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Antecedents of consumers' online apparel purchase intention through Virtual Try On technology: A moderated moderated-mediation model

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Abstract

The study aims to empirically examine the consumers' online apparel purchasing behavior using the constructs from the technology acceptance model (UTAUT). The complex interrelationships between perceived usefulness, perceived risk, perceived enjoyment, and virtual try-on (VTO) technology were explored using a moderated moderated-mediation model. Most importantly, this research focuses on how VTO, one of the frequently used disruptive technologies, influences consumer behavior. Using a structured survey instrument, the data was collected from 288 millennial respondents and has been analyzed using Hayes's PROCESS macros. The results reveal that attitude towards VTO mediated the relationship between perceived usefulness and behavioral intention of customers to engage in online shopping. Perceived risk (first moderator) negatively moderated the relationship between perceived usefulness and attitude towards VTO, and perceived enjoyment (second moderator) has positively moderated the relationship between perceived usefulness and perceived risk and behavioral intention mediated through attitude towards VTO. The theoretical and practical implications were also discussed.

1 | INTRODUCTION

The proliferation of online shopping and digital retailing has increased apparel e-commerce worldwide (Liu et al., 2020; Martin & Oruklu, 2012; Nayak et al., 2022; Qin et al., 2021; Zhang et al., 2019). Online apparel sales in the global market accounted for US $180.5 billion in 2021, increased from US $145 billion in 2020, and were expected to reach US $205 in 2022 (Gallaga, 2022). To attract customers, e-retailers use mobile applications, and marketing researchers for over a decade have been investigating how to present garments through which consumers can visualize the quality, fit, and size of the product (Lee & Kim, 2019). One of the ways of increasing online apparel sales is to provide easy-to-use technology whereby consumers can effectively find a fit-size-match of what they need. Initially, e-retailers used two-dimensional virtual rooms. However, with the advancement of technology, e-retailers are using three-dimensional virtual spaces to provide a 360-degree view of apparel. In this augmented-reality-based virtual-try-on, users can derive hedonic pleasure and engage in purchase decisions. Previous researchers documented that better visualization of products leads to increased customer intention to engage in apparel shopping online (Beck & Crié, 2018). With escalating interest in VTO services, many fashion companies look forward to making unique attempts to expand their businesses to e-commerce and introduce 3-D technology to improve the quality (Debbabi et al., 2010). Furthermore, as the recent hit global pandemic increased customers' reluctance to engage in face-to-face contact and prefer e-buying, the number of companies making this VTO available is increasing (Hwangbo et al., 2020; Papagiannidis et al., 2013).

By definition, disruptive technologies are emerging or new technologies that replace old dominant technologies used by e-retailers and consumers (Elbeck, 2018; Kumaraswamy et al., 2018). Technological innovations (e.g., Artificial intelligence, Blockchain, augmented reality, and virtual reality) have dominated consumer behavior

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research (Flavián et al., 2019). The interactive technologies help consumers to experience the physical retail environment in virtual settings and play a significant role in consumer decision-making (Javornik, 2016).

The focus of this study is on VTO, which is considered one of the disruptive technologies that have been influencing consumer purchase decisions in the e-retail environment. VTO is a cutting-edge technology that allows customers to try products digitally without touching the products. VTO app captures the image of the consumer wearing the apparels with augmented reality and artificial intelligence and provides consumers to test products in a three-dimensional environment. Organizations use augmented reality and VTO as frequently used disruptive technologies to bring sweeping changes in consumer behavior as a strategy (Erdmann et al., 2021). The utilization of cyberspace which provides browsing opportunities, has been documented long back (Rowley, 2002), and companies need to reach consumers in virtual space (Catterall & Maclaran, 2002). It was found that augmented reality applications on mobile devices have significantly influenced impulse buying decisions (Trivedi et al., 2022). So, several researchers have vouched for the effectiveness of disruptive technologies in influencing consumer behavior. Some of the valuable findings from the previous research have been that consumers experience hedonic value interacting with VTO technology (Chu et al., 2022; Kim & Forsythe, 2010; Merle et al., 2012). As some studies identified the antecedent conditions leading to behavioral intention (Chatterjee et al., 2022; Lee et al., 2022; Liu et al., 2020; Yang & Wu, 2009), this study extends previous studies by dwelling on apparel online purchasing behavior in emerging economies.

The rationale for the present study stems from several factors. First, virtual territory for apparel products has expanded due to an increase in the number of online buyers, more particularly during and post-global pandemic. The e-retailers have shifted their gears from traditional offline shopping to virtual mode by using tools like social networking and blogs and creating a platform for VTO in virtual stores. Second, though online shopping for apparel has escalated, some scholars reported high level of perceived risk in online buying compared to traditional outlets (Kamani et al., 2014; Merle et al., 2012; Nayak et al., 2022) because of their inability to try apparel before buying. Further, as some researchers reported, the lack of in-shop experience of trying clothing offline significantly impacts customer enjoyment (Jaiswal & Singh, 2020). The earlier studies focused on the effect of perceived risk and perceived enjoyment in offline stores. This necessitates investigating perceived risk and enjoyment in an online context, especially concerning apparel.

Most importantly, relatively scant research addressed the impact of perceived risk and enjoyment on consumers' behavioral intention through their attitude toward VTO. In an online context and their influence on the consumer attitude toward VTO. Third, as opposed to most of the studies conducted in the western context, this research was conducted in a developing country, India. Fourth, this study explicitly addresses the behavioral intention of millennials, which are significant customers of online apparel products. Using constructs (i.e., perceived usefulness, attitude, and behavioral intention) from the technology acceptance model (UTAUT), the present study attempts to bridge the gap and answers the following research questions (RQs):

RQ1. How attitude towards VTO technology mediates the relationship between perceived usefulness and behavioral intention towards online apparel purchasing?

RQ2. How perceived risk (first moderator) and perceived enjoyment (second moderator) moderate the relationship between perceived usefulness and attitude towards VTO technology?

This research makes three significant contributions to the literature. First, though several researchers have studied the effect of VTO on online apparel consumer behavior, most of the studies were conducted in the Western context, and a limited number of studies were available in the Indian context (Chatterjee et al., 2018; Kripesh et al., 2020; Nayak et al., 2022). By investigating the behavioral intentions of consumes of online apparel products in the second thickly populated country adds to the existing studies. Second, as opposed to the previous studies that focused on consumers at large, this research focused on addressing the behavior of millennials, which received a scant attention by previous scholars (Erdoğdu & Watson, 2022; Sahelices-Pinto et al., 2021). Third, by unpacking the interrelationships between perceived usefulness, perceived risk, and perceived enjoyment and their effect on behavioral intention through a complex moderated moderated-mediation model, this study makes a unique contribution to the literature on online buying of apparel by consumers.

The rest of the paper is organized as follows. In the Section 2, we provide theoretical background and hypotheses development. The methodology was discussed in Section 3, and hypotheses testing, and analysis was covered in Section 4. The discussion, results, theoretical and practical contributions, limitations, and suggestions for future research were covered in the final section.

2 | THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

This study uses the Unified Theory of Adoption and Utilization of Technology (UTAUT) as a theoretical platform for explaining the consumers' adoption of a technology (Venkatesh et al., 2003). Though some previous researchers have used the technology acceptance model (TAM) as a theoretical framework for explaining consumers' behavior in accepting new technology (Abdullah et al., 2016; Adams et al., 1992; Kang et al., 2021; King & He, 2006; Youn & Lee, 2019), UTAUT is superior in predicting the consumers' adoption of new technology and in social media research (Brown et al., 2010; Gonzalez et al., 2012; Huang & Qin, 2011; Shareef et al., 2020; Sorce et al., 2021; Venkatesh et al., 2012). This research considers UTAUT as a helpful tool for e-retailers in assessing the success of VTO, and explains the relationship between perceived usefulness and behavioral intention. The basic tenet of UTAUT is that perceived usefulness

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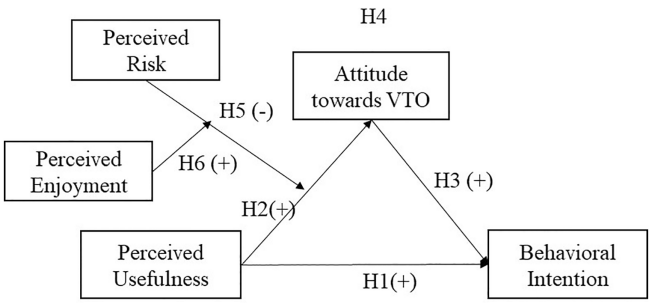


FIGURE 1 Conceptual model.

influences behavioral intention through facilitating conditions and social influences such as perceived enjoyment, perceived risk, price value, and experience (Buchanan et al., 2013; Venkatesh et al., 2012).

The adoption of technology by consumers is determined mainly by two perceptions: perceived usefulness and perceived ease of use. Most importantly, the focus is on investigating how perceived usefulness, and contextual variables such as perceived risk and enjoyment, influence the consumers' attitude towards VTO in online apparel purchase behavior. Perceived usefulness is defined as "the extent to which a person believes that using IT will enhance their performance" (Venkatesh & Davis, 2000, p. 187). Perceived ease of use is defined as "the degree to which a person believes that using an IT will be free of effort" (Venkatesh & Davis, 2000, p. 187). Another important variable in this study is the attitude of consumers towards VTO technology. Several researchers have explored the attraction towards VTO technology for online apparel shopping (Martin & Oruklu, 2012; Merle et al., 2012; Pantano et al., 2017). As VTO involves high interaction between consumers and technology, e-retailers make attractive websites to promote online sales (Huang & Qin, 2011). As technology paved the way for online shopping, e-retailers introduced user-friendly logistical changes in their websites and motivated consumers to engage in online shopping (Zhang et al., 2019). As clothing and other fashion-related shopping have become the essential merchandising category in the past few years, e-retailers have focused on attracting and retaining customers (Lo et al., 2019). Despite the online sales of apparel products, the trial facility is a significant obstacle in the clothing industry, mainly called suit, fit and match options (Pachoulakis & Kapetanakis, 2012). Online retailers have worked hard to sort out this issue and found this as a VTO technology solution, which has become a trend these days (Liu & Uang, 2016). Despite having the vast literature on this topic, there is a shortage of studies focusing on how attitude toward VTO technology influences the perceived usefulness-behavioral intention relationship. Most importantly, it would be interesting to study how the complex moderating impact of perceived risk and perceived enjoyment on the attitude toward VTO by consumers, which in turn influences their behavioral intention. This study aims to bridge the gap by identifying the boundary conditions (perceived risk and perceived enjoyment) which will strengthen the relationship between perceived usefulness and attitude toward VTO technology. The conceptual model showing these relationships is presented in Figure 1.

2.1 | Hypotheses development

2.1.1 | Perceived usefulness and behavioral intention

When we talk in the context of millennials labelled as "first-generation technology" people, the perceived usefulness of technology plays a vital role in influencing them to exhibit their attitude towards VTO. Though the customers may start utilizing the technology for fun, they may eventually find it worth purchasing the product as the latest technologies and reveal how they look with those apparel in shopping malls, grocery stores, and busy streets. For example, selectable virtual scenes can be displayed in a virtual-reality-based try-on and an augmented-reality-based try-on; customers can see how they look wearing the garments in a real-life setting in life-size (Liu et al., 2020).

It was predicted three decades back by Adams et al. (1992) that individuals who perceive the online retail environment as convenient are more likely to consider the technology as helpful and easy to use and exhibit a positive attitude towards interactive media (Shareef et al., 2018). Roughly two decades later, Koo et al. (2008) found that customers search for products using new technology and derive benefits from interactive shopping compared to traditional in-store shopping. Most importantly, perceived usefulness and perceived ease of use are the most influential factors determining customers' behavioral intention (Venkatesh & Davis, 2000). Through technology, e-retailers' welcome consumers into a virtual world to enjoy a variety of experiences that include product trials and entertainment (Lee & Leonas, 2018). The perceived usefulness of VTO leads to perceived use, which in turn influences behavioral intention (Venkatesh & Davis, 2000). In addition, Chen and Tan (2004) reported that individuals who desire navigation through websites would perceive online shopping as enjoyable. Thus, while consumers may engage in online shopping only for instrumental purposes, some may derive pleasure from interactive online shopping available around the clock (Kirk et al., 2018).

However, consumers' behavioral intention largely depends on how they perceive the available technology, which depends on the effectiveness and capability of websites providing three-dimensional visualizations of products. It motivates customers to shop online (Chang & Wang, 2011). Yang and Wu (2009) documented that customers consider both utilitarian and hedonic values in apparel, and beliefs about self-congruity, body esteem, and confidence significantly influence purchase decisions. Extant research confirmed that perceived usefulness is an essential driver of behavioral intention to adopt online technology for shopping (Abu-Shamaa & Abu-Shanab, 2015; Devaraj et al., 2002; Faqih, 2016; Kim et al., 2007; Lee et al., 2003). Therefore, we hypothesize:

H1. Perceived usefulness is positively related to behavioral intention.

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2.1.2 | Perceived usefulness and attitude towards VTO

While making the distinction between perceived usefulness and perceived ease of use, some researchers found that the individual's attitude is influenced by the perceived usefulness of the technology rather than perceived ease of use, and perceived usefulness is a significant determinant of attitude and intention for technology use (Devaraj et al., 2002; Faqih, 2016). For example, when consumers perceive the usefulness of virtual fitting rooms in trying out a product, they are more likely to show an attitude toward VTO (Gültepe & Güdükbay, 2014; Lee & Leonas, 2018). When it comes to millennials, who are digital natives and are heavily dependent on technology and spend a considerable amount of their time in online activities, it is more likely that the perceived usefulness of technology increases their attitude towards VTO (Leon, 2018). A study by Zhang et al. (2019) on online apparel consumers found that perceived usefulness was significantly and positively associated with the attitude toward VTO. Based on the above discussion, we hypothesize:

> **H2.** Perceived usefulness is positively related to attitude towards VTO.

2.1.3 | Attitude towards VTO and behavioral intention

VTO technology enables customers to try various models and designs and see if they fit their requirements (size, color, length, width, etc.) (Fiore et al., 2005). VTO technologies have been used in the digital platform to help customers choose whatever they want. Extant literature reveals a positive association of VTO technologies with the behavioral intention of customers to make purchases (Kim & Forsythe, 2009; Merle et al., 2012). VTO, through visualized shopping assistance, provides adequate information to the consumers about the clothing by (i) rotating the product images, (ii) enlarging the images, and (iii) matching different clothing items (Fiore & Jin, 2003), which helps in influencing behavioral intentions (Beck & Crié, 2018). Furthermore, it was well documented that VTO applications provide customers with helpful information about their purchase options, sizes, and color that could suit them well (Baytar et al., 2016). Based on the above arguments and available empirical evidence, we offer the following hypothesis:

> **H3.** Attitude towards VTO is positively related to behavioral intention.

2.1.4 | Attitude towards VTO as a mediator

While the direct effect of perceived usefulness on consumers' behavioral intention was well documented by earlier researchers (Merle et al., 2012; Pachoulakis & Kapetanakis, 2012; Yen et al., 2017), the attitude towards VTO as a mediator in the relationship between perceived usefulness and behavioral intention has not been examined. Though perceived usefulness may directly impact consumers' behavioral intention and purchase decisions, it is also more likely that perceived usefulness may have an indirect effect on behavioral intention through the attitude toward VTO. Following the TRA, we argue that consumers' attitude toward VTO plays a more significant role in consumers' behavioral intentions to make purchases. As consumer decision-making entails a five-step process (problem recognition, information search, evaluation of various alternatives, purchase decision, post-purchase behavior), consumer attitude towards VTO helps determine whether to continue to engage in online shopping apparel or discontinue. Most importantly, the behavioral intention toward online shopping is influenced by the consumers' attitude toward online retailing websites (Kim & Forsythe, 2009). A recent study conducted on virtual dressing room applications found that Kinect for Windows can generate a perfect fit of clothing to suit customers' requirements (Musry & Al-Jabi, 2019). With the technological revolution, e-retailers install the websites the features so that the consumers can create 3D (three-dimensional) virtual models corresponding to their physical features (Cho & Schwarz, 2012; Hwangbo et al., 2020; Merle et al., 2012). While the early VTO was based on avatar-or-photo-based, recent development included augmented-reality based, which enriches the consumers' experience of reality and significantly impacts consumer purchase-making decisions (Beck & Crié, 2018; Hilken et al., 2018). Since consumers who are habituated to apparel online shopping tend to utilize these emerging trends of VTO to find a good fit for what they need, it is more likely that perceived usefulness affects behavioral intention through their attitude towards VTO. Based on the above arguments, we offer the following hypothesis:

> **H4.** Attitude towards VTO mediates the relationship between perceived usefulness and behavioral intention.

2.1.5 | Perceived risk as a first moderator

In traditional shopping, consumers had the privilege of having experience visiting the stores and physically examining the product in dressing rooms before making purchase decisions (In Shim & Lee, 2011). In online shopping, consumers are bereft of the benefit of personal experience and hedonic pleasure derived from the physical examination of tastes, sounds, scents, tactile impressions, and so forth (Huang & Shiau, 2017). Most customers prefer to purchase by touching the merchandise, and this interactive behavior is the hallmark of traditional shopping in-store (Yaoyuneyong et al., 2014). Perceived risk, in this study, is concerned with the chance of getting a low-quality product delivered than exhibited in an online store. In addition, when consumers believe that e-retailers may misuse their personal information, they are more likely to shy away from online apparel purchases (Choi & Lee, 2003; Law & Ng, 2016; Merle et al., 2012). Some researchers documented that buying apparel through VTO has inherent perceived risk; the greater the perceived risk, the lesser the

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behavioral intention will be (Kim, 2016; In Shim & Lee, 2011). The risk-takers tend to ignore these risks and engage in online apparel shopping. However, when customers are less confident that their apparel will not meet their expectations, they are less likely to make purchase decisions. Anecdotal evidence reveals that e-retailers exhibit a product different from the product that arrives at the doorstep of the customers (Baytar et al., 2016; Merle et al., 2012). In Shim and Lee (2011) found that three-dimensional virtual models may reduce the perception of risk. Using two-dimensional models may increase risk perception, and consumers may avoid making purchase decisions. Therefore, the perception of risk reduces the strength of the positive relationship between the perceived usefulness of the product and attitude towards VTO. Less perceived risk results in a more significant positive association between perceived usefulness and attitude towards VTO and vice versa (Huang & Qin, 2011). Based on the above, we hypothesize:

H5. Perceived risk negatively moderates the relationship between perceived usefulness and attitude towards VTO.

2.1.6 | Perceived enjoyment as a second moderator

Perceived enjoyment is related to the satisfaction customers derive from shopping online. Extant research reported a positive association between perceived enjoyment and consumers' attitude toward online shopping (Pantano et al., 2017; Wong & Haque, 2022; Yu & Park, 2014). The current stream of research heavily documented that consumers' attitude toward VTO has some hedonic value (Javornik, 2016), which significantly influences purchase decisions. Earlier researchers have found that perceived enjoyment affects the technology adoption for specific word programming or graphics the consumers are interested in, thus reflecting the microcomputer usage in apparel purchase decisions (Kim, 2011). Web-interactivity dimensions, viz., customization, socialization, and demonstrability, significantly impact consumers' online shopping consumers perceived enjoyment. While earlier researchers have studied these aspects, perceived enjoyment in mitigating the adverse effects of perceived risk has been largely ignored.

This research highlights the importance of perceived enjoyment in reducing the ill effects of perceived risk and enhancing the positive association between consumers' perceived usefulness and attitude towards VTO. The logos for the assumption is that consumers are fully conscious of the potential risks involved in the online shopping of apparel (such as perceived privacy and perceived product risks). However, perceived enjoyment experienced by consumers cannot be ignored as some researchers have found that adventurous shopping behavior results in entertainment from the online buying experience and positively affects the attitude towards VTO. In the wake of interactive social media, adopting the VTO of the required items is not difficult. As e-retailers strategize to use VTO tools based on augmented reality to attract customers, perceived enjoyment would be more pronounced. Though augmented reality-based VTO tools were initially applied to jewellery and facial makeup, they were eventually used for clothing (Hilken et al., 2018; Rese et al., 2017; Yim et al., 2017).

Perceived risk and enjoyment have been studied independently in the context of online apparel shopping. However, to our knowledge, the role of perceived risk and perceived enjoyment and their interactive effect has not been studied in extant literature. Therefore, it would be interesting to investigate the perceived usefulness as a second moderator in reducing the negative impact of perceived risk (first moderator) in the consumer's behavior intention. Furthermore, it is proposed that higher levels of perceived enjoyment would lessen the adverse effects of perceived risk on the relationship between perceived usefulness and attitude toward VTO. Based on these arguments, we offer the exploratory moderated moderated-mediation hypothesis:

H6. Perceived enjoyment positively moderates the negative moderation effect of perceived risk on behavioral intention from perceived usefulness via attitude towards VTO as a mediator.

3 | RESEARCH METHODOLOGY

This study focuses on the behavioral intentions of the millennials, who are born between 1980 and 2000, thus people in the age group of 20–31 years (Wang & Herrando, 2019). We focused on millennials because of three reasons: (i) millennials are technology-dependent as the technological revolutions took place during their growing up years (Leon, 2018); (ii) millennials spend a majority of the time every day glued to the technology-based instruments such as computers, mobile phones, i-Pads, i-Phones, i-Pods, etc. and constantly engage in online activities, whether for pleasure or the necessity (Purani et al., 2019); and (iii) millennials are 23% of the world population (1.8 billion people worldwide in 2020) (United Nations, 2019).

3.1 | Sample

A survey instrument was distributed using a stratified sampling method among the millennials (who were born between 1990 and 2000). The strata were formed based on members' shared attributes or characteristics. We prepared a carefully crafted survey instrument and employed three graduate students to collect data. A traditional paper-and-pencil technique was used and the respondents were asked to fill out the information. In all, we sent survey instrument to 350 respondents from three cities in the Southern part of India. A qualifier statement was mentioned in the survey that only those who engage in online shopping apparel or regularly visit online shopping sites. We received 292 surveys back and found four surveys were incomplete and therefore, we used 288 surveys in the analysis. Out of 288, 220 (76.4%) were between 18 and 25 years of age, and 67 (23.3%) were in the age group of 25–31 years. Of the respondents, 162 (52.3%) were males, and 126 (43.8%) were females.

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3.2 | Measures

The constructs were measured using indicators on Likert five-point scale ("5" = strongly agree; "1" = strongly disagree). *Perceived usefulness* measured using five items adapted from Adams et al. (1992), and the sample item reads as: "I would use VTO for buying clothes." The reliability coefficient Cronbach's alpha of perceived usefulness was 0.88. *Perceived enjoyment* was measured using five items adapted from Kim (2011), and the sample items read as: "Shopping with VTO would be fun for its own sake." The reliability coefficient of perceived enjoyment was 0.83. *Perceived risk* was measured using four items adapted from Zhang et al. (2019), and the sample item reads as: "Shopping online using VTO is unsafe." The reliability coefficient of perceived risk was 0.85.

Attitude towards VTO was measured using four items adapted from Kim and Forsythe (2009), and the sample item reads as: "VTO Would be of good experience." The reliability coefficient for attitude towards VTO was 0.87. *Behavioral intention* was measured using four items adapted from Davis (1989). The sample item reads as: "I would be willing to buy online using VTO technology." The reliability coefficient of behavioral intention was 0.82.

4 | ANALYSIS AND RESULTS

4.1 | Reliability and validity

Table 2 provides means, standard deviations, correlations, reliability and validity. As shown in Table 2, the reliability coefficient Cronbach's alpha for all the variables was greater than 0.70 and less than 0.95, thus vouch for a strong face validity and construct validity as suggested by researchers (Hair et al., 2019). Construct validity indicates that the indicators indeed tap into those underlying constructs.

To assess the convergent validity, Average Variance Extracted (AVE) and Composite Reliability (CR) estimate for each construct were calculated. CR values for all the constructs were greater than 0.80 (ranged from 85 to 89), and AVE values are over 0.50, which are more than the cut-off values as suggested by researchers (Fornell & Larcker, 1981; Hair et al., 2019). We also tested for discriminant validity by comparing the variance extracted estimates of the measures with the squares of the correlations between the constructs as suggested by Fornell and Larcker (1981) and Netemeyer et al. (1990). The AVE estimates for all the variables in this study exceeded the suggested level of 0.50, thus establishing discriminant validity (Fornell & Larcker, 1981, p. 46). The variance extracted estimates for perceived usefulness and perceived enjoyment were 0.0.62 and 0.60 respectively, and both exceeded the squared correlation between these perceived usefulness and perceived enjoyment ($\Phi_{21} = 0.71$, $\Phi^2_{21} = 0.50$; $p < .05$). Further, the squared correlation between perceived risk and behavioral intention was 0.115, which is lower than the variance extracted estimates of 0.63 and 0.59 respectively ($\Phi_{21} = -0.34$, $\Phi^2_{21} = 0.115$; $p < .05$). Moreover, the correlation between perceived enjoyment and attitude towards VTO was 0.72, which is less than the square root of average variance extracted estimates of 0.79 and 0.82 for perceived enjoyment and attitude towards VTO respectively. As shown in Table 1, the correlations between variables were lower than the square root of the average variance extracted estimates, thus establishing discriminant validity among the constructs.

As an additional measure, we also assessed discriminant validity through Heterotrait Monotrait (HTMT) values (Hair et al., 2019). As shown in Table 2, the correlation values of HTMT construct were

TABLE 1 Descriptive statistics: Means, standard deviations, zero-order correlations, reliability and validity.

Variable	Mean	SD	1	2	3	4	5	CA	CR	AVE
1. PU	3.33	0.91	**0.78**					0.88	0.89	0.62
2. PENJ	3.75	0.80	0.71***	**0.77**				0.83	0.88	0.60
3. PRISK	3.25	0.98	−0.37***	−0.48***	**0.79**			0.85	0.87	0.63
4. ATVTO	3.94	0.85	0.62***	0.72***	0.27***	**0.82**		0.87	0.89	0.68
5. BI	3.94	0.89	0.62***	0.70***	−0.34***	0.70***	**0.76**	0.88	0.85	0.59

Note: Values in the diagonals (mentioned in the bold) are the square root of AVE (i.e., Average Variance Extracted).
Abbreviations: ATVTO, attitude towards VTO; BI, behavioral intention; CA, Cronbach's alpha; CR, composite reliability; PENJ, perceived enjoyment; PRISK, perceived risk; PU, perceived usefulness; SD, standard deviation.
***$p < .001$.

TABLE 2 Discriminant validity using HTMT (Hetero Trait Mono Trait).

Variable	PU	PENJ	PRISK	ATVTO	BEHI
Perceived usefulness (PU)	-				
Perceived enjoyment (PENJ)	0.8	-			
Perceived risk (PRISK)	0.43	0.49	-		
Attitude towards VTO (ATVTO)	0.68	0.84	0.3	-	
Behavioral intention (BI)	0.69	0.86	0.37	0.88	-

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lower than the threshold values of 0.90, providing strong support for the discriminant validity.

4.2 | Multicollinearity and non-response bias

Since multicollinearity is very common in survey-based research, it is customary to check for multicollinearity by analysing the correlations between the variables. According to Kennedy (1992), if the correlations between the variables are over 0.80, that signifies the presence of multicollinearity. As shown in Table 1, the correlations ranged between 0.27 and 0.72 and hence multicollinearity is not a problem with the data (Tsui et al., 1997). In addition, we also checked for Variance Inflation Factor (VIF), which is another way to examine the presence of multicollinearity, and the VIF for each of the independent variables was less than the threshold value of 5.0 (Hair et al., 2019).

We also performed non-response bias by comparing the data from first seventy-five respondents and the last seventy-five respondents and found no significant difference between these groups as revealed by "*t*" test (Chen & Paulraj, 2004; Lambert & Harrington, 1989). Thus, the present study did not find any non-response bias.

4.3 | Common method bias

Survey-research has another potential problem, that is, common method bias. When survey data is collected from the same source for independent and dependent variables, spurious variance may exist because of measurement error, common method bias exists. Reducing this bias may help in ensuring that instrument captures the actual predispositions. Though it is not possible to eliminate the existence of common method bias, researchers recommend conducting Harman's single-factor analysis to see the extent of common method bias present in the data. We followed the recommendations of Podsakoff et al. (2003) and conducted Harman's Single factor test, which revealed that the single factor accounts for less than 50% indicating that common method bias is not a problem in the data. When all the indicators were loaded into a single factor, the goodness of statistics revealed the following fit: ($\chi^2 = 3305.55$; df = 209; RMSEA = 0.078; RMR = 0.094; Standardized RMR = 1.12; CFI = 0.71; TLI = 0.68; GFI = 0.63). When compared to five-factor measurement model, the one-factor model showed a poor fit ($\Delta\chi^2 = 1314.44$; Δdf = 10, $p < .01$). These results provide strong support that common method bias is not a problem with the data.

4.4 | Measurement model

Before testing the hypotheses, we followed the procedures outlined by two-step process of Anderson and Gerbing (1988) and did check the measurement model first. We performed Confirmatory Factor Analysis (CFA) and the results are presented in Table 3.

As shown in the Table 3 the factor loadings of all the constructs ranged between 0.72 and 0.86 and indicate good reliability of indicators. The composite reliability of over 0.80 and less than the threshold levels of 0.90 indicates good reliability of the indicators in the survey instrument. We also compared measurement models and presented the results in Table 4.

As presented in Table 4, the baseline five-factor model fitted the data well ($\chi^2 = 1991.11$; df = 199; RMSEA = 0.076; RMR = 0.049; Standardized RMR = 0.052; CFI = 0.89; TLI = 0.87; GFI = 0.86). The results reveal that the comparative fit index (CFI) for the five-factor model was 0.89, and the root-mean-squared error of approximation (RMSEA) was 0.076. The researchers suggest that RMSEA of less than 0.08 provides a good fit of the model to the data (Browne & Cudeck, 1993). These goodness of statistics for the five-factor model render evidence of construct distinctiveness for perceived usefulness, perceived enjoyment, perceived risk, attitude towards VTO, and behavioral intention. These statistics, together with the CFA results, offer support for discriminant validity between these five variables.

4.5 | Hypotheses testing

4.5.1 | Testing the direct and mediation hypotheses

To check the direct hypotheses (i.e., H1, H2, and H3) and the mediation hypothesis (i.e., H4), we used Hayes (2018) PROCESS MACROS (Model 4) and presented the results in Table 5.

Step 1 from Table 5 show the effect of control variables viz., age ($\beta = -0.23$, $t = -2.25$; $p < .05$) on behavioral intention was significant, and gender ($\beta = 0.05$, $t = 0.56$; $p = .57$) was not significant. The regression coefficient of perceived usefulness on behavioral intention was positive and significant ($\beta = 0.64$, $t = 13.21$; $p < .001$). 95% bias-corrected confidence interval (BCCI) was 0.5478 (LLCI) and 0.7395 (ULCI). The model was significant and explains 39.8% variance in the behavioral intention because of perceived use ($R^2 = 0.398$; $F(3,283) = 62.45$; $p < .001$), thus supporting Hypothesis 1 that perceived usefulness is positively and significantly related to behavioral intention.

The relationship between perceived usefulness and attitude towards VTO was shown in Step 2 (Table 5). The regression coefficient of perceived usefulness was positive and significant ($\beta = 0.54$; $t = 12.38$; $p < .001$). The model was significant and explains 38.4% variance in the dependent variable (i.e., attitude towards VTO) because of perceived usefulness ($R^2 = 0.384$; $F[3,283] = 59.04$; $p < .001$). These results support Hypothesis 2 that perceived usefulness is positively influencing attitude towards VTO.

Hypothesis 3 states that attitude towards VTO is positively related to behavioral intention. As shown in Step 3 (Table 5), the regression coefficient of attitude towards VTO on performance was significant and positive ($\beta = 0.95$; $t = 26.68$; $p < .001$). The model is significant and explains 82.9% of variance in performance because of organizational innovation ($R^2 = 0.829$; $F[4,282] = 342.44$; $p < .001$). These results support Hypothesis H3.

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TABLE 3 Results of confirmatory factor analysis and measurement properties.

Variable	Alpha	Standardized loadings (λ_{yi})	Reliability (λ^2_{yi})	Variance (Var(ε_i))	Average variance-extracted $\Sigma(\lambda^2_{yi})/[(\lambda^2_{yi}) + (\text{Var}(\varepsilon_i))]$
Perceived usefulness	0.88				0.62
I would use VTO technology		0.74	0.55	0.45	
I would use VTO for buying clothes		0.88	0.77	0.23	
I would use VTO for buying footwear		0.80	0.63	0.37	
I would use VTO for buying cosmetics		0.74	0.55	0.45	
I would use VTO for buying lens wear		0.78	0.61	0.39	
Perceived enjoyment	0.83				0.60
Shopping with VTO would be fun for its own sake		0.78	0.61	0.39	
Shopping with VTO would make me feel good		0.72	0.52	0.48	
Shopping with VTO would be interesting		0.71	0.50	0.50	
Shopping with VTO would involve me in the shopping process		0.86	0.73	0.27	
Perceived risk	0.85				0.63
Shopping online using VTO is unsafe		0.83	0.69	0.31	
Purchasing online with VTO could involve significant money losses		0.87	0.76	0.24	
Experienced challenges in the purchased material		0.71	0.50	0.50	
Variation in the size or color of the products purchased		0.76	0.58	0.42	
Attitude towards VTO	0.87				0.68
VTO would be of good experience		0.85	0.72	0.28	
VTO would be of superior feel		0.85	0.72	0.28	
VTO would be of pleasant shopping environment		0.78	0.61	0.39	
VTO would be interesting and worthwhile		0.82	0.67	0.33	
Behavioral intention	0.82				0.59
I would be willing to buy online using VTO technology		0.79	0.62	0.38	
I would be willing to recommend VTO technology to my friends		0.81	0.66	0.34	
I would use VTO technology very often		0.74	0.55	0.45	
In the future also, I would use this VTO technology		0.74	0.55	0.45	

Hypothesis 4 proposes that attitude towards VTO mediates the relationship between perceived usefulness and behavioral intention. The effect of perceived usefulness on behavioral intention, after including the mediating variable (attitude towards VTO), was positive and significant. As shown in Table 5, total effect (0.644) (LLCI = 0.5478; ULCI = 0.7395) was consisting of direct effect of perceived usefulness on behavioral intention (0.1334) (LLCI = 0.0699; ULCI = 0.1969) and indirect effect through attitude towards VTO (0.5103), and the 95% BCCI was 0.3878 (LLCI) and 0.6223 (ULCI). The indirect effect was calculated as the multiplication of regression coefficient of perceived usefulness on attitude towards VTO (0.5385) with regression coefficient of attitude towards VTO on behavioral intention (0.9476) (i.e., $0.5385 \times 0.9476 = 0.5103$). Therefore, the total effect of perceived usefulness on behavioral intention was $(0.1334 + 0.5103 = 0.6437)$ rounded off to 0.644. If the indirect effect is significant, then mediation hypothesis is supported. The indirect effect of perceived usefulness → attitude towards VTO → behavioral intention was significant ($\beta = 0.5103$; Boot se = 0.0597). The bootstrapping results based on 20,000 bootstrap samples in Hayes (2018) PROCESS macros show that 95% Confidence Intervals (CI) are between 0.3878 and 0.6223. Because zero was not contained in CIs, Hypothesis 4 that attitude towards VTO mediates the relationship between perceived usefulness and behavioral intention was supported.

4.5.2 | Testing the first order moderation, and moderated moderated-mediation hypotheses

The most important part of the conceptual model is testing the first-order moderation, and second-order moderation, that is, moderated moderated-mediation. The results from Hayes (2018) PROCESS macros (Model Number 11) are presented in Table 6.

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TABLE 4 Comparison of measurement models.

Model	Factors	χ^2	df	$\Delta\chi^2$	RMSEA	RMR	Standardized RMR	CFI	TLI = NNFI	GFI
Null		7747.29	231							
Baseline model	Baseline five factor model	1991.11	199		0.076	0.049	0.052	0.89	0.87	0.86
Model 1	Four factor model: PU + PENJ; PRISK, ATVTO, BEHI	2353.78	203	361.89**	0.082	0.053	0.058	0.87	0.85	0.82
Model 2	Three factor model: PU + PENJ + PRISK, ATVTO, BEHI	3078.27	206	1087.16**	0.086	0.062	0.065	0.84	0.82	0.79
Model 3	Two factor model: PU + PENJ + PRISK + ATVTO, BEHI	3208.38	208	1217.27**	0.92	0.074	0.079	0.79	0.76	0.75
Model 4	One factor model: PU + PENJ + PRISK + ATVTO + BEHI	3305.55	209	1314.44**	0.078	0.094	1.12	0.71	0.68	0.63

Abbreviations: ATVTO, attitude towards virtual try on; BEHI, behavioral intention; PENJ, perceived enjoyment; PRISK, perceived risk; PU, perceived usefulness.
**$p < .01$.

TABLE 5 Testing H1, H2, H3 and the mediation hypothesis (H4).

	DV = behavioral intention				DV = attitude towards VTO H2				DV = behavioral intention			
	Step 1				Step 2				Step 3			
	Coeff	SE	*t*	*p*	Coeff	SE	*t*	*p*	Coeff	SE	*t*	*p*
Age	−0.2324	0.1030	−2.2570	.0248	−0.0736	0.0996	−0.7387	.4607	−0.1680	0.0550	−3.0552	.0025
Gender	0.0508	0.0902	0.5633	.5737	−0.2410	0.0873	−0.2762	.7826	0.0719	0.0481	1.4936	.1364
Perceived usefulness H1	**0.6437**	**0.0487**	**13.2187**	**.0000**	**0.5385**	**0.0471**	**12.3817**	**.0000**	**0.1334**	**0.0323**	**4.1352**	**.0000**
Attitude towards VTO H3									**0.9476**	**0.0328**	**26.6800**	**.0000**
R-square	0.398				0.384				0.829			
F	62.45				59.04				342.44			
df1	3				3				4			
df2	283				283				282			
p	.0000				.0000				.0000			

Total effect

Total effect	SE	*t*	*p*	LLCI	ULCI
0.6437	**0.0487**	**13.2187**	**.0000**	**0.5478**	**0.7395**

Direct effect

	Direct effect	SE	*t*	*p*	LLCI	ULCI
Perceived usefulness → behavioral intention	**0.1334**	**0.0323**	**4.1352**	**.0000**	**0.0699**	**0.1969**

Bootstrapping indirect effect: H4

	Indirect effect	BOOT se	BOOT LLCI	BOOT ULCI
Perceived usefulness → attitude towards VTO → behavioral intention	**0.5103 (0.5385 × 0.9476 = 0.5103)**	**0.0597**	**0.3878**	**0.6223**

Note: $N = 288$. Boot LLCI refers to the lower bound bootstrapping confidence intervals. Boot ULCL refers to the upper bound bootstrapping confidence intervals. Number of bootstrapping samples for this bias corrected bootstrapping confidence intervals are 20,000. The level of confidence for all confidence intervals in output was 0.95. We have four decimal digits for bootstrap results because some values may be very close to zero. The bold values signify that hypotheses were supported.

In Step 1 (Table 6), the regression coefficients of control variables (age and gender) and main variables (including moderator variables viz., perceived risk and perceived enjoyment) were presented. As expected (but not hypothesized) the regression coefficient of perceived risk on the attitude towards VTO was negative and significant ($\beta = -0.128$; $t = -3.68$; $p < .001$), and the regression coefficient of

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TABLE 6 Testing of Hypothesis 5 and 6 (three-way interaction) (results of moderated moderated-mediation model).

	DV = attitude towards VTO											
	Step 1				Step 2				Step 3			
	Coeff	SE	*t*	*p*	Coeff	SE	*t*	*p*	Coeff	SE	*t*	*p*
Age	0.0890	0.0703	1.2666	.2063	0.1399	0.0682	2.0530	.0410	0.1047	0.0667	1.5710	.1173
Gender	0.0170	0.0654	0.2598	.7952	−0.1488	0.0704	−2.1124	.0355	−0.0909	0.0697	−1.3039	.1934
Perceived usefulness	0.0582	0.0474	1.2265	.2210	0.2473	0.2104	1.1756	.2408	2.7364	0.6200	4.4139	.0000
Perceived risk	−0.1278	0.0347	−3.6801	.0003	0.5402	0.2151	2.5116	.0126	2.7334	0.5564	4.9125	.0000
Perceived enjoyment	**0.9057**	**0.0519**	**17.4578**	**.0000**	**1.2358**	**0.2337**	**5.2885**	**.0000**	2.2839	0.3350	6.8184	.0000
Perceived usefulness × perceived risk H5					**−0.1427**	**0.0462**	**−3.0859**	**.0022**	−0.9578	0.2315	−4.1379	.0000
Perceived usefulness × perceived enjoyment					−0.0250	0.0624	−0.4003	.6893	−0.5447	0.1364	−3.9933	.0001
Perceived risk × perceived enjoyment					−0.0147	0.0682	−0.2149	.8300	−0.6133	0.1194	−5.1353	.0000
Perceived usefulness × perceived risk × perceived enjoyment H6									**0.2036**	**0.0479**	**4.2523**	**.0000**
R-square	0.706				0.736				0.752			
F	134.86***				96.73***				93.27***			
R-square change					0.030				0.016			
df1	5				8				9			
df2	281				278				277			
F-Change					10.46***				18.08***			

Index of moderated moderated-mediation

Index	BOOT SE	BOOT LLCI	BOOT ULCI
0.1781	**0.0647**	**0.0624**	**0.3156**

Indices of conditional moderated mediation by perceived risk

Perceived enjoyment	Index	BOOT SE	BOOT LLCI	BOOT ULCI
3.0000 (low)	−0.3033	0.1467	−0.6295	−0.0507
3.6667 (medium)	−0.1846	0.1152	−0.4406	0.0153
4.6667 (high)	−0.0065	0.0887	−0.1830	0.1685

Conditional effects of the focal predictor (perceived usefulness) at values of moderators (perceived risk × perceived enjoyment)

Perceived risk	Perceived enjoyment	Effect	SE	*t*	*p*	LLCI	ULCI
Low	Low	0.4087	0.1083	3.7723	.0002	0.1954	0.6219
Low	Medium	0.3171	0.1132	2.8008	.0055	0.0942	0.5399
Low	High	0.1796	0.1473	1.2192	.2238	−0.1104	0.4697
Medium	Low	−0.1116	0.0830	−1.3441	.1800	−0.2750	0.0518

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TABLE 6 (Continued)

Conditional effects of the focal predictor (perceived usefulness) at values of moderators (perceived risk × perceived enjoyment)							
Perceived risk	**Perceived enjoyment**	**Effect**	**SE**	***t***	***p***	**LLCI**	**ULCI**
Medium	Medium	0.0005	0.0512	0.0090	.9929	−0.1004	0.4697
Medium	High	0.1685	0.0760	2.2184	.0273	0.0190	0.3180
High	Low	−0.4584	0.1728	−2.6523	.0085	−0.7986	−0.1182
High	Medium	−0.2106	0.1101	−1.9131	.0568	−0.4273	0.0061
High	High	0.1611	0.0781	2.0614	.0402	0.0073	0.3149
Moderator value(s) defining Johnson-Neyman significance region(s)							
	Value			**% below**			**% above**
	3.9996			59.9303			40.0697

Note: The bold values signify that hypotheses were supported.
***$p < .001$.

perceived enjoyment towards VTO was positive and significant and positive ($\beta = 0.906$; $t = 17.45$; $p < .001$). To check the moderation effects, interaction terms were introduced in the second step (Table 6). The first moderation hypothesis (H5) states that perceived risk moderates negatively on the relationship between perceived usefulness and attitude towards VTO. The regression coefficient of the multiplicative term (i.e., perceived usefulness and attitude towards VTO) was negative and significant ($\beta = -0.143$; $t = -3.085$; $p < .01$). The model was significant and explained 73.6% variance in the dependent variable (i.e., attitude towards VTO) because of direct and interaction effects ($R^2 = 0.736$; $F = 96.73$ (8278), $p < .001$; $\Delta R^2 = 0.030$; $\Delta F = 10.46$; $p < .001$). These results support Hypothesis H5. The interaction plot of the interactive effect of perceived usefulness and perceived risk on attitude towards VTO was presented in Figure 2.

As shown in Figure 2, lower levels of perceived usefulness are associated with lower attitude towards VTO. As perceived risk becomes higher, the relationship between perceived usefulness and attitude towards VTO was negative. When perceived usefulness increases from low to high, at higher levels of perceived risk attitude towards VTO reduces significantly. On the other hand, when perceived usefulness increases from "low" to "high" attitude towards VTO increases steeply at lower levels of perceived risk. These results corroborate Hypothesis 5 that perceived risk negatively moderates the relationship between perceived usefulness and attitude towards VTO.

Hypothesis 6 posits that perceived risk (first moderator) and perceived enjoyment (second moderator) interact with perceived usefulness to affect attitude towards VTO. The results of the three-way interaction were shown in Step 3 of Table 6. The regression coefficient of three-way interaction term (perceived usefulness × perceived risk × perceived enjoyment) was significant ($\beta = 0.203$; $t = 4.25$; $p < .001$). The regression results (Hayes, 2018 PROCESS – Model 11) reveal that the three-way interaction between perceived usefulness, perceived risk, and perceived enjoyment is supported through attitude towards VTO as mediator. This is called testing the "moderated moderated-mediation." As can be seen in Table 6, the index of moderated moderated-mediation show that index (0.1781) and BOOT SE (0.0647) and BOOT LL (0.0624) and BOOT UL (0.3156) shows significant values. Since zero is not contained in the Lower and Upper limits the moderated moderated-mediation Hypothesis 6 supported.

At the bottom of Table 6, the conditional effects of the focal predictor (perceived usefulness) at values of moderators (perceived risk × perceived enjoyment) were presented. The conditional moderated mediation results show that the linear relationship between perceived usefulness and perceived risk at different values of perceived enjoyment. A close look at the indies of conditional moderated mediation reveal that the indirect effect of perceived usefulness is negatively related (−0.3033) low, (−0.1846) medium, and (−0.0065) high values of perceived enjoyment. The BOOT LLCI and ULCI (−0.6295; −0.0507) at "low" values were significant whereas the BOOT LLCI and ULCI (−0.4406; 0.0153) at "medium," and BOOT LLCI and ULCI (−0.1830; 0.1685) at "high" values of perceived enjoyment were not significant. These results imply that perceived enjoyment moderates

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the indirect effect of perceived usefulness on attitude towards VTO was significant only at lower values but not a medium and higher values of perceived enjoyment. However, the conditional effects of focal predictor (perceived usefulness) at values of moderators (perceived risk × perceived enjoyment), as shown in the bottom of Table 7, show that the direct effects were significant at low and high levels of both variables (viz., perceived risk and perceived enjoyment). Further, moderator value(s) defining Johnson-Neyman significance region(s) show that for PROCESS values from 1.000 to 3.9996, the effect was significant. These can be seen in the conditional $X \times W$ interaction (perceived usefulness × perceived risk) at values of the Moderator Z (perceived enjoyment) as shown in Table 7.

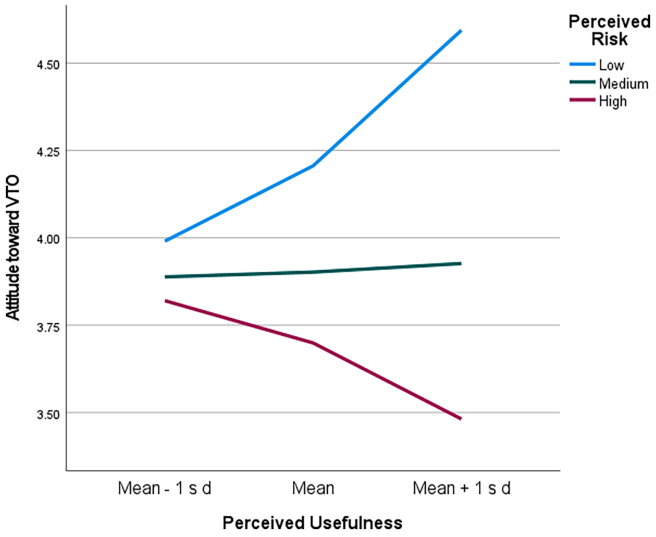


FIGURE 2 Perceived risk as a moderator between PU and attitude towards VTO (two-way interaction graph).

The three-way interaction was shown in Figure 3. As can be seen in Figure 3 (i.e., lower panel), at low levels of perceived risk, low level of perceived enjoyment is associated with lower levels of attitude towards VTO, when perceived usefulness is low. However, as we move to the middle panel in Figure 3, as perceived enjoyment increases from low to medium, perceived usefulness results increase in the attitude towards VTO. Finally in the upper panel (Figure 3), we can see significant increase in attitude towards VTO at all levels of perceived risk and perceived enjoyment. However, at the higher level of perceived enjoyment, lower levels of perceived risk are associated with increase in the attitude towards VTO when perceived usefulness increases from "low" to "high." These results provide support for the three-way interaction Hypothesis 6.

4.5.3 | Results of hypotheses testing

In this research, all six hypotheses were supported, and the results of hypotheses testing were presented in Table 8.

TABLE 7 Conditional $X \times W$ interaction (perceived usefulness × perceived risk) at values of the moderator Z (perceived enjoyment).

Perceived enjoyment	Effect	SE	*t*	*p*	LLCI	ULCI
1.0000	−0.7541	0.1861	−4.0528	.0001	−1.1204	−0.3878
1.2000	−0.7134	0.1772	−4.0269	.0001	−1.0621	−0.3646
1.4000	−0.6727	0.1683	−3.9966	.0001	−1.0040	−0.3413
1.6000	−0.6319	0.1595	−3.9608	.0001	0.9460	−0.3179
1.8000	−0.5912	0.1509	−3.9183	.0001	−0.8882	−0.2942
2.0000	−0.5505	0.1423	−3.8673	.0001	−0.8307	−0.2703
2.2000	−0.5097	0.1339	−3.8059	.0002	−0.7734	−0.2461
2.4000	−0.4690	0.1257	−3.7313	.0002	−0.7165	−0.2216
2.6000	−0.4283	0.1177	−3.6400	.0003	−0.6599	−0.1967
2.8000	−0.3876	0.1099	−3.5272	.0005	−0.6039	−0.1713
3.0000	−0.3468	0.1024	−3.3872	.0008	−0.5484	−0.1453
3.2000	−0.3601	0.0953	−3.2124	.0015	−0.4937	−0.1185
3.4000	−0.2654	0.0887	−2.9935	.0030	−0.4399	−0.0909
3.6000	−0.2246	0.0826	−2.7200	.0069	−0.3872	−0.0621
3.8000	−0.1839	0.0772	−2.3809	.0179	−0.3360	−0.0319
3.9996	**−0.1433**	**0.0728**	**−1.9686**	**.0500**	**−0.2866**	**0.0000**
4.0000	−0.1432	0.0728	−1.9676	.0501	−0.2864	0.0001
4.2000	−0.1025	0.0693	−1.4775	.1407	−0.2390	0.0341
4.4000	−0.0617	0.0671	−0.9197	.3585	−0.1939	0.0704
4.6000	−0.0210	0.0662	−0.3172	.7513	−0.1514	0.1093
4.8000	0.0197	0.0667	0.2958	.7676	−0.1116	0.1510
5.0000	0.0605	0.0685	0.8823	.3784	−0.0744	0.1953

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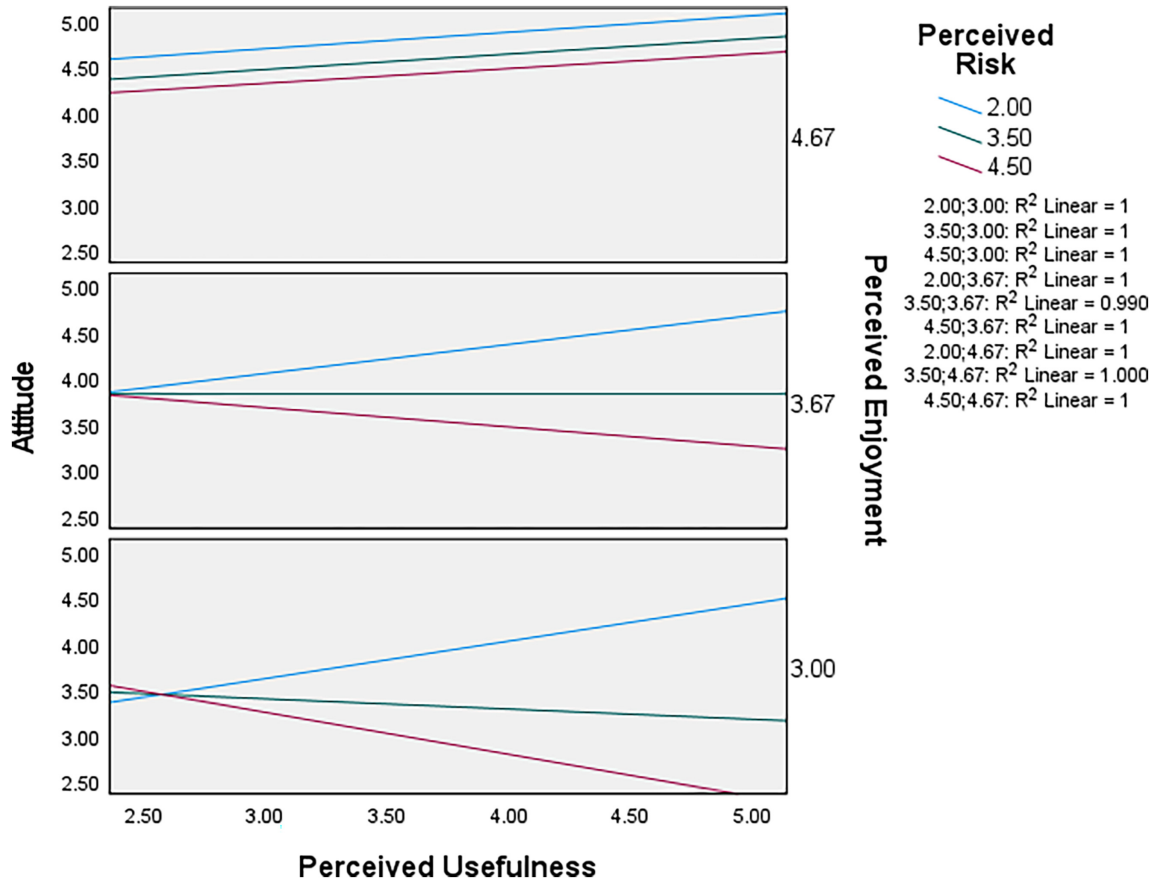


FIGURE 3 Moderation effect of perceived enjoyment at high, medium, and low values (three-way interaction graph).

TABLE 8 Results of hypotheses testing.

Number	Hypothesis	Result
1	H1: Perceived usefulness is positively related to behavioral intention	Supported
2	H2: Perceived usefulness is positively related to attitude towards VTO	Supported
3	H3: Attitude towards VTO is positively related to behavioral intention	Supported
4	H4: Attitude towards VTO mediates the relationship between perceived usefulness and behavioral intention	Supported
5	H5: Perceived risk negatively moderates the relationship between perceived usefulness and attitude towards VTO	Supported
6	H6: Perceived enjoyment positively moderates the negative moderation effect of perceived risk on behavioral intention from perceived usefulness via attitude towards VTO as a mediator	Supported

4.5.4 | Post hoc analysis

Since the perceived usefulness and perceived ease of use were two variables influencing the individual's adoption to technology as

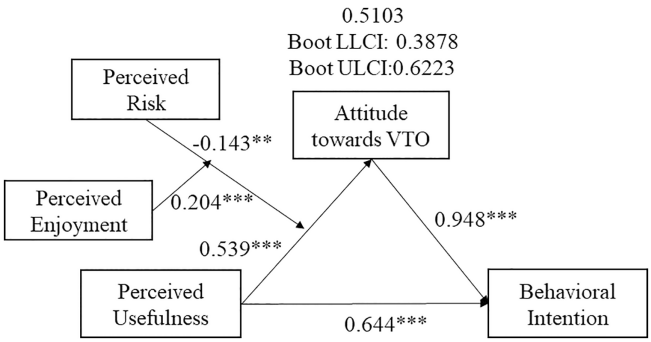


FIGURE 4 Empirical model.

postulated by UTAUT, we verified the impact of perceived ease of use on perceived usefulness. We found that the regression coefficient of perceived ease of use on perceived usefulness was positive and significant ($\beta = 0.594$; $t = 12.673$; $p < .001$). We did not include perceived ease of use in the model and hence did not hypothesize the relationship between perceived ease of use and perceived usefulness. As attitude towards VTO mediates the relationship between perceived usefulness and behavioral intention, the post hoc analysis revealed that attitude towards VTO mediates the relationship between perceived ease of use and behavioral intention. Because of

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space constraint, we did not include this in the analysis. The empirical model was presented in Figure 4.

5 | DISCUSSION

This study examined the multi-layer moderated moderated-mediation model involving constructs from UTAUT to explain one of the frequently used disruptive technologies, that is, VTO, in influencing the millennials' online apparel purchase behavior. Hayes (2018) PROCESS was used to analyse 288 respondents, and the hypotheses developed based on the conceptual model were tested, and all the hypothesized relationships found support. In addition, the confirmatory factor analysis revealed that the five-factor model fit the data well.

The results revealed that perceived usefulness is positively related to the behavioral intention of consumers to adopt technology and engage in online shopping (Hypothesis 1). This is consistent with the findings from previous studies (Youn & Lee, 2019; Zhang et al., 2019). The results corroborate the relationship between the constructs, perceived usefulness, and behavioral intention proposed in UTAUT (Venkatesh et al., 2003). The findings also demonstrated the direct relationship between the perceived usefulness of websites to attitude towards VTO (Hypothesis 2). These results also align with previous studies' findings (Tandon et al., 2021). When the website features "enable the creation and manipulation of product or environment images to stimulate experience with the product or environment" (Fiore et al., 2005, p. 39), customers are more likely to show their attitude towards VTO. Our results echo the findings from the previous studies on VTO literature. Third, as hypothesized in the conceptual model, the attitude towards VTO is positively and significantly related to consumers' behavioral intention in engaging in online apparel shopping.

The results also documented the indirect relationship of perceived usefulness to behavioral intention through attitude towards VTO (mediation hypothesis). Though previous studies did not exist to vouch for the relationship, we found in this research that the intuitive appeal and ethos suggest that consumers derive intrinsic satisfaction by substituting the VTOs for the "touch and feel" characteristic that consumers experience in-store shopping. The most important result from the study is the negative moderation of perceived risk that would adversely affect the relationship between perceived usefulness and attitude towards VTO (Hypothesis 5). Previous studies have found that perceived risk negatively relates to online apparel shopping behavior (Faqih, 2016). The result of the second moderation that perceived enjoyment changes the negative relationship between perceived usefulness and attitude towards VTO (Hypothesis 6) is an important finding from this study. Previous studies did not examine this three-way interaction. However, the results from this exploratory three-way interaction are significant because the complex relationships make more sense to study rather than individual components. Overall, this study used UTAUT to the practice of millennials engaging in online apparel shopping.

5.1 | Theoretical implications

This study proposed a complex moderated moderated-mediation model to examine consumers' online apparel shopping behavior. The proposed model contributes to the existing literature of online shopping and the role of technology. First, in alignment with the previous studies, the present study also uses UTAUT and explores the interactive effect of antecedent conditions influencing technology adoption. It incorporates variables that have both positive and negative impacts on online consumption. The positive variables include perceived usefulness and perceived enjoyment, and the negative variable included in this study was perceived risk. Second, by establishing that perceived usefulness is positively related to attitude towards VTO and behavioral intention to adopt technology, the findings add to the growing literature on e-shopping. The earlier studies focused on attracting online customers through different types of virtual try-on; this study further adds that attitude towards VTO plays a significant role in influencing behavioral intention. Another critical variable, that is, perceived ease of use, though not hypothesized in this model, was positively related to perceived usefulness, according to the post-hoc analysis, consistent with the previous research (Youn & Lee, 2019). Third, identifying the risk associated with online shopping is negatively related to online consumption. Consumers may be afraid that their information may be misused by e-retailers or hackers and shy away from continuing to engage in online shopping. In addition to information risk, there is a potential risk of financial fraud as the number of cybercrime cases has been increasing rapidly worldwide including developing countries like India (Keelery, 2021). Therefore, this study helps understand the dynamics of perceived risk in influencing the relationship between perceived usefulness and attitude towards VTO.

Fourth, a significant contribution of this study is the proposed moderated moderated-mediation model that includes perceived risk as the first moderator and perceived enjoyment as the second moderator in the relationship between the constructs of UTAUT is a novel concept that has not been explored before. The findings suggest that perceived enjoyment overpowers and reduces perceived risk's harmful effect on behavioral intention, mediated through attitude towards VTO. As the millennials tend to enjoy online shopping, as mentioned before, as they belong to the first-generation technology-oriented population and spend most of their time interacting with the technology, they are more likely to benefit from adopting the technology. To the best of our knowledge, this three-way interaction has been explored in the literature for the first time. Our findings suggest that these complex relationships would help understand the dynamics of the risk-enjoyment relationship in the online apparel shopping environment. As previous studies did not study millennials, the present study opens new avenues for future research. Lastly, the conceptual model adds a new dimension to the already popular and dominant UTAUT and suggests that interactions between the constructs outlined in the model are worth examining.

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5.2 | Practical implications

This study has several implications for practicing managers and e-retailers. First, as documented in this study, the perceived usefulness of VTO technology positively predicts the behavioral intention of millennials; e-retailers need to make their websites user-friendly. Further, as millennials tend to get glued to social media networking (Grace et al., 2015) and technology-related interactions, e-retailers must equip their websites to attract and retain these customers (Acikgoz et al., 2023). As social media marketing has been effectively used by the e-retailers to attract customers (Shareef, Mukerji, et al., 2019), it is more likely that the effectiveness of VTO technology may be transmitted to the customers. When online buying becomes a habit, they are more likely to continue to engage in online shopping apparel, which is reasonably necessary. With the changing fashions and introduction of new clothing, e-retailers must keep abreast of consumers' tastes and preferences to make these products available online. Second, as one of the critical findings in this study suggests that the perceived usefulness of VTO is more likely to influence the attitude of consumers to VTO technology, e-retailers must be mindful of incorporating the latest tools in technology to enhance the VTO. Some of the latest technologies include augmented-reality-based and virtual-reality-based VTO on their websites (Liu et al., 2020). Third, based on our finding that perceived risk plays a vital role in influencing the effect of the perceived usefulness of VTO on the consumers' attitude towards VTO before making purchase decisions, e-retailers need to ensure the safety and security of data concerning the consumers. More specifically, e-retailers need to understand that there may be risk-averse customers who are conscious about their privacy and shy away from online shopping because they may be afraid that their private data will become public. Therefore, e-marketers must ensure the security and safety of privacy of the information provided by the customers in VTO.

Further, the customers must be assured of the financial safety of both their information and money. A safe return policy must be embedded in the websites if the product does not meet the customers' requirements. Third, while designing the websites, the e-marketers need to consider the factors that would enhance perceived enjoyment, be it hedonic pleasure resulting in intrinsic satisfaction or satisfaction derived from purchasing decisions.

Fourth, this documented that perceived enjoyment plays a significant role in mitigating the adverse effects of perceived risk attached to online shopping. Therefore, e-retailers must continuously update their websites by incorporating new features, so that perceived enjoyment outweighs the risks associated with online shopping. Finally, based on the overall empirical results, this research suggests that e-marketers need to diffuse technological improvements that would bring behavioral changes in customers and attract them to online apparel shopping.

5.3 | Limitations and future research

The results from this study should be interpreted in light of some limitations. First, the study was related to the constructs in the UTAUT theory, and the limitations that apply to the UTAUT are also applicable to the study. UTAUT has been applied in various situations with technology introduction (maybe a new software or a new program). UTAUT focuses on individual behavior and ignores group behavior. As some researchers documented that group behavior plays a vital role in the formation of social media trust (Shareef et al., 2020), it is important to consider group behavior in influencing attitude of customers. Therefore, the impact of social networking on individual consumer behavior cannot be tapped from UTAUT constructs (Beglaryan et al., 2017). Second, this study focused on only a limited number of constructs and did not consider customers' environmental conditions, personality differences, emotions, and educational levels, and therefore our study also suffers from these limitations. Third, the common method bias inherent in survey research is a problem in this study. However, to minimize the problem, we conducted Harman's single-factor analysis, which explained less than 50% of the variance. Thus, it is confirmed that common method bias is a problem. Fourth, since the sample consists of under three hundred respondents, it would be advisable to have a more extensive sample to study the relationships between the variables as conceptualized in the proposed model. Fifth, this study focused only on the online shopping millennials, which constitutes another limitation.

This study offers several avenues for future research. First, future studies may explore the relationships in a cross-country context by comparing the online shopping behavior of people from different countries regarding apparel purchase decisions. Second, a comparative analysis can be carried out to determine the differences, if any, between the consumer behavior of millennials and others. Third, it would also add to the literature if there are gender differences in online apparel purchase behavior. Future studies may also involve the effect of perceived risk of making mobile payments when customers buy apparel online (Kar, 2021; Liu et al., 2019). Fourth, it would also be interesting to explore the effect of mobile-learning management on millennials in adopting VTO technology in online buying of apparel (Alfalah, 2023) and the repercussions of digital service failure in influencing the online buying (Mustafa et al., 2020). Further, the problems of technology adoption by poor people in rural areas especially in developing countries that limit the use of VTO technology may be investigated in future studies (Mobarak & Saldanha, 2022). Finally, the future researchers may be also encouraged to explore variables such as trust (Shareef, Dwivedi, et al., 2019), reliability, price discounts, coupons, and promotional aspects of the apparel in influencing customers' online apparel purchase decisions.

6 | CONCLUSIONS

This study has used the constructs from UTAUT and explored some complex relationships in the context of millennials' online apparel purchase behavior. As competition for online sales increases, particularly in the garment industry, e-retailers continue to engage in strategies to capture the market by attracting customers. In this process, VTOs play a significant role, as predicted by earlier researchers and documented

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by several researchers worldwide. Given technological developments and digitalization, and changing nature of consumer behavior, the importance of online shopping and the competition among e-retailers continue to be on the agenda for marketing researchers.

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CONFLICT OF INTEREST STATEMENT

The authors do not have any conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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