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Research Article

The effect of consumers' perceived risk from the COVID-19 pandemic on their stockpiling behaviour: An evaluation from the framework of planned behaviour theory

Tüketicilerin COVİD-19 pandemisinden algıladıkları riskin stokçuluk davranışlarına etkisi: Planlı davranış teorisi çerçevesinden bir değerlendirme

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Abstract

COVID-19 pandemic has affected the entire world and brought isolation, filiation, quarantine, lockdown, social distance, etc. concepts that are not a part of our daily lives. People have reflected this deviance in many ways, including changing the consumption behaviours that visual and written media express. One of these behaviours that arise with the pandemic is stockpiling. This research aims to study the effect of perceived risk on stockpiling behaviour for grocery products by applying the Planned Behaviour Theory frame. Data has been collected from 937 attendants. ANOVA, t-test, reliability analysis, factor analysis, and confirmatory factor analysis were applied to the collected data. It was found that effective risk has an essential effect on stockpiling behaviour. On the other hand, demographic variables seem to differentiate pandemic stockpiling behaviour for grocery products.

Keywords: COVID-19, Consumer Behaviour, Hoarding, Risk, The Theory of Planned Behaviour, Grocery Products

Jel Codes: M31, I12

Öz

COVİD-19 pandemisi bütün dünyayı etkilemiş ve izolasyon, filyasyon, karantina, sosyal mesafe vb. kavramları hayatımızın bir parçası haline getirmiştir. İnsanlar bu duruma tüketim kalıplarını değiştirmek de dahil olmak üzere pek çok farklı şekilde tepki vermişlerdir. Bu tepkilerden birisi de stokçuluktur. Bu çalışmanın amacı, Planlı Davranış Teorisi çerçevesinden tüketicilerin pandemiden kaynaklı algıladıkları riskin süpermarket ürünlerine yönelik stokçuluk davranışlarına etkisini ortaya koymaktır. 937 kişiden toplanan veriye uygulanan ANOVA, t-testi, güvenilirlik analizi, faktör analizi ve doğrulayıcı faktör analizi neticesinde duyusal riskin stokçuluk üzerinde önemli bir etkisi olduğu, ayrıca demografik değişkenlere göre stokçuluk eğiliminin fark ettiği tespit edilmiştir.

Anahtar Kelimeler: COVİD-19, Tüketici, Stokçuluk, Algılanan Risk, Süpermarket Ürünleri, Planlı Davranış Teorisi

JEL Kodları: M31, I12

Introduction

COVID-19 disease (Also known as Coronavirus 2019 and 2019-nCoV) is a deadly severe acute respiratory syndrome. The WHO declared that the origin of the disease is Wuhan, China (Fauci, Lane and Redfield, 2010). At the beginning of the pandemic, the virus was only seen in people from China or people who visited China. However, due to the spreading speed of the virus, it became a global concern, and WHO declared the situation as pandemic (Mercan Annak and Öner Karaveli, 2020).

COVID-19 pandemic brought radical changes for both professional and the daily lives of the people (Ho, Hui, Kim Aimee and Zhang, 2020). According to Lennihan (2020), the economic problems based on the COVID-19 pandemic are twice worse than the Great World Depression of 1929. Since the world has not been able to bring the pandemic under control yet, the outcomes cannot be forecasted clearly; but it certainly brings deviance to every aspect of life. This situation is stated as "New Normal" by many researchers.

Pandemics cause both supply-sided and demand-sided negativities in some industries, and that causes extra financial costs for governments since some of the firms are unable to carry on their businesses (Patel, 2015). Sealing borders as a pandemic measure slows the logistic mobility that causes a domino effect on industries as; agriculture, transportation, tourism, Etc. (Jonas, 2013). As a result, consequences have substantial impacts on inventory levels, price, in-store placement, Etc., in the retail industry where people make shopping for their daily needs. All these emergent negativities of the pandemics may increase the level of stress for the consumers since they feel they are losing control of the environment (Botti and McGill, 2011).

The consumer decision processes are one of the primary research areas for consumer behaviour discipline (Rajagopal, 2020). These processes are mostly related to consumers' internal and external characteristics (Richardson, Dick and Jain, 1994; Asioli, Varela, Hersleth, Almli, Olsen and Naes, 2017).

People are restricted from their daily routines and stayed their houses because of the isolation measures. This situation raised the threat perception of the people, and they have hoarded the stores chaotically. According to the OECD report, the COVID-19 pandemic made people buy more food and fewer luxury products (OECD, 2020a). In another report of the OECD, it is mentioned that the economic effects of the pandemic have affected the living standards of the consumers (OECD, 2020b). On this basis, it can be said that consumers focused on their physiological needs and paid more attention to the functional benefits of the products. Under this circumstance, consumers preferred long-life foods (like frozen, canned, Etc.) more than fresh foods (like vegetables, bakery products, Etc.) (FAO, 2020a). On the other hand, ease of stock brings an opportunity and convenience for the consumers.

Theory of Planned Behaviour (TPB) is one of the most applied frames in the literature for understanding consumer behaviour. This theory asserts that an individual's behaviour is an output of attitude, subjective norm, perceived behavioural control, and behavioural intention (Ajzen, 1985; Ajzen, 1991). Therefore, TBP was also applied as a frame for this research to understand consumer behaviour in the COVID-19 pandemic.

Lately, the anomalies caused by the uncertainties brought by the pandemic in consumers' behaviour patterns have been the subject of many news bulletins. In this research, the relationship of these anomalies with the risk perceived by consumers is discussed within the Theory of Planned Behaviour framework for stockpiling behaviour. Although studies in the literature relate the Theory of Planned Behaviour framework with stockpiling behaviour, no study has been found in Turkish literature that explains the impact of perceived risk together with the TPB framework. This research aims to fill this gap in the Turkish literature.

Literature review

Theory of planned behaviour

Azjen's (1985) Theory of Planned Behaviour is a theory that aims to explain the behaviours of individuals by their beliefs and attitudes that are constructed upon the Reasoned Action Theory. This theory's principal assumption is that the intention for behaviour is affected by the attitude, subjective norm, and perceived behavioural control. These variables are defined and associated with the COVID-19 pandemic in Table 1.

Table 1: Components of TPB and Impacts of COVID-19 Pandemic on Them

Concept	Definition
Attitude	Attitudes are positive or negative evaluations towards a behaviour of an individual, and they are quite hard to change after they have constituted. In the COVID-19 pandemic, the warnings from the competent authorities about the risks may cause a distortion of the people's behaviours of the pre-COVID-19 era.
Subjective Norm	Subjective norm is a community pressure on a person about presenting or not presenting a behaviour. Announcements and advice by the government for social distancing, isolation, avoiding crowded places, etc., may cause pressure from their social environment on the people who rule out these measures.
Perceived Behavioural Control	Perceived behavioural control can be defined as a belief in presenting a behaviour successfully. People need resources for achieving success in this issue. These resources can be physical, financial and-or informational. Price fluctuations on disinfectants, soaps, etc., at the beginning days of the pandemic, may cause anxiety in people about some products' inaccessibility. In this case, people may look for some precautions to avoid that loss.

Reference: Ajzen, 2001; Rivis et al., 2009; Knowles et al., 2012; Hsu and Huang, 2012

In other words, in reference to TPB, behavioural intention is a function or output of attitude, subjective norm, and perceived behavioural control (Ajzen, 1985; Ajzen, 1991).

In addition to the researchers that applied the TPB frame for theorizing the consumer behaviour in natural disasters (Like Long and Khoi, 2020; Daellenbach, Parkinson and Krisjanous, 2018; Deng, Wang and Yousefpour, 2017; Paton, 2003), some researchers applied the same theoretical frame to set forth the consumer behaviour in retail practices and consumer goods (Hensen, 2008; McDermott, Oliver, Svenson, Simnadis, Beck, Iverson, Caputi and Sharma, 2015; Aliaga-Ortega, Adasme-Berríos, Méndez, Soto and Schnettler, 2019).

Perceived risk

Perceived risk is an output of a subjective evaluation of an individual in uncertain situations (Bauer, 1960). People apply their past experiences and intuitions for understanding the similarity of the situation while evaluating the risk (Butler and Mathews, 1987). Since perceived risk is the determinant for the behaviour, most researchers focused on it instead of the risk itself (Dillard, Ferrer, Ubel and Fagerlin, 2012).

There might be many factors that affect the risk that people perceive about the pandemic. Undoubtfully, the first factor is the anxiety of infecting by the COVID-19 virus, making people take measures to avoid getting infected. According to the Protection Motivation Theory, the societal perceived risk of a disease depends on the severity and possible damage of the pandemic (Rogers, 1975; Ibuka, Chapman, Meyers, Li and Galvani, 2009; van der Weerd, Timmermans, Beaujean, Oudhoff and van Steenbergen, 2011). There are also many other factors as; socio-demographic factors, social class, values, etc., that affect the perceived risk of disease (Vaughan and Tinker, 2009; Goodwin, Gaines, Myers and Neto, 2011). Bish and Michie (2010) established that women, elders, well-educated people, and nonwhite people are recultivating health-protective behaviours more than others. Besides, low-income groups' perceived risk level increases since they become sceptical about achieving health services equally and fairly (Vaughan and Tinker, 2009).

Great pandemics are spreading like waves, and different circumstances may emerge during these periods that may affect the level of the perceived risk of the consumers (Goodwin et al., 2011).

Besides, the trust of the society in the messages sent to them by the competent authorities has a significant effect on their perceived risk level during the pandemic. While people mostly trust the information shared by healthcare professionals and medical institutions, they rely on media lesser (van der Weerd et al., 2011; Siegrist and Zingg, 2014).

While consumers' perceived level of risk of pandemic increases, their psychological well-being levels decrease, and they are applying various strategies to extinguish this problem (Krok and Zarzycka, 2020). It can be expected that consumers may keep away from physical grocery stores and increase the level of their grocery product stocks for disambiguating the uncertainties caused by the pandemic. Wang et al. (2020: 2) carried out research on 2.500 US citizens and found that consumers' in-store hygiene expectations increased, they planned and decreased the time they spend in physical stores, increased the amount of shopping per visit, and focused on their basic needs more.

Results of research made in the USA with 630 consumers in May 2020 show that:

- 72% of the participants indicated that they have increased their online shopping frequency but decreased their store shopping visits,
- 56% of consumers feel anxious about forgetting to pick up or finding specific foods when shopping in-store.
- More than 30% of the participants expressed that they have begun eating healthy foods more than ever (DeBroff, 2020).

It is understood that the COVID-19 pandemic increases consumers' perceived risk and makes them cognitively unbalanced. Under these circumstances, consumers' inventory level of grocery products and de-contamination measures expectations from the grocery stores have changed in this era.

Stockpiling behaviour

Stockpiling behaviour usually occurs when a consumer intends to make a profit or avoiding from a possible loss. Chu (2018) describes stockpiling behaviour as gathering and preserving goods more than needed for using up in the future. On the other hand, Frost and Gross (1993) assert that stockpiling has evolutionary and instinctive roots fuelled by the anxiety of getting caught unprepared for a particular situation.

The perceived need for a product may increase when a threat to product availability arises, and the consumers may feel a higher level of losing control of the situation (Clee and Wicklund, 1980). Concordantly to this, some researches indicate that stockpiling behaviour occurs if the consumer avoids a product's unavailability (McKinnon, Smith and Hunt, 1985; Lynn, 1993; Frost and Gross, 1993; Ong, 1999; Frost, Meagher and Riskind, 2001). In-store stockpiling behaviour is an output of situational factors like promotion, discount, or sales campaigns that make the inevitable desire to possess a product. In such situations, consumers may compete to restrain each other from acquiring the products by buying more than they need (Sobirova, 2020). In this case, in-store stockpiling behaviour is also a result of an instant perceived risk about the product's unavailability.

Consumers may also expect an increase in the product price or product unavailability anxiously, which may drive them to stockpiling behaviour for their future purchasing plans (Verhallen and Robben, 1994; Sterman and Dogan, 2015).

Stockpiling behaviour triggered by natural disasters (like earthquakes, pandemics, etc.) is more like a defence mechanism against possible losses and involves more irrationalities than the ones triggered by situational factors (McKinnon et al., 1985; Pan, Dresner, Mantin and Zhang, 2020).

Disinformation generated by the press, social media, and likewise channels when there is not enough time and information for making a proper evaluation in disaster days spreads like a disease. Distorted reality and exaggerated disinformation may increase stockpiling behaviour and worsen the situation (Taylor, 2020). For example, Kaigo (2012) indicates that the disinformation spread over social media caused a panic and a chain reaction on stockpiling for drinking water, fuel, toilet paper, and long-life foods in the Great Earthquake of Japan that happened in March 2011.

Some researches indicate that hoarders have a high level of the perceived risk of being unable to get their needs, which drives them to buy as much as they can impulsively to prevent getting out of stock (McKinnon et al., 1985; Steketee and Frost, 1998). The level of perceived risk is also affected when people compare themselves with others about what they have. People keep their eyes on other people for achieving equal or more acquisitions when they compare themselves with others, which may drive them to struggle with others (Walster, Traupman and Walster, 1978; Fehr and Schimdt, 1999). In the light of this information, stockpiling behaviour can also be defined as a result of an individual's comparison own self with others.

Stockpiling behaviour also affects the operational processes of retailers. It is expected that retailers would organize their inventories based on their past experiences in natural disaster situations (Lodree, Ballard and Song, 2012; Davis, Samanlioglu, Qu and Root, 2013; Morrice, Cronin, Tanrisever and Butler, 2016). In such circumstances, disruptions and delays may happen on supply chains that cause problems to retailers and consumers (Pan et al., 2020). When these negativities come to the community's attention, this may collectively trigger irrational stockpiling behaviour.

On disaster days, the stockpiling behaviour may negatively affect retailers' logistics systems, especially for the fast-moving consumer goods when it is impossible to replace the depleted stocks. Media channels announced news worldwide about the retailers' running out of food and hygiene

products in the COVID-19 pandemic. This case brings the price fluctuations since distorting the accessibility justice of the products. The problem is not only about the physical shopping stores. Cargo services are also affected negatively by over-demand in online shopping that causes delays on delivery dates (Dowle, 2020).

According to Jovančević and Milićević (2020), stockpiling behaviour has a cultural aspect since they found that Latin Americans are more tend to hoard food products than Serbians. The same research also urges that the level of anxiety for pessimistic people rises faster and they are more tend to hoard than optimistic ones when they are exposed to conspiracy theories (Jovančević and Milićević, 2020).

Nowak et al. (2020) assert that people who have the dark triad of psychology (Machiavellianism, narcissism, and psychopathy) are more in need of being on the safe side and that motive may drive them to hoard.

Sheth (2020: 281) modelled the alteration in the consumer behaviour in the COVID-19 pandemic, as shown in Figure 1. According to this model, the consumers' first reaction to pandemics is stockpiling, but the cycle indicates that behaviour would change rapidly over time.

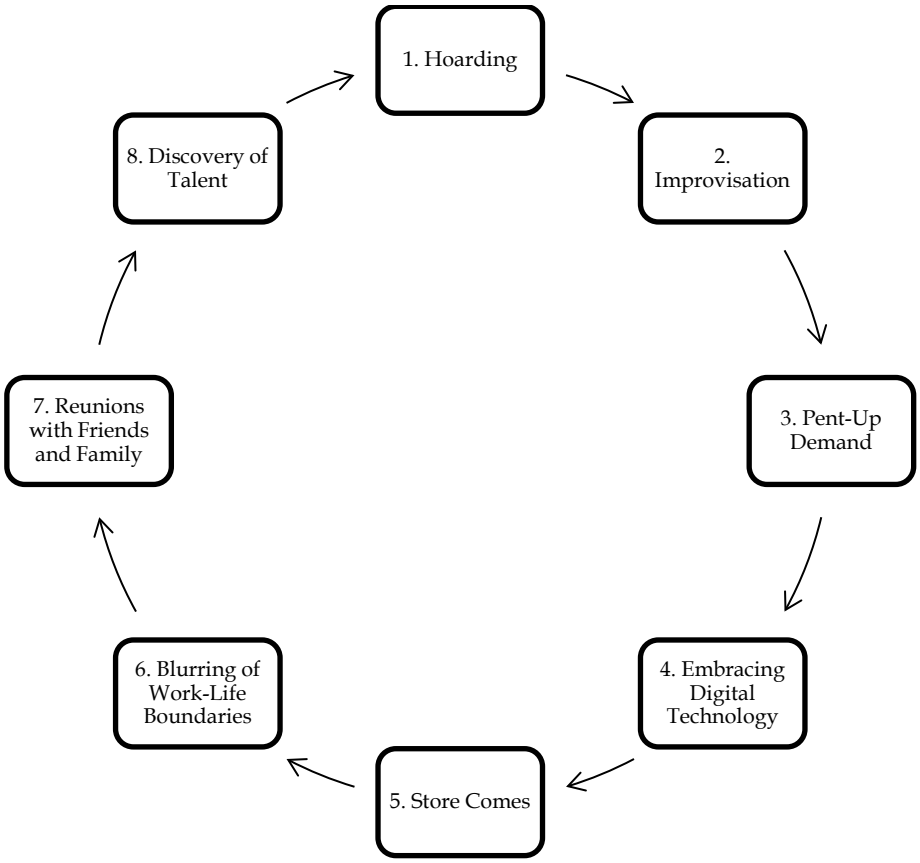

Fig 1: Alteration in the consumer behaviour in the COVID-19 pandemic

Reference: Sheth, 2020: 281.

Sheth (2020) asserts that shortages on the supply channel drove consumers to hoard at the beginning of the pandemic. They strung along with the fluctuations and changes in the market, postponed their arbitrary needs, made more online shopping, preferred retailers with home delivery systems, their work and life balance distorted, they tried to socialize online and learned new things while they were at home. It is understood that consumers have developed many different behaviours in the pandemic period because of the disease's unpredictable structure.

Consumers have shown irrational stockpiling behaviour for the short shelf-life food products in a high volume at the beginning of the COVID-19 quarantine measures even though the high prices (Bochko, Feier and Donets, 2020). According to another similar research, the demand for freshly baked bread 76% and frozen vegetables 52% rise in Europe in the first week after the pandemic's announcement (Crisp, 2020). On the other hand, the research made by NC Solutions (2020) in the USA reveals a dramatic increase in the sale amount of disinfectant (838%), solid soap (65%), and house cleaning products (52%) because of the pandemic.

The research made on 1033 adult Polish people shows that stress is risen by the pandemic related information sent by friends on communication channels, and that cause anxiety on people for the depletion of food products. Moreover, this stress and anxiety may increase over time and bring tension for stockpiling food products (Jezewska-Zychowicz, Plichta and Krolak, 2020).

In the COVID-19 pandemic, 17,99 USD priced digital thermometer price has risen to 27 USD, 1 USD priced N95 mask price has increased to 3,98 USD in Amazon web site, and such price fluctuations may motivate the stockpiling behaviour for preventing a future loss (Sobirova, 2020).

Method

Adult Turkish consumers are the population of this research. According to the Turkish Statistical Institute (2020), Turkey's total population is 83.154.997, and 63.696.728 (76,6%) of this population are adults. For this population, 400 participants are enough as the minimum sample size for 95% confidence interval to achieve a significant result (Israel, 1992: 3). The convenience sampling method was applied because of the financial and timewise constraints of the research.

For testing the research model, 27 items have been applied with 5 point Likert Scale to participants. These items were modified and implemented from the research of Bae and Chang (2020). Also, nine items have been asked with 3-point Likert Scale to understand the consumers' stockpiling and general shopping behaviour of grocery products. Also, a demographic questionnaire section was added to the form for collecting data about the marital status, age, education, sex, and financial status of the participants.

Research hypotheses are given below that modified from Bae and Chang's (2020) research hypothesis for this research:

- H_1: Perceived risk exerts a statistically significant positive influence on behavioural attitude.
    - H_{1a}: Cognitive risk perception exerts a statistically positive influence on behavioural attitude.
    - H_{1b}: Affective risk perception exerts a statistically positive influence on behavioural attitude.
- H_2: Perceived risk exerts a statistically significant positive influence on the subjective norm.
    - H_{2a}: Cognitive risk perception exerts a statistically positive influence on the subjective norm.
    - H_{2b}: Affective risk perception exerts a statistically positive influence on the subjective norm.
- H_3: Perceived risk exerts a statistically significant positive influence on behavioural control.
    - H_{3a}: Cognitive risk perception exerts a statistically positive influence on behavioural control.
    - H_{3b}: Affective risk perception exerts a statistically positive influence on behavioural control.
- H_4: Attitude towards the behaviour exerts a statistically significant influence on behavioural intention.
- H_5: Subjective norm exerts a statistically significant influence on behavioural intention.
- H_6: Perceived behavioural control exerts a statistically significant influence on behavioural intention.
- H_7: Subjective norm exerts a statistically significant influence on attitude towards the behaviour.
- H_8: Subjective norm exerts a statistically significant influence on perceived behavioural control.
- H_9: Means of participants' inventory levels of grocery products exert a statistically significant difference in terms of their marital status.
- H_{10}: Means of participants' purchase frequency of grocery products exert a statistically significant difference in terms of their marital status.

- H_{11}: Means of participants' inventory levels of grocery products exert a statistically significant difference in terms of their sex.
- H_{12}: Means of participants' purchase frequency of grocery products exert a statistically significant difference in terms of their sex.
- H_{13}: Means of participants' inventory levels of grocery products exert a statistically significant difference in terms of their age.
- H_{14}: Means of participants' purchase frequency of grocery products exert a statistically significant difference in terms of their age.
- H_{15}: Means of participants' online shopping frequency of grocery products exert a statistically significant difference in terms of their age.
- H_{16}: Means of participants' credit card using frequency of grocery products exert a statistically significant difference in terms of their age.
- H_{17}: Means of participants' level of perceived cognitive risk in the COVID-19 era exert a statistically significant difference in terms of their education level.
- H_{18}: Means of participants' level of perceived affective risk in the COVID-19 era exert a statistically significant difference in terms of their education level.
- H_{19}: Means of participants' level of perceived cognitive risk in the COVID-19 era exert a statistically significant difference in terms of their age.
- H_{20}: Means of participants' level of perceived affective risk in the COVID-19 era exert a statistically significant difference in terms of their age.

The research model is based on the hypotheses and given in Fig 2.

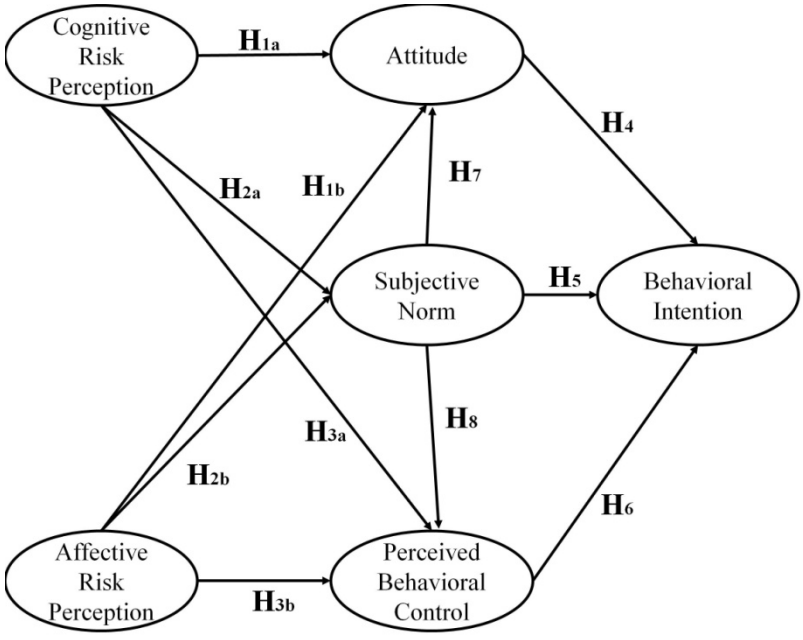

Fig 2: Research Model

An online questionnaire established, and the link has been sent for data collection. The collected data analysed with SPSS 22 and AMOS programs. Frequency analysis, ANOVA, exploratory factor analysis, T-test, and confirmatory factor analysis were applied to data.

This research has been done by considering ethical principles and under the 2020/12/01 numbered permission of the Ethical Committee of Non-Invasive Researches of Yüksek İhtisas University.

Findings

The frequency analysis was applied by SPSS to 937 valid forms obtained during the data collection phase to determine the participants' demographic characteristics. As shown in Table 2, most of the participants are younger than 41, well educated, and have no financial difficulties.

Table 2: Summary of the Demographic Variables

Age	
Between 18-25	252
Between 26-33	197
Between 34-41	202
Between 42-49	146
Between 50-57	89
58 and above	51

Economical	
My income is more than my expenses	318
My income is equal to my expenses	405
My income is less than my expenses	214

Sex	
Female	579
Male	358

Education	
High School Degree	168
Associate Degree	81
Bachelor's Degree	287
Master's Degree	227
Doctorate Degree	174

Marital Status	
Married	484
Single	453

In this research, the lower bound for Cronbach's Alpha value for reliability analysis was taken as 0,70 based on the studies of Vale et al. (1997) and Christmann and Aelst (2005).

Nineteen questions asked for the dimensions of intention, subjective norm, perceived control, and behavioural attitude of the TPB frame for understanding the stockpiling behaviour. Exploratory factor analysis shows these 19 questions explain 81% of the total variance. The Cronbach's Alpha value of the questionnaire is 0,948. According to these results, it can be said that the questionnaire is reliable. Dimensions, factor loads, and variance values can be seen in Table 3.

Table 3: Factor and Reliability Analysis for the Planned Behaviour Items

Dim.	Item	Fac. Load	Var. Exp.	Dim.	Item	Fac. Load	Var. Exp.
Behavioural Intention	BI-1	0,821	%26,188	Perceived Behavioural Control	PBC-1	0,579	%18,002
	BI-2	0,889			PBC-2	0,828	
	BI-3	0,891			PBC-3	0,818	
	BI-4	0,89			PBC-4	0,887	
	BI-5	0,877			PBC-5	0,832	
Subjective Norm	SN-1	0,768	%23,049	Attitude	A-1	0,597	%13,885
	SN-2	0,785			A-2	0,639	
	SN-3	0,81			A-3	0,756	
	SN-4	0,74			A-4	0,709	
	SN-5	0,795					
Total Variance Explained			%81,124				
Cronbach's Alpha Value			0,948				

For understanding the cognitive and affective risk perception of the COVID-19 pandemic, eight questions were asked to participants (four for cognitive risk perception and four for the affective risk perception). Exploratory factor analysis shows these eight questions explain 73% of the total variance. The Cronbach's Alpha value for these eight questions is 0,911. The results show that the questionnaire is reliable. Dimensions, factor loads, and variance values are given in Table 4.

Table 4: Factor and Reliability Analysis for the Perceived Risk Items

Dim.	Item	Fac. Load	Var. Exp.	Dim.	Item	Fac. Load	Var. Exp.
Cognitive Risk Perception	CRP-1	0,889	%36,856	Affective Risk Perception	ARP-1	0,819	%36,526
	CRP-2	0,889			ARP-2	0,737	
	CRP-3	0,756			ARP-3	0,668	
	CRP-4	0,599			ARP-4	0,613	
Total Variance Explained			%73,382				
Cronbach's Alpha Value			0,911				

After exploratory factor analysis is made, confirmatory factor analysis has been applied by using the AMOS program to confirm the research model. The fit indices values show that the model is valid structurally. The calculated fit indices values, the acceptable limits for these values, and references for the limits are given in Table 5.

Table 5: Model Fit

Fit Indices	Estimated Analysis Result	Acceptable Limits	Reference
CMIN/DF	4,710	2≤CMIN/DF≤5	(Marsh and Hocevar, 1985; Awang, 2012)
CFI	,997	0,90≤CFI	(Noudoostbeni et al., 2008)
GFI	,994	0,90≤GFI≤0,95	(Hooper et al., 2008)
RMSEA	,063	0,05≤RMSEA≤0,08	(Noudoostbeni et al., 2008)

The First eight hypotheses were tested with structural equation modelling by AMOS. Hypotheses except for H1a, H2a, H3b, and H6 are accepted. Structural equation model analysis results are given in Table 6.

Table 6: AMOS Hypothesis Tests

No	Path			S.E.	C.R.	P	Label
H1b	A	<---	ARP	0,127	0,021	6,056	***
H2b	SN	<---	ARP	0,336	0,032	10,349	***
H3a	PBC	<---	CRP	0,289	0,026	11,087	***
H4	BI	<---	A	0,453	0,039	11,703	***
H5	BI	<---	SN	0,316	0,039	8,036	***
H7	A	<---	SN	0,787	0,02	39,159	***
H8	PBC	<---	SN	0,29	0,027	10,772	***

According to the results affective risk have a substantial effect on the subjective norm. On the other hand, there is no statistically significant influence of cognitive risk perception on attitude towards the behaviour and subjective norm. Also, affective risk perception has no statistically significant influence on perceived behavioural control. Regression coefficients calculated with path analysis by AMOS are given in Figure 3.

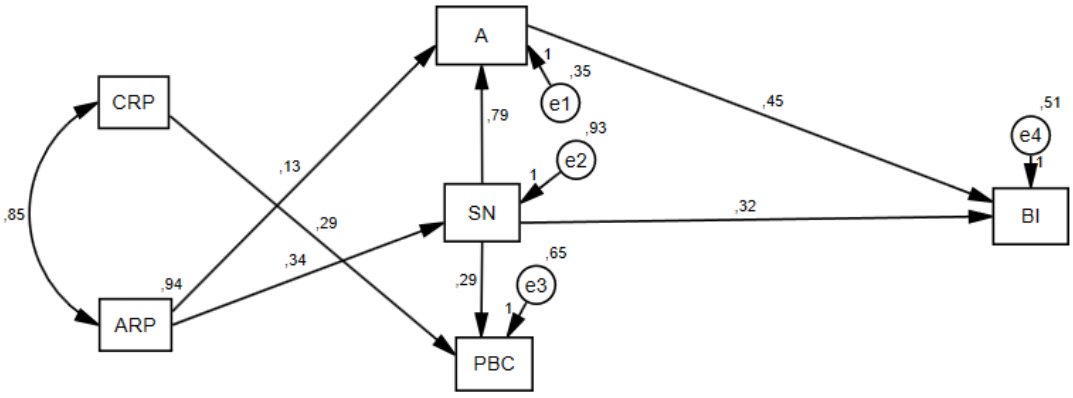

Fig 3 Research Model and the Regression Coefficients Between Variables (CRP: Cognitive risk perception; ARP: Affective risk perception; BI: Behavioural intention; SN: Subjective norm; PBC: Perceived behavioural control; A: Attitude)

A T-test has been applied for addressing the marital status and the inventory level grocery products of the participants; married ones stocked food products, and single ones stocked hygiene and personal care products more. Another applied T-test shows that hygiene products' shopping frequency is higher for married ones and personal care products for single ones in the COVID-19 pandemic.

Table 7: Differences on Inventory Levels and Shopping Frequencies for Grocery Products Based on Marital Status in the COVID-19 Pandemic

Item (H9; H10)	Martial Status	N	Sig.	Sig. (2 tailed)	Mean	Std. Dev.	Std. Er. Mean	Result
Level of food products in your inventory	Married	484	,000	,009	2,2335	,47856	,02175	Higher for married ones
	Single	453			2,1545	,44419	,02087	
Level of cleaning products in your inventory	Married	484	,012	,036	2,2996	,51391	,02336	Higher for single ones
	Single	453			2,3709	,52313	,02458	
Level of personal care products in your inventory	Married	484	,000	,005	2,0434	,49446	,02248	Higher for single ones
	Single	453			2,1369	,51849	,02436	
Your purchase frequency for cleaning products	Married	484	,017	,000	2,2541	,57868	,02630	Higher for married ones
	Single	453			2,3885	,57148	,02685	
Your purchase frequency for personal care products	Married	484	,228	,000	1,9174	,54733	,02488	Higher for single ones
	Single	453			2,0486	,60039	,02821	

A T-test has been applied for understanding the participants' inventory levels and purchasing frequencies based on their sex. Compared to men, women have increased their inventory level and shopping frequency for cleaning products. Results of the analysis can be seen in Table 8.

Table 8: Inventory Level of the Grocery Products and Sex (F: Female / M: Male)

Sex (H11)		N	Sig.	Sig. (2 tailed)	Mean	Std. Dev.	Std. Er. Mean	Result
Level of cleaning products in your inventory	F	579	,001	,041	2,3610	,52869	,02197	Higher for women
	M	358			2,2905	,50150	,02651	
Your purchase frequency for cleaning products	F	579	,061	,000	2,3748	,56371	,02343	Higher for women
	M	358			2,2291	,59224	,03130	

Participants older than 50 years old fall behind the younger ones for credit card using and online grocery shopping in the COVID-19 pandemic. On the other hand, the same group's shopping frequency and inventory level of hygiene and personal care products are higher than other age groups. Also, their shopping frequency for food products is higher than other age groups. The ANOVA analysis results for the differences in inventory levels and shopping frequencies for grocery products based on age in the COVID-19 pandemic are given in Table 9.

Table 9: Differences in Inventory Levels and Shopping Frequencies for Grocery Products Based on Age in the COVID-19 Pandemic

Games-Howell							
Dependent Variable (H13; H14; H15; H16)			Mean Dif. (I-J)	Std. Er.	Sig.	95% Conf. Int.	
						Low. B.	Up. B.
Your purchase frequency for food products	Between 34-41	58 or older	,28577*	,09452	,038	,0096	,5619
	Between 42-49	58 or older	,34958*	,09773	,007	,0648	,6343
Level of cleaning products in your inventory	58 or older	Between 26-33	-,24923*	,08497	,049	-,4976	-,0009
Level of personal care products in your inventory	Between 18-25	Between 42-49	,15406*	,05072	,031	,0086	,2995
		58 or older	,25303*	,06349	,002	,0680	,4380
Your purchase frequency for cleaning products	Between 18-25	Between 50-57	,20978*	,07122	,043	,0042	,4154
		58 or older	,34197*	,08872	,003	,0821	,6019
	Between 26-33	Between 34-41	,19943*	,05536	,005	,0409	,3580
		Between 42-49	,21028*	,06311	,012	,0292	,3913
		Between 50-57	,26584*	,07261	,005	,0564	,4753
		58 or older	,39803*	,08984	,000	,1352	,6609
	Between 34-41	Between 18-25	-,14337	,05352	,082	-,2966	,0098
Your purchase frequency for personal care products	Between 18-25	Between 50-57	,27105*	,06769	,001	,0759	,4662
		58 or older	,26774*	,07117	,004	,0606	,4749
Your purchase frequency of grocery products on the internet	Between 26-33	58 or older	,40729*	,12212	,017	,0486	,7660
	Between 34-41	58 or older	,37798*	,12216	,033	,0192	,7368
Your purchase frequency with credit card	Between 26-33	Between 50-57	,22820*	,07631	,037	,0081	,4483
	58 or older	Between 26-33	-,40291*	,11241	,008	-,7329	-,0729

*. The mean difference is significant at the 0.05 level.

The result of the ANOVA analysis shows that perceived cognitive risk level increases with the education level for the COVID-19 pandemic. Outputs of this analysis are given in Table 10.

Table 10: Perceived Risk and Education Level in the COVID-19 Pandemic

Multiple Comparisons							
Games-Howell							
Dependent Variable (H17)			Mean Dif. (I-J)	Std. Er.	Sig.	95% Conf.Int.	
						Low. B.	Up. B.
Cognitive Risk Perception	High School Grad.	Bachelors Grad.	-,39903*	,10363	,001	-,6835	-,1146
		Doctorate Grad.	-,42601*	,10832	,001	-,7233	-,1287
	Associate Grad.	Bachelors Grad.	-,46924*	,16346	,039	-,9233	-,0152
		Doctorate Grad.	-,49622*	,16647	,029	-,9581	-,0343
*. The mean difference is significant at the 0.05 level.							

H_{12}, H_{18}, H_{19}, and H_{20} hypotheses were rejected since there is not sufficient statistical evidence for proving them.

Participants' shopping frequencies, inventory levels, credit card using frequencies, and online shopping frequencies in the COVID-19 pandemic days are shared in Table 11 as a piece of general information about the situation.

Table 11: Shopping Frequencies, Inventory Levels, Credit Card Using Frequencies, and Online Shopping Frequencies in the COVID-19 Pandemic

When you consider the COVID-19 period;	Less than usual	As usual	More than usual
Level of food products in your inventory	2,88%	74,71%	22,41%
Level of cleaning products in your inventory	2,35%	61,90%	35,75%
Level of personal care products in your inventory	8,86%	73,43%	17,72%
Your purchase frequency for food products	10,89%	61,69%	27,43%
Your purchase frequency for cleaning products	5,87%	56,35%	37,78%
Your purchase frequency for personal care products	17,61%	66,70%	15,69%
Your purchase frequency of grocery products from physical stores	57,95%	31,80%	10,25%
Your purchase frequency of grocery products on the internet	9,28%	32,55%	58,16%
Your purchase frequency with credit card	5,34%	39,27%	55,39%

As shown on the table, consumers' online shopping and credit card usage levels are remarkably increased compared to the pre-COVID-19 era. Increasing home delivery opportunities of the grocery stores and people's infection risk avoidance may be the reasons behind this increase in credit card and online shopping usage of the consumers. Another remarkable substantial difference in avoiding the infection risk is the increased level of cleaning products in the consumers' inventory.

Discussion and conclusion

Findings show that perceived risk affects the subjective norm, perceived behavioural control, and attitude towards behaviour components of consumers' stockpiling behaviour on grocery products. Thus, it can be said that behavioural intention is also affected by perceived risk.

Findings of the stockpiling behaviour questions show that participants' inventory level for some grocery products has increased in the pandemic. Table 12 shows this increase through demographic variables.

Table 12: Increased Inventory Levels in Pandemic Based on Demographic Variables

Product Type	**The Ones Who Increased Their Inventory Levels in the COVID-19 Period**
Food	Married ones
Hygiene	Singles, middle-aged and older
Personal Care	Singles, middle-aged and older

Measures like social distance, isolation, lockdown, and quarantine may increase people's feelings of loneliness (Tull et al., 2020; Labrague et al., 2020; Saltzman, Hansel and Bordnick, 2020; Luchetti et al., 2020). Single people may have that feeling more than married ones. Das et al. (2003) assert that loneliness may drive people to surf on internet unintentionally. People who spend time more than ever on the internet may make impulsive buying a lot with the impression of online advertisements (Drossos et al., 2014; Zheng et al., 2019).

One of the most substantial factors that affect one's stockpiling behaviour is the other people around that person who make stockpiling for some products (Walster et al., 1978; Fehr and Schmidt, 1999). As known, people younger than 20 and older than 65 years are the ones who has been affected by the quarantine and isolation measures the most. That may be the reason for the step forth of the single and mid-aged participants for stockpiling behaviour. The household has a barrier impact on individuals for stockpiling behaviour. However, this structure may get reversed into a stockpiling motivating decision center with the pandemic because of spreading anxiety of products' inaccessibility through the community. In this case, people would try to reach their physiologic needs first according to Maslow's Hierarchy of Needs. On the other hand, hoarders are undesirous for being disclosed in their community since that may cause them to be condemned (Wheaton et al., 2018; Ayers and Dozier, 2015).

The findings of this research show that cognitive risk perception is increasing with the level of education. Sperling's (2020) study on nurses also shows similar results for cognitive-risk perception and education. Research by Yıldırım et al. (2021) shows that avoiding behaviour from the risks affiliated with the COVID-19 and education level has a statistically significant and positive correlation. Avoiding crowded places and-or public transportation and washing hands frequently for preventing the infection disease are defined as the COVID-19 avoiding behaviours (Yıldırım, Geçer and Akgün, 2021). Based on this information, retailers should demonstrate and announce that they are strictly following the disease preventive measures in their physical shopping environments esoterically for highly educated people. It is understood that the impact of information about the pandemic increases with the level of education. According to Jang et al. (2020), there is no statistically significant relationship between education and cognitive risk perception. However, when they added the trust for the government in the model, the perceived cognitive risk statistically decreased with the increase of age. Thus, the governments may decrease the community's stress with constructive communication, which may decrease the older people's stockpiling behaviour.

Findings of the analysis show that online shopping increased over the COVID-19 pandemic (2,49/3). Current research confirms the increase of online shopping in the pandemic (Li, Hallsworth and Coca-Stefaniak, 2020; Neger and Uddin, 2020). Ivanovic and Antonijevic (2020) assert that there are five motives for the consumers to make online shopping in the COVID-19 pandemic;

- A significant number of companies that do online business,
- Low costs,
- Low disease contamination risk,
- Using time effectively,
- Lockdown.

The first three items are the most important motivations for first-time online shoppers (Ivanovic and Antonijevic, 2020). Although the findings of this research show an increase in online shopping, participants older than 50 years are an exception for the general population.

When the increasing level of online shopping in the COVID-19 pandemic is considered, the retailers should apply consumer information systems more effectively in this era. Digital marketing applications offer a wide range of opportunities to effectively estimate and allocate grocery products' demand for grocery products. This information can be useful for the logistic design (inventory levels, supply planning, distribution, etc.) of retailers too.

The questionnaire form of this research can be applied with various scales together as The Fear of COVID-19 Scale, The COVID-19 Anxiety Syndrome Scale, Self-Esteem Scale, or personality scales for setting the different aspects of the concept. Also, choosing different product categories instead of grocery products offers an opportunity to research.

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