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Exploring new predictors of game meat consumption

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Game meat offers various environmental and nutritional benefits, but its consumption remains low. In this study, the extended Theory of Planned Behaviour (TPB) was applied to measure consumers' intention to eat game meat. An online survey was conducted among 603 Croatian respondents to determine their attitudes, subjective norms, perceived behavioural control, and factors such as attitudes towards African swine fever (ASF) and hunting. The results showed that attitudes towards game meat, subjective norms, and subjective knowledge positively influenced consumption intentions, while attitudes towards hunting had a strong and significant impact on attitudes towards game meat. The extended TPB model demonstrated better predictive power than the basic TPB model. These findings highlight the importance of exploring additional determinants of intention in interventions aimed at influencing game meat consumption behaviour. Notably, this study is the first to apply the TPB in a European context, demonstrating that incorporating risk perceptions associated with ASF can improve intention to eat game meat.

KEYWORDS

ASF, consumers, extended theory of planned behaviour, game meat, intention to eat

1 Introduction

The term 'game meat' refers to meat derived from mammals or birds hunted in the wild, which is generally considered 'natural' or 'organic' (Hoffman and Cawthorn, 2014). In Central and Mediterranean European countries, the most commonly consumed species are red deer, fallow deer, wild boar, European hare, and rabbit (Soriano and Sánchez-García, 2021). Florijančić et al. (2025) noted that Croatian consumers mostly eat wild boar meat, followed by rabbit, pheasant, and roe deer. In several South-Eastern European countries, hunted game meat has traditionally played a role in local diets (Šprem et al., 2013), particularly in rural areas where hunting remains a culturally embedded practice (Tomasevic et al., 2018). In Croatia, however, per capita consumption remains limited, with most game meat consumed directly by hunters and their immediate social circles, often bypassing formal market channels (Vukšić Končevski et al., 2023). This limited market penetration may be attributed to structural constraints, including low availability, underdeveloped distribution systems, and concerns over food safety in the context of informal trade. Nonetheless, despite these limitations, game meat is often presented as the "meat for modern consumers" (Hoffman and Wiklund, 2006), as it combines several attributes generally associated with sustainable and healthy diets—such as high protein

content, low fat, and a reduced environmental footprint compared to intensively farmed meat (Demartini et al., 2018; Viganò et al., 2019; Fiala et al., 2020).

At the same time, it often encounters resistance from consumers due to its association with hunting, animal welfare and ethical concerns, lack of familiarity, and limited guarantees regarding traceability and standardisation (Marescotti et al., 2020; Demartini et al., 2021). In recent years, public discourse has also occasionally framed game meat within the broader context of one-health risks—such as the spread of African swine fever (ASF), which poses no direct risk to human health, but its linkage to domestic pigs and wild boar populations may contribute to increased consumer apprehension (Jarynowski et al., 2019; Lee et al., 2023).

Despite the growing interest in game meat, as highlighted in the systematic review by Corradini et al. (2022), only a limited number of studies have examined the determinants of game meat consumption in Europe, with considerable variation in national coverage. Much of the recent research has focused on Italy, exploring the relationship between consumption behaviours and various psychological and attitudinal factors. Discrete Choice Experiments have been used to investigate attitudes towards hunting and wild animals (Demartini et al., 2018), animal welfare concerns (Marescotti et al., 2019; Marescotti et al., 2020), subjective and objective knowledge of hunting and farming practices (Demartini et al., 2021), as well as food involvement, risk attitudes, and perceived risks (Fantechi et al., 2022). Further research has addressed countries such as Hungary (Bodnar et al., 2010, 2011, 2014) and Poland (Krokowska-Paluszak et al., 2020; Niewiadomska et al., 2020), often using descriptive and multivariate techniques to characterise perceptions and attitudes towards game meat and hunting. Croatian consumers were included in the cross-cultural study by Tomasevic et al. (2018) and in the segmentation analysis by Tomić Maksan et al. (2025). A recent study by Pečurlić et al. (2025), conducted among 276 Croatian hunters from Osijek-Baranja County, found that hunters strongly support education, cooperation, reporting, and preventive actions related to ASF. Despite this, a comprehensive understanding of the psychological, cultural, and environmental factors shaping game meat consumption in Europe, and especially in Croatia, remains lacking.

To our knowledge, the Theory of Planned Behaviour (TPB) and its extensions have been widely used to study general meat consumption, but their application to game meat is still limited. Furthermore, no study has yet examined the role of ASF risk perceptions in shaping consumer intentions towards game meat. The Croatian context, characterised by high meat consumption (from conventional farming) and a specific cultural environment, provides a unique setting to explore these factors. This study aims to address these gaps by investigating both behavioural determinants and risk perceptions influencing consumer acceptance of game meat as a more sustainable dietary option. This knowledge gap hinders the development of effective communication strategies and the creation of transparent, regulated supply chains (Corradini et al., 2022; Needham et al., 2023).

The main objective of this study was to identify the factors influencing the intention to eat game meat, using the TPB (Ajzen, 1991) as a theoretical framework. Additionally, the influence of further constructs—perceived barriers, attitudes towards hunting, subjective knowledge, and attitudes towards ASF—on the intention to consume game meat was also examined.

2 Research framework and hypothesis development

2.1 Theory of planned behaviour—TPB

The TPB (Ajzen, 1991) is one of the most frequently cited and influential models for predicting human social behaviour. Furthermore, TPB was chosen as the theoretical framework because it provides a robust structure for predicting intentions and behaviour, particularly in the context of food choice (Nardi et al., 2019). Ajzen (2020) noted that, unlike many other theories in the social and behavioural sciences, the TPB focuses directly on the determinants of behaviour and can be applied to any behaviour of interest to the researcher. According to the TPB, behavioural intentions are determined by three factors: attitude towards the behaviour, subjective norm concerning the behaviour, and perceived behavioural control. Attitudes (ATT) are defined as the degree to which a person has a favourable or unfavourable evaluation of the behaviour in question. Subjective norm (SN) refers to people's perceptions of what important others think they should do, and whether others would approve or disapprove of their behaviour, while perceived behavioural control (PBC) refers to people's perceptions of their ability to perform a given behaviour (Ajzen, 1991).

TPB has been applied in many research studies to predict behavioural intentions regarding food choices related to meat consumption, such as reducing meat consumption (Cheah et al., 2020; Wolstenholme et al., 2021; Hielkema and Lund, 2021; Arnaudova et al., 2022; Thangavelu et al., 2022), willingness to eat a more plant-based diet (Wang and Scrimgeour, 2021), acceptance of cultured meat (Dupont et al., 2022), halal meat consumption (Sherwani et al., 2018), and purchase of an autochthonous local lamb breed (Gracia and Maza, 2015). These previous studies found that the most important factor explaining the intention to consume or purchase is attitudes, followed by PBC.

To our knowledge, there are only a few previous studies using TPB to predict game meat consumption. Zhu et al. (2024) noted that PBC plays the most critical role in explaining the intention to consume game meats, followed by attitudes and subjective norm, while perceived risk is a mediating factor between attitude and the intention to consume game meats. D'Souza (2022) found that attitudes and subjective norm have a significant impact on the intention to buy game meat. However, in predicting social behaviours, there are no absolutes (Armitage and Conner, 2001), and the TPB may not fully account for context-specific factors. Furthermore, a main criticism of the TPB concerns the intention-behaviour relationship. Without empirical evidence of this relationship, we cannot be confident in the assumption that behavioural intentions reliably lead to actual behaviours (Miller, 2017).

Therefore, TPB allows for the inclusion of additional predictors if it can be demonstrated that they account for a significant proportion of the variance in intention or behaviour after the theory's existing variables have been considered (Ajzen, 1991). Many researchers have modified the TPB model by including additional variables such as perceived knowledge (Wang and Wang, 2016), perceived barriers (Scannell et al., 2020), availability (Tomić et al., 2016), and perceived risk (D'Souza, 2022).

2.2 Hypothesis

Previous studies have shown that consumer attitudes towards food significantly influence food consumption behaviour (Hearty

et al., 2007), including the intention to consume specific foods such as game meat (Zhu et al., 2024). In particular, positive attitudes towards the health benefits of game meat consumption and production ethics have been identified as strong predictors of game meat consumption (Kempen et al., 2023). Demartini et al. (2018) and D'Souza (2022) noted that attitudes towards game meat have a significant impact on preferences and the intention to buy game meat. While most studies focus on general meat products, less is known about the relationship between specific attitudes towards game meat and consumption intentions. Considering these factors, our first hypothesis is:

H1: Attitudes towards game meat have influence on the intention to eat game meat.

Previous studies based on the TPB have consistently shown that subjective norms are strong predictors of behavioural intention (Olsen, 2001; Maksan et al., 2018; Roh et al., 2022). Specifically, Berndsen and Van der Pligt (2004) found that subjective norms positively influence overall meat consumption. More recent studies focusing on game meat also support this relationship: Zhu et al. (2024) and D'Souza (2022) found that social pressure from family, friends, and peers positively influences consumers' intention to purchase and consume game meat. Thus, the second proposed hypothesis is:

H2: Subjective norm has influence on the intention to eat game meat.

Even if consumers prefer game meat, their consumption may be limited by low perceived behavioural control (PBC), including factors such as limited availability, higher prices, and a lack of information or advertising campaigns. Previous research has generally shown that PBC is a significant predictor of the intention to consume meat products (Spence et al., 2018). In the context of game meat, Zhu et al. (2024) reported that PBC plays a crucial role in explaining consumers' intention to eat game meat. However, findings are not entirely consistent: D'Souza (2022) found no significant effect of PBC on the intention to purchase game meat. These mixed results suggest that location-specific factors, such as accessibility or price, may have a strong impact on intention. Considering these factors, we propose the following hypothesis:

H3: Perceived behavioural control has influence on the intention to eat game meat.

In addition to the original TPB variables, four further constructs were incorporated to enhance the explanatory power of the TPB framework. The consumption of game meat differs substantially from that of conventional meat due to its strong sensory attributes, limited availability and consumer knowledge, ethical considerations related to hunting, safety perceptions, and associations with animal diseases such as ASF. Therefore, domain-specific variables were integrated into the original TPB model to better capture these context-specific influences on consumers' intention to eat game meat.

Barriers to game meat consumption include high prices, limited availability (Mesinger and Ocieczeck, 2021), restricted supply (Hölker et al., 2019; Corradini et al., 2022), specific taste and smell, lack of

habitual consumption, and seasonality of the product (Corradini et al., 2022). Previous research has shown that such contextual factors can influence PBC, which in turn affects consumption intentions. For example, Thong and Olsen (2008) found that product availability is a significant predictor of PBC, while Verbeke and Vackier (2005) demonstrated that both availability and ease of preparation are key determinants of PBC for fish consumption. Although some of these studies focus on different food products, they highlight the relevance of situational barriers in shaping PBC. Therefore, the fourth proposed hypothesis is:

H4: Perceived barriers have influence on the PBC.

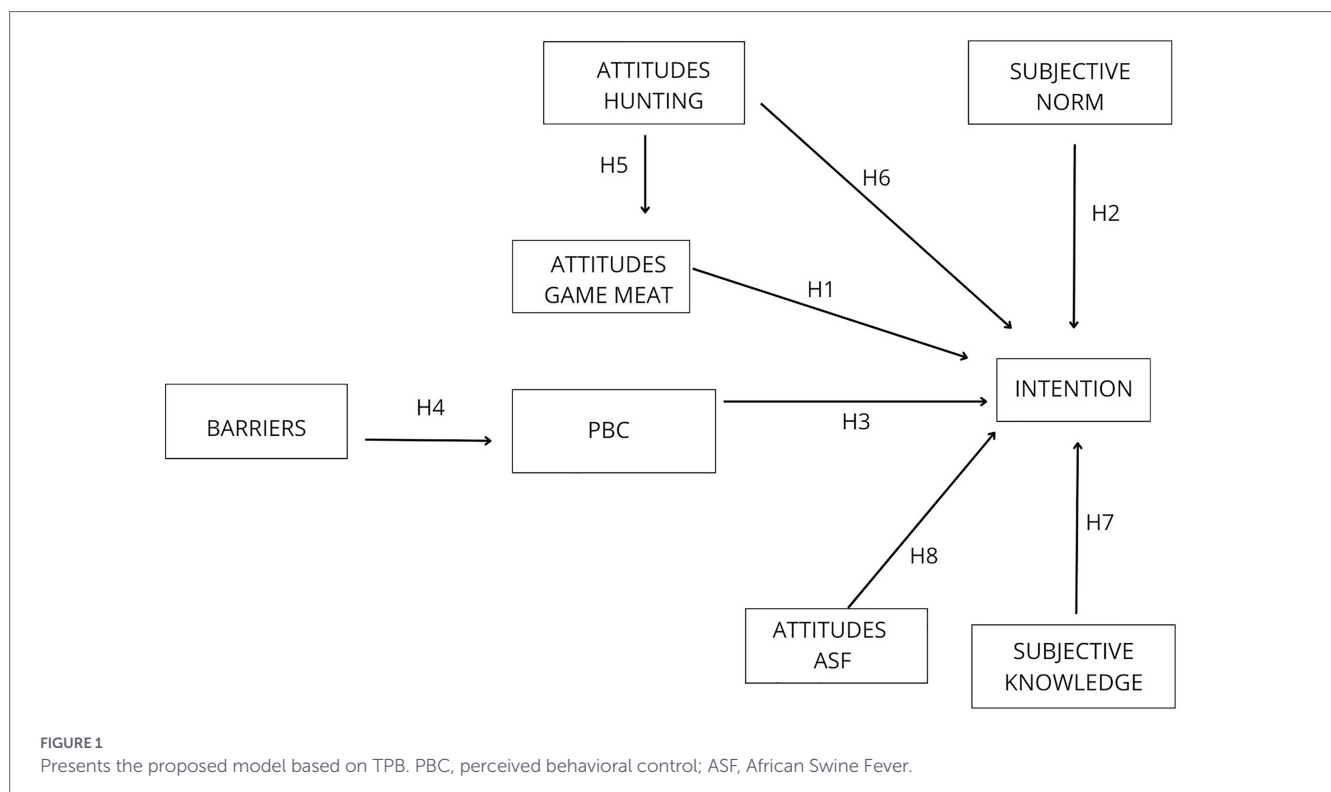
Game meat is a product that generates ethical debates about hunting (Maescotti et al., 2019; Czarniecka-Skubina et al., 2022). Fantechi et al. (2022) reported that positive or negative evaluations of hunting serve as antecedents of attitudes towards game meat. Furthermore, Maescotti et al. (2019) identified consumer segments with strong pro-animal values who tend to hold negative attitudes towards both hunting and the consumption of game meat. These findings suggest that ethical perceptions of hunting are a key determinant of consumer attitudes towards game meat. Therefore, the fifth hypothesis is formulated as follows:

H5: Attitudes about hunting have influence on the attitudes about game meat.

Ljung et al. (2012) found that positive attitudes towards hunting were associated with a higher frequency of game meat consumption within households. Corradini et al. (2022) reported that favourable attitudes towards hunting are linked to increased consumption of hunted game meat, and previous studies indicate that hunting is generally accepted among consumers who eat game meat (Butler et al., 2003; Ljung et al., 2012; Ljung et al., 2015). These findings suggest that positive attitudes towards hunting not only shape attitudes towards game meat but also directly influence consumers' intentions to consume game meat. Based on this evidence, a sixth hypothesis can be formulated:

H6: Attitudes about hunting have influence on the intention to eat game meat.

Demartini et al. (2021) identified a direct relationship between consumers' knowledge and their behaviour when purchasing wild boar meat, distinguishing between objective and subjective knowledge (Cordell, 1997). Objective knowledge refers to how much someone actually knows about a topic and is measured using specifically designed tests, while subjective knowledge refers to individuals' perception of how much they know about a product and is typically measured through self-assessment (Brucks, 1985; Cordell, 1997). This construct has been shown to play a key role in shaping food consumption patterns. For example, Pieniak et al. (2010) demonstrated its influence on vegetable consumption, while Menozzi et al. (2023) highlighted its role in decisions to purchase wild fish. Similarly, Kwiecińska et al. (2017) found that individuals with higher subjective knowledge of diet and nutrition were more willing to modify their eating habits, including their consumption of game meat. Barendse (2014) reported that Latvian consumers indicated that increased



knowledge and access to recipes for preparing game meat would enhance their motivation to purchase it. These findings suggest that subjective knowledge is an important determinant of consumers' intention to eat game meat. Therefore, the seventh proposed hypothesis is:

H7: Subjective knowledge has influence on the intention to eat game meat.

Factors external to hunting activity and the related supply chain may also influence the intention to consume game meat. For example, animal disease outbreaks are typically associated with changes in consumer preferences for meat, and ASF represents a potential issue for game meat consumption in Croatia, where it was detected for the first time in June 2023. Unfortunately, there is a lack of research related to ASF and consumer behaviour in meat consumption. Samac et al. (2024) conducted a study on a sample of 100 pork consumers from Pannonian Croatia and found that 51% of respondents were familiar with the term ASF, 72% knew that ASF posed no threat to humans, while 92% had not changed their habits when buying and consuming pork due to fear of the disease. An experiment was also conducted in the United States with pork consumers to determine how familiarity with ASF and headlines or article content affect pork purchases (Lee et al., 2023). US consumers are generally unaware of ASF, and nearly half of respondents (pork consumers) would not be willing to buy pork if an ASF outbreak occurred in the US. Additional information that ASF is not a threat to human health would help reduce the decline in pork purchases. The results of the research in the US show that consumers' prior knowledge and perception of the disease are the most important factors in purchasing decisions, highlighting the importance of working with the media to inform the public about the ASF outbreak and to emphasise that there are no human health implications. Considering the emergence of ASF in Croatia and its potential

impact on consumer behaviour regarding game meat, we propose the following and final hypothesis:

H8: Attitudes towards ASF have influence on the intention to eat game meat.

Figure 1 presents the proposed model based on TPB.

3 Materials and methods

3.1 Data collection

An online survey was conducted from 23 January 2024 to 17 February 2024 with a convenience sample of 603 respondents in Croatia using the Google Forms platform. The link to the questionnaire was sent to respondents by email, through social media (e.g., Facebook), and via mobile applications (e.g., WhatsApp). The questionnaire was preceded by a brief explanation of the research and an explicit written consent form. The average time required to complete the questionnaire was 7 min.

3.2 Measures

The questionnaire was designed according to TPB guidelines (Ajzen and Sheikh, 2013) and includes all TPB constructs: attitudes towards game meat, subjective norm, PBC, and intention to consume game meat in the next 3 months. Additional constructs were included to test the hypothesis: perceived barriers to consumption, attitudes towards hunting, subjective knowledge, and attitudes towards ASF. The questionnaire also included measures of socio-demographic characteristics (gender, age, education, place of residence, monthly

income, employment status) and dietary style. Respondents were also asked whether they were hunters, whether they had eaten game meat in the past year, and how often. Furthermore, they were asked where they buy and consume game meat.

All study constructs were assessed using a 5-point Likert scale, with responses ranging from “strongly disagree” (1) to “strongly agree” (5). Nine positive items (adapted from Demartini et al., 2018) were used to measure attitudes towards game meat (e.g., *Game meat is rich in proteins*). Subjective norm (e.g., *My family members consume game meat*) was measured with four items, while intention to consume was measured with three items (e.g., *I intend to eat game meat in the next 3 months*), adapted from Tomić et al. (2016) for each construct. PBC was measured with four items (e.g., *It depends only on me whether I will eat game meat*), adapted from Seo et al. (2011). Higher values for all constructs indicate more positive attitudes, higher subjective norm, greater PBC, and stronger intention to consume game meat.

Perceived barriers were measured with three items taken from and inspired by Tomasevic et al. (2018) (e.g., *Large seasonal fluctuations in the supply of game meat prevent me from eating game meat more often*). Subjective knowledge was measured with three items (e.g., *I know a lot about hunting*), adopted from Pieniak et al. (2010). Attitudes towards hunting were measured with four items (e.g., *Hunting helps to maintain the balance of nature*), based on Ljung et al. (2012). For the purposes of this study, three statements were created to measure attitudes towards ASF (e.g., *ASF is threatening the population of domestic pigs and wild boar*).

The questionnaire was pretested on a small sample of 30 respondents to assess the appropriateness and clarity of the questions.

3.3 Data analysis

Univariate analysis was conducted using SPSS, version 21. Relationships among the extended TPB variables were analysed using the multivariate analysis technique Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS, version 4, which enables estimation of complex models with many constructs, indicator variables, and structural paths without imposing distributional assumptions on the data (Hair et al., 2019). To determine whether a sample of 603 respondents is sufficient for PLS-SEM, we used the 10-times rule method (Hair et al., 2011), which assumes that the sample size should be greater than 10 times the maximum number of inner or outer model links pointing to any latent variable in the model.

The first step of the TPB analysis was to assess the model by examining the indicator loadings. According to Mueller and Hancock (2018), items with factor loadings <0.60 should be dropped. The second step was to assess internal consistency reliability using Cronbach's alpha and composite reliability. Reliability values between 0.60 and 0.70 are considered acceptable in exploratory research, while values between 0.70 and 0.90 are regarded as satisfactory to good. The third step addressed the convergent validity of each construct measure. Convergent validity refers to the extent to which the construct converges to explain the variance of its items. The metric used for evaluating a construct's convergent validity is the average variance extracted (AVE) for all items on each construct, which is considered acceptable if 0.50 or higher, indicating that the construct explains at least 50% of the variance of its items. The fourth step was to assess discriminant validity, which is the extent to which a construct is empirically distinct from other constructs in the structural model. Fornell and Larcker (1981) proposed the traditional metric and

suggested that each construct's AVE should be compared to the squared inter-construct correlation as a measure of shared variance between that construct and all other reflectively measured constructs in the structural model. The shared variance for all model constructs should not be larger than their AVEs. The HTMT criterion is also used to assess discriminant validity. Discriminant validity is considered established between two reflectively measured constructs when the HTMT value is below 0.90 (Hair et al., 2019).

The variance inflation factor (VIF) is commonly used to assess collinearity among formative indicators. VIF values of 5.0 or higher indicate significant collinearity issues among the indicators of formatively measured constructs. Ideally, VIF values should be close to 3.0 or lower (Hair et al., 2019).

4 Results

4.1 Sample description

As shown in Tables 1, a total of 603 respondents participated in the survey. The proportion of women (52.1%) was slightly higher than that of men (47.9%). Respondents' ages ranged from 18 to over 66 years. The largest proportion of respondents were aged 36 to 45 (28.2%), followed by those aged 26 to 35 (27.4%). The smallest proportion (1.2%) were over 66 years old, which may be related to the method of data collection (online survey). More than half of the respondents have a university degree, while 28.5% have completed high school. The majority of respondents (62.2%) live in urban areas. The largest proportion (21.2%) have a monthly income between 1,500 and 2,000 euros, while the smallest proportion (8.6%) have a household monthly income of up to 1,000 euros. The results in Table 1 show that 76.9% of respondents are employed. Regarding eating habits, the sample is dominated by omnivores (98.3% of respondents), and 66.7% are not hunters. Furthermore, the majority of respondents have eaten game meat once or less often in the past year (45.3%). Respondents who did not eat game meat in the past year make up 19.4% of the sample. The majority of respondents who consumed game meat in the past year reported not buying it (54.7%), while 21.2% obtained it directly from hunters. Most respondents consume game meat at home (80.86%) and at friends' homes (68.93%). For the question about the place of game meat consumption, multiple responses were allowed.

4.2 Descriptive statistics of TPB items

Table 2 presents the descriptive statistics for each item included in the survey. The results reveal clear patterns across the constructs of the basic TPB model. Attitudes (ATT) towards game meat are generally positive, with the highest means for general evaluations (positive attitude, mean = 4.21; rich in protein, mean = 4.18). Hedonic aspects are also rated favourably (liking, mean = 4.00; taste, mean = 3.98; smell, mean = 3.67), though with greater variability (SD > 1.20). Nutritional beliefs (fat, amino acids, vitamins) are positive but lower (means around 3.7–3.9), indicating some uncertainty about specific properties. Subjective norms (SN) show moderate agreement that family and friends consume game meat (mean = 3.70, 3.65), but respondents are less convinced that others expect them to eat it (mean = 3.05). Thus, descriptive norms appear more salient than injunctive norms. PBC is very high (means around 3.96–4.36), suggesting respondents feel

TABLE 1 Sample description.

Characteristics		N	%
Gender	Male	289	47.9
	Female	314	52.1
Age	18–25	121	20.1
	26–35	165	27.4
	36–45	170	28.2
	46–55	105	17.4
	56–65	35	5.8
	>65	7	1.2
Education	Elementary school	6	1.0
	High school	172	28.5
	Undergraduate/Graduate	322	53.4
	Postgraduate	103	17.0
Place of living	City	375	62.2
	Village	228	37.8
Household monthly income	< 1.000 €	52	8.6
	1.001–1.500 €	115	19.1
	1.501–2.000 €	128	21.2
	2.001–2.500 €	83	13.8
	2.501–3.000 €	94	15.6
	3.001–3.500 €	55	9.1
	> 3.500 €	76	12.6
Employment status	Student	96	15.9
	Employed	464	76.9
	Unemployed	26	4.3
	Retired	17	2.8
Dietary style	I eat everything (omnivore)	593	98.3
	Vegetarian (I do not eat meat or fish, but I will eat eggs and dairy)	4	0.7
	Vegan (no animal products at all)	2	0.3
	Pescetarian (I only eat fish/seafood)	4	0.7
Do you hunt?	Yes	201	33.3
	No	402	66.7
How often did you eat game meat last year?	I have not eaten game meat in the last year	117	19.4
	A few times a week	61	10.1
	A few times a month	96	15.9
	A few times a year	56	9.3
	Once a year or less	273	45.3
Where do you buy game meat?	I do not buy game meat.	266	54.7
	I get it from hunters	103	21.2
	I buy directly from hunters.	52	10.7
	In supermarkets	39	8.0
	In specialized shops	26	5.3
Where do you usually consume game meat?	At home	393	80.86
	At friends' homes	335	68.93
	At hunting clubs/associations	193	39.71
	In a restaurant	123	25.31
	At food fairs	60	12.35

TABLE 2 Descriptive statistics of extended TPB constructs.

Construct	Items	Mean	SD
Attitudes (ATT)	ATT1 - I have a positive attitude towards game meat	4.21	1.05
	ATT2 - Game meat is rich in protein	4.18	0.91
	ATT3 - I like to eat game meat	4.00	1.22
	ATT4 - I like the taste of game meat	3.98	1.20
	ATT5 - Game meat contains small amounts of fat	3.88	1.00
	ATT6 - Game meat has a favorable content of essential amino acids	3.79	0.97
	ATT7 - Game meat is rich in vitamins	3.72	0.98
	ATT8 - Game meat has a positive effect on my health	3.72	1.11
	ATT9 - I like the smell of game meat	3.67	1.22
Subjective norm (SN)	SN 1 - The members of my family eat game meat	3.70	1.28
	SN 2 - My friends eat game meat	3.65	1.11
	SN 3 - My family members think I should eat game meat	3.08	1.37
	SN 4 - My friends think I should eat game meat	3.05	1.27
Perceived behavioural control (PBC)	PBC1- It depends only on me whether I will eat game meat	4.36	0.93
	PBC2- If I wanted to, I could eat game meat	4.25	0.96
	PBC 3- Nothing prevents me from eating game meat	4.10	1.06
	PBC 4 - I expect to be able to eat game meat	3.96	1.18
Intention	Intention1 - I intend to consume game meat in the next 3 months	3.65	1.35
	Intention2 - I will probably be eating game meat for the next 3 months	3.60	1.38
	Intention3 - I have a great desire to eat game meat for the next 3 months	3.33	1.43
Barriers	Barriers1 - The limited supply of game meat prevents me from eating game meat more often (Reverse-scaled)	3.25	1.31
	Barriers2 - Large seasonal fluctuations in the supply of game meat prevent me from eating game meat more often (Reverse-scaled)	3.36	1.25
	Barriers3 - The huge differences in the quality of game meat prevent me from eating game meat more often (Reverse-scaled)	3.52	1.17
Subjective knowledge (S_know)	S_know 1- Compared to the average person, I know a lot about hunting	3.13	1.52
	S_know 2- I know a lot about hunting	2.98	1.52
	S_know 3- People who know me think I'm an expert hunter	2.25	1.40

(Continued)

TABLE 2 (Continued)

Construct	Items	Mean	SD
Attitudes towards hunting (ATT_H)	ATT_H1 - Hunting helps to maintain the balance of nature	3.92	1.19
	ATT_H2 - I see nothing wrong with hunting animals for their meat, as long as the animal is not endangered	3.80	1.28
	ATT_H3 - I have a positive attitude towards hunting	3.55	1.37
	ATT_H4 - Hunters are well trained and follow the hunting regulations	3.22	1.14
Attitudes towards African swine fever (ATT_ASF)	ATT_ASF1 - African swine fever is global problem (Reverse-scaled)	2.48	1.24
	ATT_ASF2_ fever - African swine fever causes changes in the meat market (Reverse-scaled)	2.07	1.08
	ATT_ASF3 - African swine fever affects the population of domestic and wild pigs (Reverse-scaled)	2.07	1.12

consumption largely depends on personal choice. Intention to eat game meat in the next 3 months is moderately positive (means around 3.33–3.65), though slightly below attitudes. For the other constructs considered in the extended TPB model, barriers are rated around the midpoint (means around 3.25–3.52), suggesting ambivalence about supply or quality constraints. Subjective knowledge is lower (means around 2.25–3.13), indicating limited familiarity with hunting. Attitudes towards hunting (ATT_H) are moderately positive (means around 3.22–3.92), stronger for ecological or regulatory aspects than for approval of hunting or trust in hunters. Attitudes towards ASF (ATT_ASF) are low (means around 2.07–2.48), indicating limited awareness or concern about the disease.

4.3 TPB model reliability

Cronbach's alpha values and composite reliability (Rho A) for attitudes towards game meat, subjective norm, PBC, intention to consume, perceived barriers, attitudes towards hunting, subjective knowledge, and attitudes towards ASF were all higher 0.70, indicating a satisfactory reliability level for the model (Hair et al., 2021). The AVE value for each construct was higher than the minimum of 0.70, with intention to eat game meat showing the highest value (0.91). Furthermore, as shown in Table 3, the relationships between the latent constructs and items were strong, with factor loadings always higher 0.60, ranging from 0.61 to 0.97. Regarding model quality, the results of the Fornell-Larcker criterion indicated that discriminant validity of the constructs was established (Table 4), and the heterotrait-monotrait ratio (HTMT) values among all constructs were below 0.9 (Table 5). All variance inflation factor (VIF) values were below 3.0, indicating the absence of collinearity among the constructs (Table 6).

4.4 The structural model

The results confirm that attitude towards game meat has the greatest positive influence on the intention to consume game meat ($\beta_{ATT-INTENTION} = 0.449, t = 10.332; p = 0.00$), supporting hypothesis 1. Furthermore, subjective norm also has a positive and significant impact on the intention to consume game meat ($\beta_{SN-INTENTION} = 0.204, t = 5.651; p = 0.00$), thus supporting hypothesis 2. PBC has a lower, but still positive and significant impact on the intention to eat game meat ($\beta_{PBC-INTENTION} = 0.130, t = 4.036; p = 0.00$). Therefore, hypothesis 3 is supported.

Next, barriers (all items are reverse-scaled, so higher means indicate lower barriers) also have a positive and significant impact on PBC ($\beta_{BARRIERS-PBC} = 0.136, t = 3.283; p < 0.01$), thus supporting hypothesis 4. Finally, attitudes towards hunting have a positive and strong impact on attitudes towards game meat, indicating that respondents with more positive attitudes towards hunting also have positive attitudes towards game meat ($\beta_{ATTITUDES ABOUT HUNTING-ATT} = 0.707, t = 28.212; p = 0.00$) (see Figure 2). Therefore, hypothesis 5 is also supported. Among other predictors of intention to consume game meat, subjective knowledge ($\beta_{SUBJECTIVE KNOWLEDGE-INTENTION} = 0.162, t = 4.789; p = 0.00$) has the highest impact, so hypothesis 7 is supported.

Attitudes about hunting ($\beta_{ATTITUDES ABOUT HUNTING-INTENTION} = 0.093, t = 2.099; p < 0.05$) and attitudes about ASF ($\beta_{ATTITUDES ABOUT ASF-INTENTION} = 0.070, t = 2.729; p = 0.01$) have significant but lower impacts on the intention to eat game meat, supporting hypotheses 6 and 8. All items measuring ASF were

TABLE 3 Factor loadings, Cronbach's α , Rho A, and AVE of the measurement model.

Items	ATT	SN	PBC	Intention	Barriers	S_know	ATT_H	ATT_ASF
ATT1	0.87							
ATT2	0.85							
ATT3	0.89							
ATT4	0.86							
ATT5	0.89							
ATT6	0.81							
ATT7	0.73							
ATT8	0.79							
ATT9	0.79							
SN1		0.86						
SN2		0.85						
SN3		0.88						
SN4		0.80						
PBC 1			0.81					
PBC 2			0.78					
PBC 3			0.82					
PBC 4			0.87					
Intention 1				0.97				
Intention 2				0.97				
Intention 3				0.93				
Barriers 1					0.91			
Barriers 2					0.95			
Barriers 3					0.88			
S_know1						0.96		
S_know2						0.97		
S_know3						0.88		
ATT_H1							0.91	
ATT_H2							0.90	
ATT_H3							0.91	
ATT_H4							0.61	
ATT_ASF 1								0.76
ATT_ASF 2								0.84
ATT_ASF 3								0.91
Cronbach's alpha	0.94	0.87	0.85	0.95	0.90	0.93	0.86	0.79
Rho A	0.95	0.87	0.95	0.95	0.96	0.94	0.90	0.82
AVE	0.69	0.72	0.67	0.91	0.84	0.88	0.71	0.71

reverse-scored so that higher values indicated more positive attitudes about ASF.

In summary, the results of structural modelling show that the basic model of the TPB (attitudes, subjective norm, and PBC) explains 68.6% of the variance in the intention to consume game meat, while the TPB expanded with new constructs (barriers, subjective knowledge, attitudes about hunting, attitudes about ASF) explains 71.5% of the variance in the intention to consume game meat, which justifies the expansion of the basic model with new variables.

5 Discussion

This study adds to the growing body of research on consumer behaviour towards game meat, particularly in the South-Eastern European context. Given the environmental and nutritional importance of game meat (Demartini et al., 2018; Corradini et al., 2022), understanding the psychological drivers of consumption intention is both theoretically and practically significant, confirming the TPB as a valuable framework for predicting game meat choice.

TABLE 4 Discriminant validity.

Construct	ATT	SN	PBC	Intention	Barriers	S_know	ATT_H	ATT_ASF
ATT	0.83							
SN	0.69	0.85						
PBC	0.64	0.52	0.82					
Intention	0.80	0.70	0.60	0.96				
Barriers	0.25	0.13	0.14	0.22	0.91			
S_know	0.50	0.51	0.29	0.57	-0.04	0.94		
ATT_H	0.71	0.62	0.52	0.69	0.11	0.65	0.84	
ATT_ASF	-0.33	-0.27	-0.30	-0.24	-0.05	-0.23	-0.32	0.84

TABLE 5 Heterotrait-monotrait ratio (HTMT)—matrix.

	Attitudes	ATT_ASF	ATT_H	Barriers	Intention	PBC	S_know	SN
Attitudes								
ATT_ASF	0.39							
Attitudes hunting	0.77	0.38						
Barriers	0.25	0.05	0.12					
Intention	0.83	0.28	0.75	0.23				
PBC	0.667	0.37	0.56	0.12	0.61			
S_know	0.52	0.26	0.71	0.07	0.60	0.30		
SN	0.75	0.33	0.71	0.14	0.77	0.56	0.56	

TABLE 6 Variance inflation factors (VIF).

Constructs	VIF
Attitudes → Intention	2.96
SN → Intention	2.12
PBC → Intention	1.82
Barriers → PBC	1.00
S_know → Intention	1.84
ATT_H → Attitudes	1.00
ATT_H → Intention	2.78
ATT_ASF → Intention	1.16

The findings confirm the usefulness of TPB (Ajzen, 1991), with the core model explaining 68.6% of the variance in intention and the extended model—including perceived barriers, subjective knowledge, attitudes towards hunting, and attitudes towards ASF—increasing the explained variance to 71.5%. These results are consistent with previous research showing that extending TPB with context-specific variables enhances its explanatory power (Ajzen and Sheikh, 2013; Dupont et al., 2022; D’Souza, 2022; Zhu et al., 2024). Consistent with our hypotheses, attitudes, subjective norms, and PBC were significant predictors of intention (Shen et al., 2022; Menozzi et al., 2023; Zhu et al., 2024). Attitudes towards game meat were the strongest predictor, reflecting positive perceptions of nutritional value, sensory attributes, and health aspects. This aligns with evidence that attitudes towards food and nutrition strongly influence consumption behaviour (Hearty et al.,

2007). In the context of game meat, Demartini et al. (2018) found that attitudes towards the product itself have a substantially stronger effect on willingness to pay than attitudes towards hunting. Our findings also correspond with Tomašević et al. (2018), who reported that consumers across Europe, including Croatia, generally perceive game meat as a healthy alternative, with regional variation linked to health and sensory considerations.

The significant role of subjective norms indicates that game meat consumption in Croatia is socially embedded, a pattern also observed in South-Eastern and Central Europe, where consumption is irregular and largely dependent on subjective knowledge and informal access through personal networks (Kwiecińska et al., 2017; Niewiadomska et al., 2020). This finding aligns with TPB-based food studies (Olsen, 2001; Verbeke and Vackier, 2005; Nardi et al., 2019) and broader research on social influences on dietary practices (Nestle et al., 1998). Previous Croatian and regional studies have mainly documented these patterns using descriptive or segmentation-based approaches (Tomašević et al., 2018), whereas the present study extends this literature by explicitly linking socially embedded consumption to behavioural intention within a theory-driven framework.

Perceived barriers were found to significantly influence PBC, supporting the conceptual assumption that situational constraints shape perceived control (Ajzen, 1991; Ajzen, 2002). This finding is consistent with research showing that availability and practical constraints operate through perceived control (Verbeke and Vackier, 2005; Thong and Olsen, 2008; Scannell et al., 2020). In the context of game meat, supply limitations and underdeveloped market channels are recognised as persistent obstacles

(Corradini et al., 2022; Needham et al., 2023). However, the relatively small effect size suggests that informal access through hunting networks may partially offset these barriers, as observed in Croatia (Florijančić et al., 2025).

An important finding is the strong influence of attitudes towards hunting on attitudes towards game meat, consistent with European research highlighting the role of ethical and cultural evaluations of hunting (Maescotti et al., 2019; Fantechi et al., 2022; Corradini et al., 2022). In particular, Fantechi et al. (2022) showed that evaluations of hunting act as antecedents of preferences, while Maescotti et al. (2019) identified consumer segments with pro-animal values that reject both hunting and game meat consumption. Our results confirm this mechanism in Croatia, where acceptance of hunting appears to legitimise game meat as an appropriate and positively valued food.

Attitudes towards hunting also showed a smaller but significant direct effect on intention, supporting Hypothesis 6 and aligning with evidence that favourable hunting attitudes are associated with higher consumption frequency and acceptance of game meat (Ljung et al., 2012; Corradini et al., 2022; D'Souza, 2022). Moreover, Ljung et al. (2012, 2015) emphasised that game meat consumption can reinforce urban support for traditional natural resource use, a pathway particularly relevant in Croatia, where urban consumers dominate the sample but consumption remains socially embedded.

Subjective knowledge had a significant positive influence on intention, consistent with evidence that knowledge-related constructs shape food choices and dietary change (Pieniak et al., 2010; Kwiecińska et al., 2017). In game meat contexts, Demartini et al. (2021) showed that prior knowledge can influence preferences for hunted versus farmed wild boar meat, although effects may vary depending on beliefs. In Croatia, perceived familiarity with hunting practices appears to reduce uncertainty related to sourcing, preparation, and safety—factors commonly identified as barriers in European context (Corradini et al., 2022; Needham et al., 2023).

Finally, perceptions of ASF showed a weak but significant effect on intention. Although ASF poses no direct risk to human health, its presence in public discourse may heighten concern through disease-related or market disruption narratives (Jarynowski et al., 2019; Lee et al., 2023).

Overall, the Croatian context provides an instructive case within Europe, combining a strong meat-eating culture, a meaningful hunting presence with informal access channels, and the recent emergence of ASF. While earlier studies documented attitudes, segments, and preferences (Tomašević et al., 2018; Tomić Maksan et al., 2025; Florijančić et al., 2025), this study extends the literature by quantifying how these contextual factors translate into behavioural intention within a validated theoretical framework. The findings reinforce broader European conclusions regarding the importance of cultural legitimacy of hunting and supply-chain transparency (Corradini et al., 2022; Needham et al., 2023), while highlighting the particular relevance of social embeddedness and perceived knowledge in Croatia.

5.1 Implications for practice

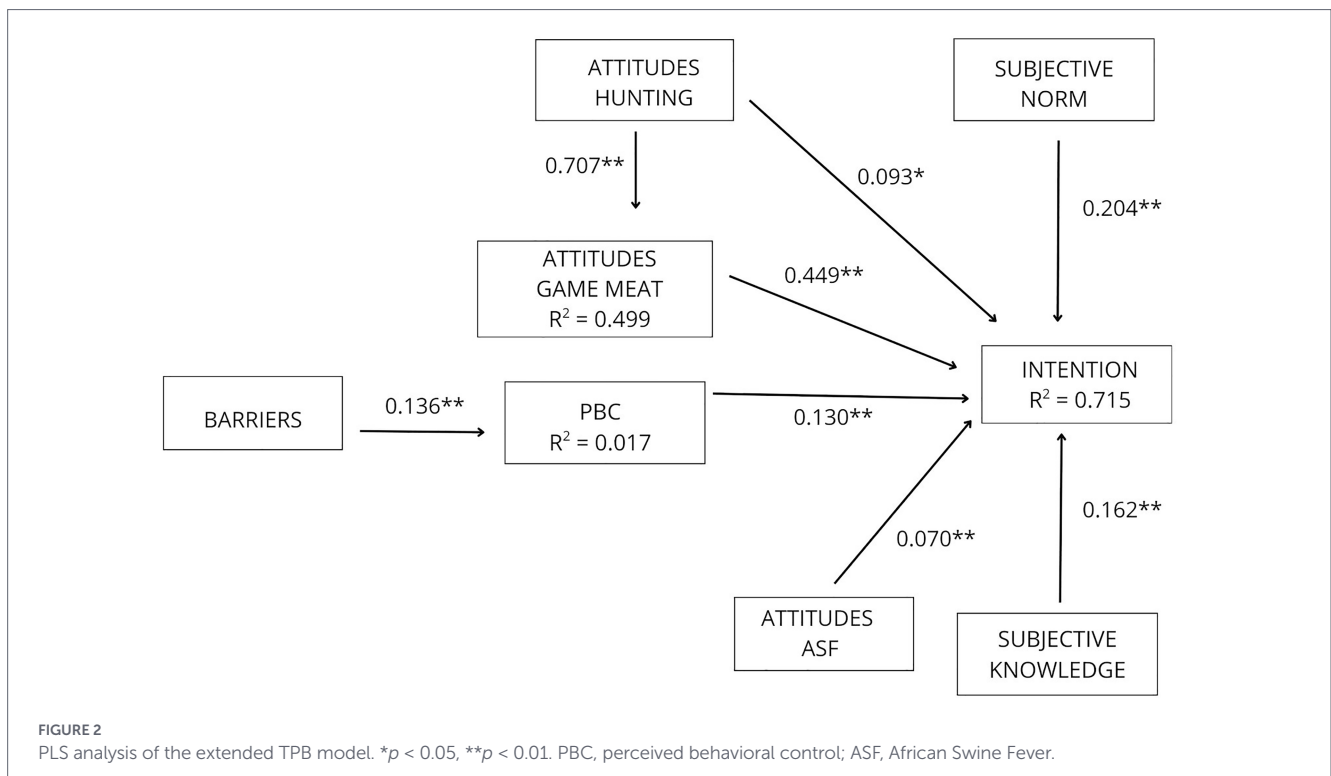
Given that attitudes towards game meat were the strongest predictor of consumption intention in our study, outreach should highlight game meat's ecological (Fiala et al., 2020) and nutritional benefits, such as its high protein and low fat content (Viganò et al., 2019; Soriano and Sánchez-García, 2021). As subjective norms also influence intentions, strategies should make game meat more visible and

socially accepted. For example, hunting associations and food operators could collaborate to organise promotional events, such as community wild game dinners, tasting events, and family-oriented festivals featuring game meat. This would normalise game dishes at social gatherings and signal that enjoying game meat is a desirable, traditional, and modern practice. In fact, familiarity with hunting and hunting culture correlates with higher game consumption (Corradini et al., 2022), suggesting that promotional events led by Croatian hunters can improve public attitudes towards this product.

Our findings also indicate that subjective knowledge about game meat reduces uncertainty and increases acceptance. Therefore, organising educational campaigns is essential. Practical workshops, cooking classes, and recipe publications by chefs can help consumers learn how to prepare game meat, increasing their confidence and familiarity with its use. Retailers and processors can also play a key role in raising awareness by offering more informative packaging. Labels could include details on product origin, sustainable hunting methods, and health benefits, as suggested in previous studies (Maescotti et al., 2020; Demartini et al., 2021). Such informative labelling can both educate consumers and alleviate safety concerns by signalling that the product has been properly inspected and is safe. In addition, coordinated public awareness campaigns—led by veterinary authorities and hunting associations—should proactively address misconceptions about ASF and emphasise that ASF poses no risk to human health (Lee et al., 2023; Kashyap et al., 2024).

Limited year-round availability of game meat also emerged as a barrier to consumption in our research. To address this issue and expand consumption, it is essential to professionalise and extend the supply chain (Needham et al., 2023). We therefore recommend establishing local game meat processing and distribution hubs in hunting regions to create a consistent stock of controlled and safe game meat. This would help overcome structural constraints by building a more transparent and regulated supply chain, as highlighted in other studies (Gaviglio et al., 2018).

A focus on hygiene and safety regulations for Croatian game meat is also needed. Croatia's national regulations have largely aligned with strict EU food safety laws since joining the European Union. Regulation (EC) 853/2004 (and related provisions) is thus followed to assure hygienic standards in game meat. The regulation requires that wild game intended for sale undergo veterinary inspection and meet specific hygiene standards, and that only carcasses passing official veterinary checks—including testing for parasites such as *Trichinella* in wild boar and brown bear—are allowed to enter the professional market. In practice, this means that hunters must deliver game to authorised game-handling establishments, where the carcass undergoes post-mortem examination by a veterinarian. Furthermore, an important EU provision is the requirement for a “trained person” in every hunting ground: a hunter who has been trained in wildlife pathology and food hygiene to perform an initial on-site examination of the carcass. If this trained hunter signs off that no abnormalities were found, the viscera and head need not accompany the carcass to the game-handling establishment, streamlining the process. On the other hand, these requirements can increase processing costs and bureaucratic burdens, potentially limiting small-scale producers and encouraging less experienced hunters to rely on informal and risky sales channels. Policymakers should look for regulatory opportunities to support hunter training and small businesses in complying with these rules—for example, by offering training courses for hunter certification (to increase the number of “trained persons”) and subsidies or mobile slaughter/inspection units in areas with abundant game.



Simplifying compliance for direct local sales could also help: EU law allows hunters to supply small quantities directly to final consumers or local retailers under national rules. Clarifying and harmonising these rules can enable hunters to sell limited game meat locally without onerous procedures, thus integrating more game into the local food economy while still upholding safety standards, as also proposed by the European Association of Hunters (FACE, 2026).

6 Conclusion

This study confirms the relevance and robustness of the TPB in explaining consumer intentions regarding game meat consumption and highlights the added value of extending the model to include context-specific constructs. Attitudes were identified as the strongest predictor of intention, emphasising the role of intrinsic motivation and personal beliefs in shaping behaviour. The inclusion of additional variables—such as perceived barriers, subjective knowledge, attitudes towards hunting, and attitudes towards ASF—further enhanced the explanatory power of the model and provided deeper insight into the psychological and ethical factors influencing consumption decisions.

The results indicate that in a predominantly urban, educated population, informational and emotional factors outweigh practical concerns. This forms a basis for developing targeted communication and education strategies aimed at reinforcing positive attitudes, increasing awareness, and addressing ethical considerations related to hunting and game meat. The extended TPB model thus offers a meaningful framework not only for scientific analysis but also for guiding public policy and marketing efforts to promote sustainable and responsible food choices.

This study has several limitations that should be considered when interpreting the results. First, the research was conducted on a sample

of Croatian consumers, which limits the generalisability of the findings to other countries and cultural contexts. Second, a questionnaire and self-reports were used, introducing a risk of socially desirable responses and discrepancies between reported and actual behaviour. Third, although the TPB model was expanded with additional constructs (subjective knowledge, attitudes towards hunting, barriers, attitudes towards ASF), only selected factors were included, while other variables (e.g., availability in different regions, trust in institutions, animal welfare) could further explain consumer behaviour.

Furthermore, the sample structure shows that a significant proportion of respondents are hunters, which may influence the results, particularly in the assessment of barriers and attitudes towards hunting. Future research should provide a more representative sample and consider a longitudinal approach to monitor changes in attitudes and behaviour over time. In addition, qualitative methods (e.g., interviews or focus groups) could contribute to a deeper understanding of consumers' motivations and barriers related to game meat consumption.

Finally, the extended TPB model used in our study can be refined by explicitly incorporating regulatory and institutional factors as part of the determinants of consumption behaviour. One approach is to treat regulatory-related perceptions as additional predictors or moderators of intention. For example, perceived food safety regulation effectiveness—essentially the consumer's trust that game meat is properly controlled, inspected, and safe—could directly reduce perceived risk and barriers. Prior research highlights that food safety concerns are a primary barrier to game meat acceptance (Czarniecka-Skubina et al., 2022; Riccioli et al., 2025); if consumers gain confidence that stringent veterinary controls and traceability are in place, this barrier can be lowered. In the TPB context, this might manifest as higher PBC and more positive attitudes. Aligning regulatory factors with behavioural predictors would also help to bridge the gap between policy interventions and consumer psychology. As Needham et al. (2023) emphasize, a collaborative multi-sector approach—involving hunters, food businesses, regulators, and

veterinarians—is crucial to develop a safe, traceable, and sustainable game meat supply chain. Incorporating this into the TPB model reminds us that consumer behaviour does not happen in a vacuum; it is influenced by the institutional context. Future research and practical interventions should therefore measure and leverage these influences. For example, an intervention might simultaneously tighten a regulation (like mandatory cooling of carcasses in the field) and run a communication campaign about it—the model would predict that consumers who internalize this knowledge will gain trust on game meat safety and be more inclined to consume game meat. In conclusion, policy measures should be aligned with behavioural determinants. Regulatory actions, such as control, certification, and traceability systems, can be designed and communicated in ways that strengthen attitudes, norms, and perceived control, ultimately shaping consumer intentions. By doing so, hunting associations and food operators not only comply with the rules but also use them as selling points—ultimately translating a strong regulatory framework into greater consumer trust and demand for game meat.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: raw data will be made available on request. Requests to access these datasets should be directed to MTM, matomic@agr.hr.

Ethics statement

The studies involving humans were approved by the Ethics Committee, University of Zagreb Faculty of Agriculture. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

MTM: Investigation, Validation, Conceptualization, Software, Methodology, Supervision, Formal analysis, Writing – original draft,

Data curation, Visualization. ED: Writing – original draft, Conceptualization, Methodology, Visualization. RB: Writing – original draft. ŽM: Writing – original draft. NŠ: Resources, Writing – original draft, Project administration, Funding acquisition, Conceptualization, Investigation, Supervision.

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