototype decreased by approximately 63% the time used to make their choices (T = 3.012, p <.001; $M_{lowFSRPpositive}$ = 0.38, $M_{highFSRPnegative}$ = 0.24) and reduced approximately 68% of the total amount of fixations (T = 2,954, p <0,001; $M_{lowFSRPpositive}$ = 15,32, $M_{highFSRPnegative}$ =

10,52). Figures 14, 15, and 16 demonstrate the results that reinforce the hypothesis H_{1b} and confirm the suggested effects on H_{4a}.

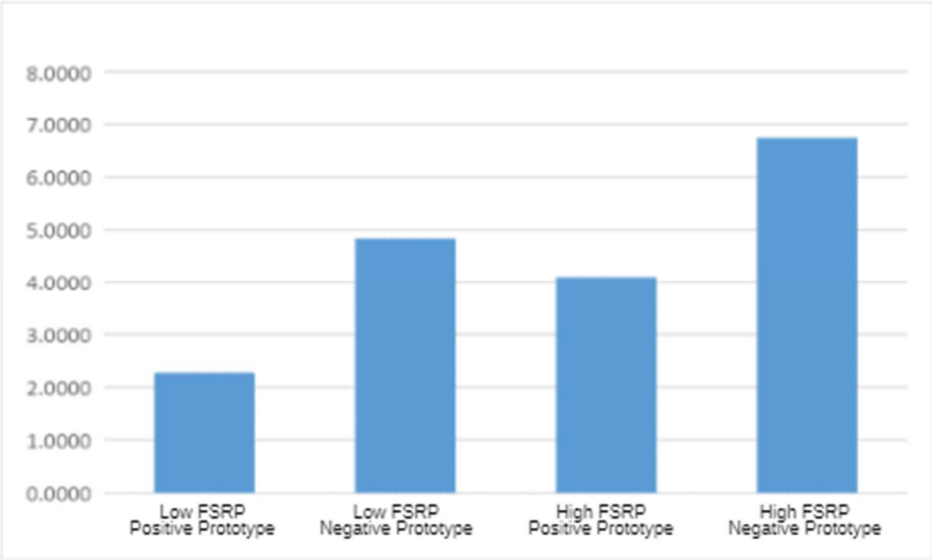


Figure 14. The effects of FSRP and prototype perception on the pupil size

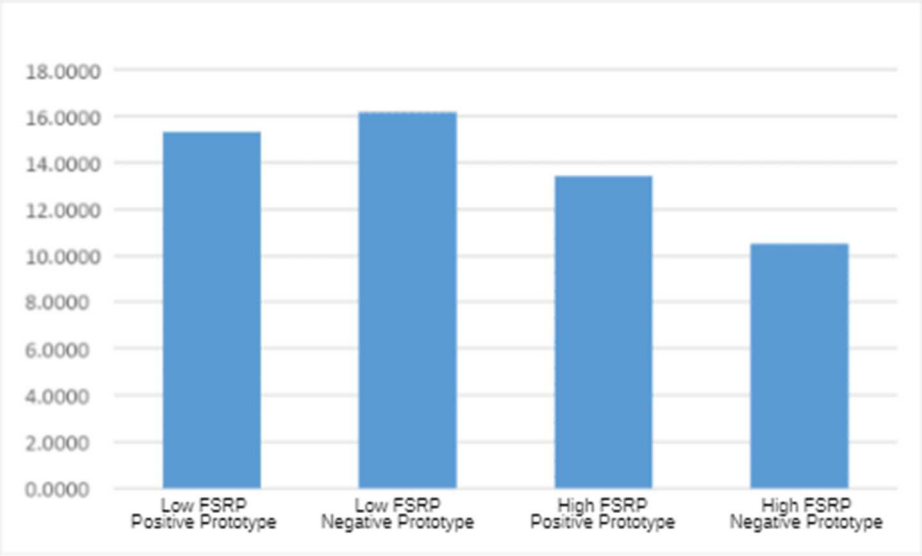


Figure 15. The effects of FSRP and prototype perception on total fixation duration

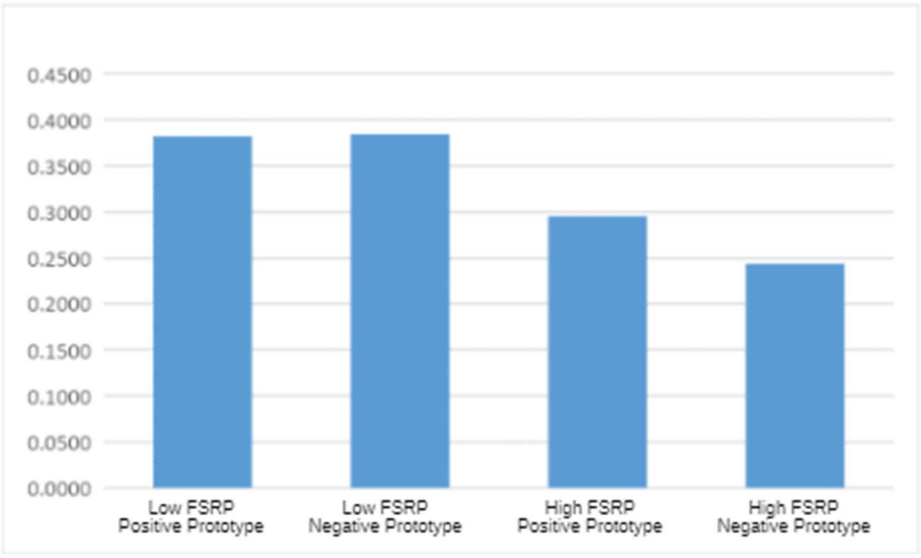


Figure 16. The effects of FSRP and prototype perception on task duration

Although it was not a central object of analysis, the posthoc pairwise comparison revealed counterintuitive effects of the interaction between FSRP and prototype perception on the visual attention to safety labels. In this sense, when participants perceived low FSRP, they tend to observe more safety symbols if they negatively evaluate the food disease patient. The effect, however, was not significant. (T = 1,263, p= ns; $M_{lowFSRPpositive}$ = 15,32, $_{MlowFSRPnegative}$ = 10,52). In another side, in the high FSRP condition, the visual attention to safety symbols is significantly altered by prototype perception (T = 2,428, p<.01; $M_{highFSRPpositive}$ = 0,18, $M_{highFSRPnegative}$ = 0,06). That is: visual attention to safety symbols occurs, especially when the individual perceives risk and at the same time, has a positive assessment (which increases their perception of similarity) of the patient's prototype food. Figure 17 shows the results obtained.

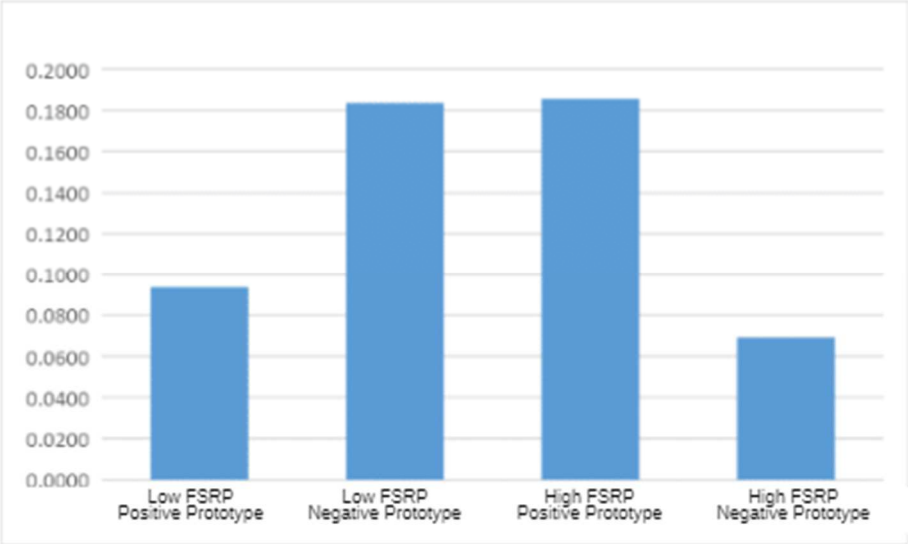


Figure 17. The effects of FSRP and prototype perception on total fixation duration on the safety labels

Finally, I tested the moderation effect of prototype perception on the specific risk perception of food to the main ratio (H_{4b}). For this, the model suggested by Hayes (model 3, bootstrap 5000) was used, having as the independent variable the FSRP, as moderating variable the specific perceived risk of the food chosen in the task, as moderating variable of moderation the perception of the prototype and as dependent variable the decision making process. The obtained results did not confirm the proposed hypothesis H_{4b}. In this sense, there was no significance when evaluating the change in pupillometry (b = .001, n.s.). However, moderation was supported marginally for the total fixation duration. (b = .034 , p<.10.) and for task duration (b = .028, p<.10). Table 9 shows the results of the four models tested.

Table 9 - Mean attitude and changes across conditions

FSRP	Prototype perception	Main effect (FSRP-PC)	Main effect (FSRP-TFD)	Main effect (FSRP-TD)
1,00	-2,52		-1.36*	-.02
1,00	4,00		-.47	.00
1,00	13,00		.75	.01
3,00	-2,52		-.63	.00
3,00	4,00		-.67	.00
3,00	13,00		.22	.00
6,00	-2,52		.45	.01

6,00	4,00		.02	.00
6,00	13,00		-.56	.00
R^2 change (X*W*Z interaction)		.001	.0345*	.0282*

Note: *= p<.10; **=p<.05; ***=p<.01. FSRP = Food safety risk perception; PC = Pupillometry change; TFD = Total fixation Duration; TD = Task Duration; VASL = visual attention to safety labels. Food safety Risk Perception and prototype evaluation in conditional tables are the 16^{th}, 50^{th} and 84^{th} percentiles

3.4.4 Discussion

Previous research suggests that FSRP can generate negative effects on consumer behavior. Study 3 reinforced the preliminary findings of studies 1 and 2 and confirming that FSRP alters consumer behavior moderated by specific food product risk perception. Additionally, it was possible to refine the model and confirm the effects of prototype perception on the central relationships.

The tests of the second moderation hypothesis (H_{4b}) were significant, especially when considering the extremes (High FSRP and negative prototype evaluation vs. Low FSRP and positive prototype evaluation). Significantly, it was possible to increase by about 3X the visual attention of participants who were exposed to the news of food fraud and had an adverse judgment from the patient of food disease. Similarly, the time taken for decision making has been significantly reduced in this case. However, when the visual attention to the safety symbols in the foods presented was evaluated, the results were different.

As shown in figure 13, the visual attention to safety labels will occur differently, given the FSRP. In the case of low FSRP, the results suggest that consumers will be more attentive to visual elements when they have a negative impression of the prototype, distancing themselves from the “ideal type” of the food patient. However, when perceived high FSRP, the effect is reversed. In other words, consumers will tend to observe the safety elements when positively assessing the patient of food disease and increasing their perception of similarity.

3.5 STUDY 4: THE CONFIRMATION TEST

Preliminary studies tested the assumptions provided in the study model. Study 4 (the confirmatory test) aims to reassess the research hypotheses and test the complete model through

an alternative experimental approach. That is: through a laboratory-controlled experiment, evaluate the main effect of FSRP on the CB (H_1), the moderation role of specific food product risk perception (H2), the moderated moderation of visual attention to safety labels and prototype perception (H_{3a} and H_{4a}) and, finally, the moderation effect of visual attention to safety labels and prototype perception (H_{3b} and H_{4b}) in the central relationship.

3.5.1 Participants and procedure

Sixty-three undergraduate students (47.6% male; M_{age} 24.37, SD = 6.26) from a major university volunteered to take part in the study and were not paid. Study 4 uses a one-factor between-subjects design with two levels of risk perception (low vs. high).

We used a screen-based Tobii eye tracker (Tobii Pro X3-120) with a high frequency (120 Hz) to collect the data. This eye tracker is integrated into a 17-inch TFT monitor, has no visible devices, and no need for participants to wear any additional gadget that might affect their behaviors, allowing them to look directly at the screen. The eye tracker relies on infrared reflection technology to track the movement of the viewer's cornea and pupil, with two image sensors (at the top and bottom of the monitor) that capture images of the eyes. Participants came individually into a lab room every 5 minutes. Each participant was asked to seat in front of the monitor with the eye tracker technology. A calibration procedure was performed with each participant to ensure that the eye tracker correctly recognized both eyes before the recording was started. For those that the calibration procedure fails, the chair or the monitor was adjusted to provide accurate participants' eyes recognition.

Participants were randomly assigned across the risk perception of experimental conditions. We used the Tobii Studio software to develop the stimuli. Participants in the high FSRP condition read a magazine notice about foodborne illness occurred in their state. In contrast, the participants in the low FSRP read a similar note about Indians contamination. After that, each participant is invited to choose three products exposed in supermarket gondolas: a typical tea (a low-risk food), honey (a medium risk food), and, finally, milk (a high-risk food). Both groups of participants, either in the high and low-risk perception condition, were exposed to the same gondolas with the same products. For both conditions, all instructions and stimuli were presented on the 17-inch TFT monitor in full-color bitmaps with a 1280x1024 pixel resolution. We used real familiar food brands on study 4.

3.5.2 Measures

The first dependent variable (consumer behavior) was measured with two different approaches. In line with the prediction of H_{4a}, the intention to buy food were measured with a three-items for each product (α_{tea} = .753; α_{honey} = .849; α_{milk} = .805; Klein et al, 1998). The items evaluated were: "I would like to buy this tea/honey/milk," "I intend to buy this powder tea/honey/milk," "I believe that people should buy this tea/money/milk." In another way, using the same approach of studies 2 and 3 and in line with the prediction of H_{4b}, I measured the decision-making process by the pupil size and the total fixation duration during the task. On another side of the main relation, we check the priming effect with the health ten-items dimension general risk perception scale (α = .792; Weber et al., 2002).

The moderation variables were measured in different ways. The total fixation count measured visual attention within the area of interest (safety labels on the products). Prototype perception was measured with eleven-items (Thornton et al., 2002). Participants answer items such as "I look like someone who gets sick from eating food," "The food disease patient is sophisticated," "The food disease patient is confused," to evaluate prototype evaluation and perceived similarity with foodborne disease patients. Finally, We assess the FSRP for each food with four-items for each product. The assessed items were: "The risk of someone being contaminated by consuming this tea/honey/milk is high," "I can get sick after consuming this tea/honey/milk," "I can have negative consequences on my health due to consuming this tea/honey/milk," and "My health may be damaged in the future by consuming this tea/honey/milk" (Danelon & Salay, 2012). All measures used a seven-point Likert-scale (1-strongly disagree to 7-strongly agree).

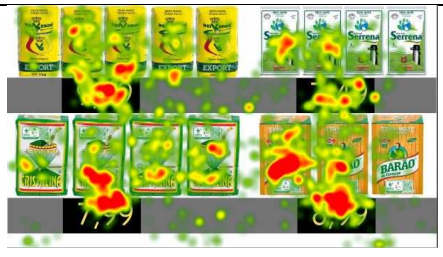
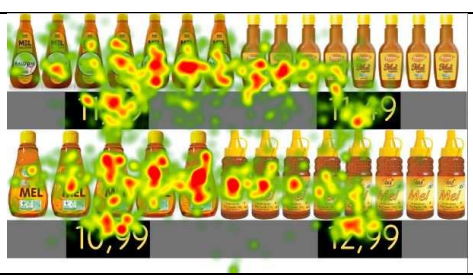
To control for other factors that could explain visual attention and buying intentions, we measured socio-demographic questions (gender, age, income, children and elderlies at the house).

3.5.3 Results

Initially, the effectiveness of the applied priming was tested. The results indicate that the priming was effective, pointing a significant difference (F = 13,525, p <.001) between the different experimental conditions. The group that presented the food crisis report in their state

(high FSRP group) had higher risk perception (M = 2.72) compared to the group that read the food crisis report in India (low FSRP group) (M = 2.03).

Results from one-way ANOVAs show that FSRP n had a main effect on buying intentions ($F_{(1, 63)} = 5.49$; $p < .001$). Specifically, participants in the "high FSRP" condition had less intention to buy ($M_{highrisk} = 4.54$ and $M_{lowrisk} = 5.11$), providing support for H_{1A}. Moreover, participants in the high FSRP condition had higher pupil size levels ($M_{highrisk} = 3.55$ and $M_{lowrisk} = 3.38$) and total fixation duration ($M_{highrisk} = .43$ and $M_{lowrisk} = .29$) in comparison to those in the low-risk perception, providing evidence for H1b. Post-hoc tests reinforce these findings by showing a significant difference in the time for reading the magazine noticed between the groups ($F_{(1, 63)} = 1.27$; $p < .001$). Participants in the high FSRP condition demand more time to analyze the notice in comparison with the low FSRP group ($M_{highrisk} = 54.40$ seconds and $M_{lowrisk} = 45.28$ seconds). Conversely, the pupil size during the analysis is higher for the high-risk perception group ($M_{highrisk} = 3.39$ and $M_{lowrisk} = 3.07$). This result is aligned with previous findings and show the effect of FSRP on the decision-making process, increasing the attention (pupil size) but reducing the fastly to make decisions (time to read). Figure 18 shows the heat maps of all exhibited images between the two groups.

Image	**Low FSRP**	**High FSRP**
Stimulus		
Low specific food product risk perception (tea)		
Medium specific food product risk perception (honey)		

High specific food product risk perception (milk)	

Figure 18. Heatmaps of study 4 images

To further detail the analysis on consumer behavior, we conducted one-way ANCOVAs showing that FSRP continued to significantly affect the dependent variables, even when controlling for each psychological dimension. The covariates agreeableness ($F_{(1, 63)} = 0.10$; ns), conscientiousness ($F_{(1, 63)} = 7.14$; ns), neuroticism ($F_{(1, 63)} = 1.85$; ns), openness ($F_{(1, 63)} = 12.58$; ns) and extraversion ($F_{(1, 63)} = 7.81$; ns) had no main effect on buying intention.

In the next step, I tested the moderation role of the specific food product risk perception was tested, in line with the hypothesis H_2 (Hayes, 2018, Model 1; bootstrap 5.000). First, I test using the intention to buy food, such as the dependent variable. The model test showed good consistency (R = .273; p<.001), with statistical significance supported for the moderation hypothesis (R^2 = .023; $F_{(1, 63)}$ = 4.68; p<.05). The results suggest that the lower level of perceived risk in each food decreases the negative effects of perceived risk on purchase intention. That is: when purchased low-risk foods such as tea, the risk perceived by the consumer have little effect on the intention to buy, being statistically decreased compared to the overall average (B = -.350, p<.001, [-.534;-.166]). This moderating effect decreases in medium risk foods such as honey. (B = -.271, p<.001, [-.413;-.129]), and becomes non-significant in medium-high risk products (B = -.11, p= ns; [-.268;.042]). These results confirm the hypothesis of moderation predicted in the proposed theoretical model.

After that, using the intention to buy food such as dependent variables, we performed the moderation test for visual attention for safety labels, aiming at testing the hypotheses. H_{3a} and H_{3b}. Initially, tests of the double moderation predicted in the hypothesis H_{3b} (Hayes, 2018, Model 2; bootstrap 5.000). In line with study 2, the results confirm the double moderation, with the statistical significance of the model. (R = .313; p<.001), confirming the hypothesis. Subsequently, moderate-moderation tests were performed (Hayes, 2018, Model 3; bootstrap 5.000), in line with the suggestion of H_{3a}. Again aligned with the preliminary results, the findings of study 4 did not confirm the hypothesis ($R^{2change}$ = .0087, $F_{(1, 63)} = 1.07$; $p<.ns$)

Finally, the moderation hypotheses of prototype perception were tested using the intention to buy food such as consumer behavior outcomes (H_{4a} and H_{4b}). Similar to previous

tests, initially the hypothesis of double moderation was tested (Hayes, 2018, Model 2; bootstrap 5.000). The results were statistically significant for the general model (R=.389, p<.0001), confirming the hypothesis of double moderation. Analyses of the predictor conditional effects for combined moderator extracts suggested that reducing the negative effects of risk perception on choosing food is mitigated when (i) the food has a low level of perceived risk; or (ii) the consumer does not perceive himself as being similar to the patient with an eating disorder. Similarly, participants with a high perception of similarity and positive prototype evaluation had recurring negative effects of FSRP on ITBF, confirming the proposition and reinforce the findings of study 3.

Subsequently, tests of the hypothesis of moderation of the specific food product risk moderated by the perception of the prototype were performed (Hayes, 2018, Model 3; bootstrap 5.000). The main model presented statistical significance. (R=.424, p<.0001), also supported moderate moderation (R^2change = .052, p<.0001). Analysis of the predictor, conditional effects for combined moderator extracts, suggested that while the effects are consistent across all tested foods, they are more significant for perceived high specific food product risk perception. In this case, the positive prototype evaluation (the increase of perceived similarity) increases the negative effects of FSRP on the ITBF (B=-.383, p<.0001), while positive perception negates these effects (B=.161, p<.ns). That is: When consumers perceive a food risk situation and choose foods with high perceived risk (such as milk), consumers will tend to maintain their purchase intention if they perceive themselves to be distant from the patient's food prototype, reducing their similarity with this mental model. Conversely, the positive evaluation of the prototype (with its increased perception of similarity) will reinforce the negative effects. These findings confirm the predicted hypotheses (H_{4a} and H_{4b}).

3.5.4 Discussion

Study 4 aimed to test, with an alternative experimental approach, the hypotheses predicted in the theoretical model. As identified in the preliminary studies, it was possible to confirm the adverse effects of FSRP on the CB. Additionally, from the specific risk moderation analysis of each food, the hypothesis was supported that this effect is more substantial in foods with higher risk, such as milk. This finding reinforces preliminary studies that have shown that food product is a significant moderator of the relationship between FSRP and CB, especially the intention to buy food (Nardi et al., 2020).

The hypotheses of double moderation (H_{3b} and H_{4b}) were also supported from the results obtained in study 4. That is: while visual attention to safety labels diminishes the negative effects of FSRP on ITBF - especially for high specific food product risk perception - the effect of prototype perception is inverse. In this case, the increase of positive prototype evaluation (and consequently the increase of perceived similarity) with the foodborne illness patient increases the negative effects of FSRP on ITBF, especially in foods with high intrinsic risk (such as milk).

Finally, the moderate moderation hypothesis (H_{3a} and H_{4a}) presented different results. While it was not possible to confirm the effects of visual attention to safety labels as moderator of the central moderation, such effects were supported for prototype perception. In other words, when the positive perception and similarity with the food patient is increased, the moderating effects of the intrinsic food risk are enhanced, making the negative effects of risk perception on purchase intention greater.

In this way it is possible to suggest that (i) consumers usually lower their intention to buy food when they increase their FSRP; (ii) the decrease is more significant for foods with high specific risk such as milk; (iii) the reduction in consumption is mitigated by visual attention to safety labels and increased by the perception of similarity with the foodborne illness patient's and (iv) the most substantial decrease in consumption due to FSRP will occur when the food chosen has a high specific risk, the consumer perceives it to be similar to the foodborne illness patient, and visual attention to safety labels is low. The set of results obtained suggests theoretical and managerial contributions that will be explored in the following chapter.

4. GENERAL DISCUSSION

By integrating the visual attention theory (Pieters & Wedel, 2004) and the prototype-willingness model (Gibbons & Gerrard, 1995) in the context of food choices, the current research has explored whether FSRP lead to differential consumer behaviors (intention to buy food and the decision-making process) considering heterogeneous levels of specific food product risk perception. The findings are consistent with the assumption that consumers in a high FSRP condition will change the decision process and reduce their ITBF. Additionally, the visual attention to safety labels will reduce this negative effect, and, on the opposite, the positive prototype perception will increase this effect. Table 10 shows the synthesis of results.

Table 10 - Synthesis of results

Hypothesis	Studies	Results
H1a: Food safety risk perception have a negative effect on food intention to buy	1 and 4	Supported
H1b: Food safety risk perception have a negative effect on the decision-making process	2, 3 and 4	Supported
H2: The negative relationship between food safety risk perception and food consumer behavior is weaker (vs. stronger) for low (vs. high) risk perception of specific food product	1, 2, 3 and 4	Supported
H3a: The negative relationship between food safety risk perception and consumer behavior is weaker (vs. stronger) for high (vs. low) visual attention to safety labels	2 and 4	Supported
H3b: The moderation effect of risk perception of specific food products on the negative relationship between food safety risk perception and consumer behaviors is weaker (vs. stronger) for high (vs. low) visual attention to safety labels.	2 and 4	Not supported
H4a: The negative relationship between food safety risk perception and consumer behaviors is weaker (vs. stronger) for	3 and 4	Supported

negative (vs. positive) prototype perception		
H4b: The moderation effect of risk perception of specific food product on the negative relationship between food safety risk perception and consumer behaviors is weaker (vs. stronger) for negative (vs. positive) prototype perception	3 and 4	Partially supported

Results from four experimental studies suggest that FSRP negatively affects consumer behaviors. When assessing self-declared choice (intention to buy food), individuals who recognize high FSRP decreased ITBF by about 10% and 13% (respectively, study 1 and 4). Additionally, the results obtained (research 2 and 3) suggest that the decision-making process is affected by the FSRP, causing a decrease in the choice time and an increase in the levels of visual attention (pupil size). Taken together, the results of the four studies suggest that the perception of risk in food chains leads the individual to quick choices and high cognitive effort. The danger, as expected, diminishes your purchase intent in a "disgust" move for those items (Bredahl, Grunert & Frewer, 1998). However, this effect is not linear, being moderated by specific food product risk perception, visual attention to safety labels, and prototype perception.

In the four experimental studies, the hypothesis of food safety moderation (H_2) was tested. From the establishment of specific food products perceived risk performed in the pre-test, it was possible to check the different effects produced in the FSRP-CB relationship. Study 1 suggested important results. Through the double analysis (food risk level and presence/absence of certification symbols), it was found that food safety is a significant moderator of the effects of FSRP on ITBF. Additionally, the results suggest that the insertion of safety symbols only produces substantial effects when the food is perceived as high risk by the consumer (such as milk and cheese). Risk perception, coupled with the absence of certifications on specific high-risk food (cheese), resulted in a 19.79% reduction in intention to buy. However, it is not only the presence/absence of certifications that determines the moderating effect but the consumer's visual attention to these symbols.

The results obtained from study 2 suggested a moderating effect on the relationship between FSRP and CB: the visual attention to safety symbols. In this sense, it was possible to indicate that high visual attention can mitigate the negative effects of FSRP, a fact that supported the hypothesis H_{3b}. Conversely, hypothesis H_{3a} could not be supported. In other

words, it cannot be stated from the results obtained that visual attention to safety symbols decreases the moderating effects of specific food product risk perception on the FSRP-CB relationship. These findings suggest that, especially in foods with high specific risk, the exposure of visual elements that indicate safety should be done to capture high consumer attention, minimizing the negative effects of FSRP in the decision-making process.

Additionally, from the results of studies 3 and 4, it is possible to suggest effects derived from a top-down factor: the prototype perception. Positive perception of the prototype accentuated the negative effects of risk perception on decision making. The interaction between these two elements caused significant changes in the participant's visual attention in the decision-making process (296% increase), in the total fixations (68% reduction) and in the decision time (63% reduction). These results confirm H_{4a} and broaden the results of study 2, identifying the increase in cognitive effort and at the same time, suggesting the participant's repulsion to the decision-making process. Although unanticipated, the interaction between FSRP and prototype perception has had diverse effects on attention to safety symbols, remaining significant only in risk situations, when the positive perception of the prototype (i.e., a higher perception of similarity) makes the consumer triple the number of fixings on these visuals symbols.

Finally, the results of study 3 partially supported the moderating effects of prototype perception on the moderation of specific food product risk perception. In this sense, it was possible to identify the interaction between the perception of the prototype and the low risk of food. That is: when consumers perceive that the food has little risk and if they perceive little similar to the prototype of the food patient, the effects of the perception of risk in the decision process are reduced, both for the decision time and the attention to the certification symbols. Figure 19 presents the consolidated model from the hypothesis test.

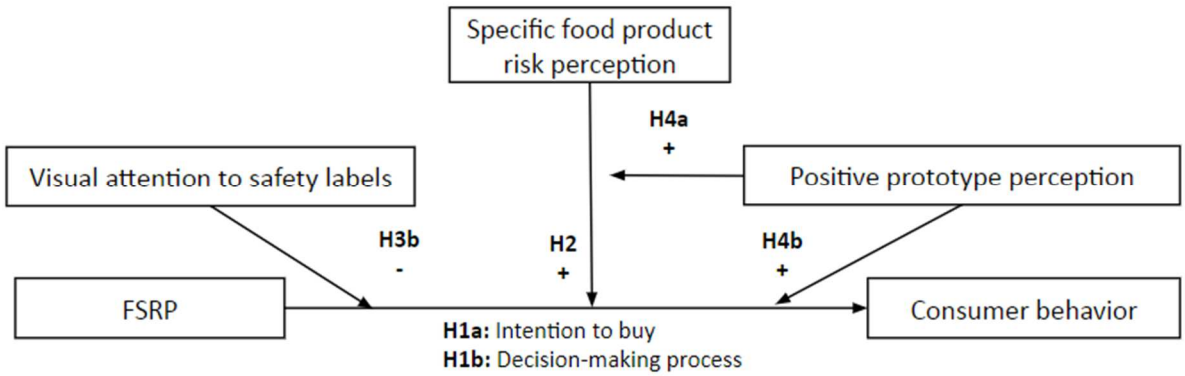


Figure 19. Consolidated research model

4.1 THEORETICAL AND MANAGERIAL IMPLICATIONS

The results have implications for the comprehension of food marketing and consumer behaviors (Ha, Shakur & Do, 2019; Petrolia, 2016; Redmond & Griffith, 2004). Notably, the current research makes four contributions to the discussion of how FSRP influences food preferences. First, it demonstrates that different food products have different specific levels of risk perception, being possible to group down (such as sugar), medium (such as honey) and high (such as cheese) and this factor is an essential moderator in the relationship between FSRP and CB for understanding the effects of risk on food choices. The results showed that food safety crises tend to affect the demand for foods perceived by consumers as more vulnerable to contamination (due to their origin, life cycle, etc.). Although previously recognized (Nardi et al., 2020) this result suggests that the food category should be considered, for example, in the formulation of strategies for consumer education on food safety, and it is possible that campaigns that are developed with foods of high perceived risk reach better results in increasing the denial of unsafe food (Lobb, Mazzocchi & Traill, 2007).

Second, the current research offers empirical evidence for the role of safety labels on food consumption behavior (Jongwanich, 2009). In this sense, in line with the previous contribution, the results obtained suggest that certification and traceability tools and their use as market positioning strategies have limited effects on foods with low and medium perceived risk (Brach, Walsh & Shaw, 2018). On the other hand, these resources are decisive for mitigating the denial of consumption in specific high-risk foods. These findings suggest a reason for the high heterogeneity of preliminary results. Such effects may be derived from the risk level of the food used in the study, a fact that requires further analysis. On the other hand, this result suggests an essential managerial contribution (Newman et al, 2018). Although the use of safety strategies is critical to mitigating risks in a product's value chain, their use as a selling argument has a specific niche that excludes perceived low-risk foods (Siegrist et al, 2015).

Third, we identify the main effect of FSRP on the decision-making process (time used to decide and pupillometry), primarily while interacting with positive prototype perception and high levels of visual attention to safety labels. Preliminary efforts have shown that in quick decisions - such as choosing food in a supermarket, for example, - visual attention can influence choices more than individual preferences (Milosavljevic, 2012). This effect would be even stronger when individuals had no clear preference for a product, such as when exposed to multiple brands. In the FSRP context, though, I put light on a significant contribution that

extends previous efforts. Top-down factors such as FSRP and the prototype perception will interact to modify the decision-making process, reducing the time to make a choice while increasing the visual attention. This finding together with the identified role of visual attention to safety labels raises the importance of visual stimuli. Managers may use this insight to reinforce their communication strategies, especially when the company's product is considered high risk.

Finally, an unexpected outcome of this research. I identify that individuals with a high perception of similarity with foodborne illness patients significantly increase their visual attention during the choice - and almost triple the visual attention to safety labels. In line with preliminary studies, these results broaden the scope of the contribution of the prototype-willingness theory (Gibbons & Gerrard, 1995) to the field of food choices and reveal a hitherto unexplored element in the context of food choices. These results suggest the possibility of developing public nudges that reinforce the ordinary nature of foodborne diseases (e.g., advertising campaigns using common people rather than artists with low perceptions of similarity). Similarly, managers will be able to use these insights to enhance the results of their security attribute-based promotion strategies (Bocker, 2002).

Although the magnitude of some results has been reduced (such as the potential moderating effects of prototype perception to moderating specific food product risk perception), the impact can be translated into significant effects when market circumstances are considered. In general, the food market is characterized by high competitiveness and a small profit margin. Consumers in this sense can choose between different options, and minor changes translate into significant effects on companies' results. Thus, the results obtained allow us to advance our understanding of the factors that affect the food choice process and incorporate aspects such as visual attention and prototype perception into this context (Marucheck et al, 2011; Roth et al, 2008).

4.2 LIMITATIONS AND FUTURE RESEARCH

Of course, the current research has limitations that offer avenues for future investigations. First, I didn’t consider the effect of prior knowledge – and subjective knowledge too. Preliminary research suggests that there is a gap in risk assessment when analyzing general consumers and experts in that context (De Boer et al., 2005; Krystallis et al., 2007; Kendall et al., 2018). This phenomenon may be replicated when analyzing food choices. What is more,

the difference in knowledge within different consumer groups may account for some of the unidentified effects in this research. Future research may exploit this opportunity by extending analytics to distinct groups of consumers. They may also incorporate into the theoretical model and experimental design mechanisms that enable participants to recognize the real likelihood of being affected by a contaminant in different types of food. Moreover, such studies may use the perspective theory (Kahnemann and Tversky, 1979), identifying the possible influence generated by the exposure of the probabilities of potential gains and losses.

The second limitation refers to the impossibility of generalization derived from the geographic characteristic of the analyzed sample. Although the results remained significant in different experimental approaches, the group of participants was culturally limited. This may have conditioned, for example, the perception of intrinsic risk to each type of food, as recent episodes of contamination in animal food chains. Further studies may overcome this barrier by replicating and extending the research to global contexts.

The third factor to consider is the possible effect of time pressure on the proposed model. In general, consumers tend to make quick choices in supermarkets (Molosavljevic et al. 2011), a factor that increases the relevance of the findings. The incorporation in future studies of factors that induce the participant to feel pressured by time may bring new insights and, especially, consolidate the conclusions regarding the importance of visual attention to safety labels in the decision making process under risk.

Four, recent studies in neuroeconomics have shown that the value attributed to a product depends on the amount of attention it has received during the decision-making process (Armel, Beaumel & Rangel, 2008; Krajbich, Armel & Rangel, 2010). In this sense, the present research was limited to investigate the effects of FSRP on the choice process and the consumer's effective decision, not exploring as a consequence the value attributed by the participant that product. Future studies may broaden our findings by assessing the possible impacts on the valuation of a product. In particular, it is possible to determine how visual attention to safety labels and prototype perception can interact in this context.

Five, the present research did not evaluate how different origins (public vs. private) or forms of exposure of packaging certification symbols affect consumer attention. Although the change caused by the insertion of safety certification elements has been recognized, different visual aids may make the effect more pronounced. Based on preliminary studies (Mannan et al., 2009; Itti and Koch, 2011), it is recognized that more prominent features in a given context condition automated visual attention. Future studies may assess, for example, whether different colors, shapes, or luminosity in symbols cause greater visual salience and consequently

condition the decision-making process. For example: in opaque packaging, will the insertion of a glowing safety symbol cause different effects? Additionally, do public and private certifications have different effects on consumer behavior?

Finally, the model tested did not take into account the social factors of food choice, such as the role of crowd perception and the presence/absence of partners in the decision making process. These factors are, in theory, significant since the distribution of consumers in a market is not uniform, and often, the consumer makes their purchases accompanied by family or friends. For example, when in crowded areas, crowd perception may lead the consumer to observe fewer elements of certification than in empty areas of supermarkets. In the same way, the presence of partners in the acquisition may restrict the individual's cognitive ability to invest time and attention to the decision-making process, altering the effects identified in this study.

5. CONCLUSION

Combining one online experimental survey and three laboratory-controlled experiments, We researched to assess the effects of FSRP on consumer behaviors. In this context, we show the negative impact of FSRP on the intention to buy and in the decision-making process, revealing the moderation role of the specific food product risk perception to the central relationship, making contributions to the theoretical domain. We also demonstrate the not yet explored role of prototype perception and visual attention to safety labels on the context of food choices. In this sense, we show that absence or low levels of visual attention to safety labels and the positive prototype perception (that is, the perception of similarity with foodborne illness patients) will reinforce the negative effects of FSRP on the CB.

The contributions span the empirical and theoretical literature on FSRP. One contribution of this study demonstrates that different food products (and consequently the entire value chain), need to be treated in different ways. Value chains of high perceived risky food products (such as meat, milk, and cheese) need to considerer the central role of FSRP in the food choice. With this, practitioners can implement strategies to reinforce the safety condition such as marketing strategy for their products. In another way, value chains of medium/low risky food products can implement this procedure to reinforce the quality – but with little effect in the increase of sales because of this.

We also provide evidence of the shift in the decision-making process caused by the FSRP. In this sense, individuals make decisions more fastly and with more attention. This finding provides foundations for relevant practical insights. In the specific case of food buying behaviors, the recurrence and time pressure is standard lead to quick decisions. Companies and sellers can improve the choice of architecture by reinforcing the top-down factors to fastly capture the attention of consumers – especially in crisis time.

Finally, the role of positive prototype perception substantiates a valuable managerial insight. Although not largely explored, the perception of similarity with foodborne illness patients can drive public actions to increase the rejection of non-safety food. Through nudges that reinforce the common characteristic of food illness, consumers can see themselves, such as the target of campaigns and with this, increase their attention to safety labels and the consume of safe food products.

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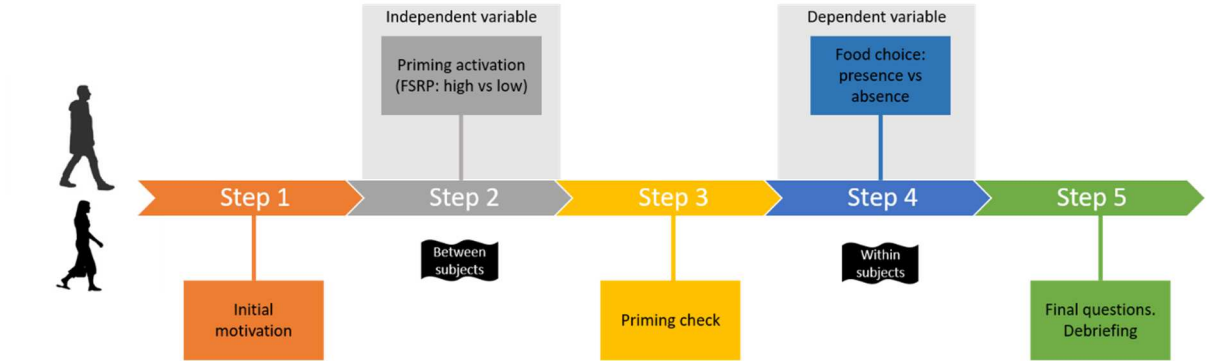
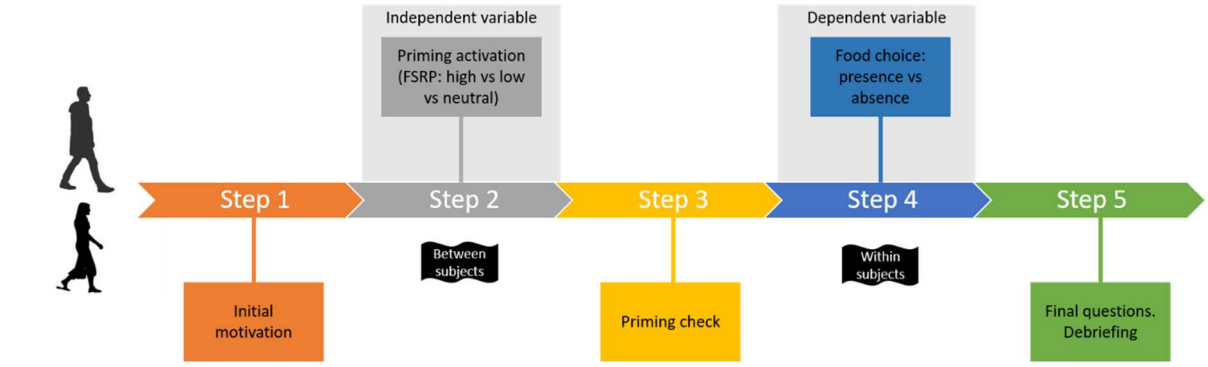
APPENDIX A – EXPERIMENTAL PROTOCOLS

Study 1 and 4 protocol



Study 2 protocol



Study 3 protocol