

ABSTRACT

LEE, HANNA. Fashion Consumers' Perception and Adoption of Virtual Fitting Rooms (VFRs): A Perspective of Regulatory Focus and Shopping Involvement (Under the direction of Dr. Yingjiao Xu and Dr. Anne Porterfield).

Virtual Fitting Rooms (VFRs) are among the most promising technologies that can overcome inherent problems of online shopping—mainly, the inability to have the experience of trying on an item before making the purchase. However, despite the great potential of VFRs to enhance consumer experiences through satisfying functional, experiential, and social needs, its adoption is still in preliminary stages. Little is currently known about inherent psychological reasons as to why consumers would perceive value and adopt VFRs, and who specifically is more likely to be an adopter of this technology. Consumers' technology adoption is dependent upon their state-level experiences, which are integrative in nature, and involves processing multiple values associated with the use of technology, including functional, experiential, and social aspects. Thus, individuals' internal beliefs and expectations towards functional, experiential, and social values can be key predictors for their adoption intention.

At the same time, consumers' cognitive and affective attributional process can be influenced by their enduring chronic traits, such as regulatory focus, which represents one's goal-specific motivational orientations, and shopping involvement, which represents one's stable tendency to perceive personal relevance with shopping. In other words, individuals' state-level experience and subsequent behavior can be influenced by trait-level differences in their motivational orientations. Most technology adoption studies have largely focused on state-level experiences that motivate individuals to use a technology. Considering the varying motivational orientations among consumers, it is vital to understand the psychological mechanism behind consumers' unique and different state-level experiences with VFRs. Consumers' chronic regulatory focus and shopping involvement were investigated in this study regarding its

influences on how consumers develop perceptions of functional, experiential, and social values associated with the use of VFRs.

The purpose of this study was to investigate the influence of chronic regulatory focus and shopping involvement on consumers' VFR adoptions via VFR perceptions. Particularly, the first objective was to evaluate how chronic regulatory focus influences consumers' perceptions of value provided by using VFRs. The second objective was to evaluate how trait-level differences in chronic regulatory focus and shopping involvement affects the influence of consumers' perceptions on adoption behaviors.

Before examining the proposed model, focus group interviews were conducted by recruiting 21 university students to explore consumers' beliefs and expectations toward VFRs and to build the foundation of this study. Then, data were collected from 480 consumers who have at least heard of VFRs in the past via an online survey and analyzed using structural equation modelling as well as multi-group comparisons. Empirical results revealed that respective chronic regulatory foci play as preconceived factors that drive consumers' different processing, exerting significant influences on consumers' perceptions of functional, experiential, and social value toward the use of VFRs, which, in turn, had a positive influence on their adoption intention. Thus, it suggests that the goal-specific motivational orientations behind the use of VFRs needs to be understood to be successfully adopted. Results also suggest that both trait-level differences in regulatory focus and shopping involvement moderated the importance of rendering functional, experiential, and social features of VFRs in increasing consumer adoption of VFRs. Theoretical and managerial implications are discussed.

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Fashion Consumers' Perception and Adoption of Virtual Fitting Rooms (VFRs): A Perspective
of Regulatory Focus and Shopping Involvement

by
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DEDICATION

This dissertation is dedicated to my parents, Sang-dal Kim and Mi-hyang Kim for their unconditional support throughout my Ph.D. work

BIOGRAPHY

Hanna Lee was born in Seoul, South Korea. She initially studied Accounting at University of Minnesota-Twin cities, but then, she started to be interested in fashion business. Hence, she started her undergraduate at Sungkyunkwan University to study fashion consumers' behavior. Hanna holds Bachelor's and Master's degrees in Clothing and Textiles from Sungkyunkwan University under the direction of Dr. Sun-jin Hwang. During her undergraduate and graduate study, she realized the power of innovative retail technologies in reshaping consumers' experience. She joined the Ph.D. program in Textile Technology Management at North Carolina State University supported by the provost fellowship. Her dissertation committee is co-chaired Dr. Yingjiao Xu and Dr. Anne Porterfield.

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TABLE OF CONTENTS

LIST OF FIGURES	viii
LIST OF TABLES	ix
Chapter 1: Introduction	1
Background	1
Statement of Purpose	5
Significance of the Study	6
Definition of Key Terms	7
Chapter 2: Literature Review	10
Emerging Virtual Fitting Rooms (VFRs) Technology	10
Consumers' Perceptions of Virtual Fitting Rooms (VFRs)	14
Perceived Functional Value	15
Perceived Experiential Value	18
Perceived Social Value	21
Regulatory Focus	23
Shopping Involvement	31
Chapter 3: Methodology	36
Research Model	36
Research Design	36
Focus Group Interviews	37
Online Survey	38
Survey Instruments	39
Regulatory Focus	41

Shopping Involvement.....	41
Perceived Functional Value.....	43
Perceived Experiential Value	44
Perceived Social Value.....	45
Adoption Intention.....	45
Data Analysis	45
Focus Group Interviews	45
Online Survey	46
Chapter 4: Results and Discussions.....	47
Focus Group Interviews.....	47
Sample Characteristics of the Online Survey	50
Assessment of the Measurement Model	54
Structural Model Analysis and Hypotheses Testing.....	56
Test of Main Effects	56
Test of Moderating Effect: Regulatory Focus.....	60
Configuration Invariance Test and Measurement Invariance Test	60
Test of Moderating Effect.....	62
Test of Moderating Effect: Shopping Involvement.....	64
Configuration Invariance Test and Measurement Invariance Test	64
Test of Moderating Effect.....	66
Summary of Hypotheses Testing	67
Discussions	69
Chapter 5: Conclusions	76

Implications.....	76
Academic Implications.....	77
Practical Implications.....	78
Limitations and Suggestions for Further Research.....	85
References.....	88
Appendices.....	109
Appendix A: IRB Form for Approval of Focus Group Interview.....	110
Appendix B: Survey Questionnaire.....	111
Appendix C: IRB Form for Approval of Online Survey.....	118
Appendix D: Comparisons of Sample Profile with the U.S. General Population.....	119

LIST OF FIGURES

Figure 1	Research Model.....	36
Figure 2	SEM Results (H1-H3).....	57
Figure 3	SEM Results (H4).....	58
Figure 4	Moderating Effect of Regulatory Focus.....	61
Figure 5	Multi-group Analysis Results: Regulatory Focus.....	64
Figure 6	Moderating Effect of Shopping Involvement.....	65
Figure 7	Multi-group Analysis Results: Shopping Involvement.....	67

LIST OF TABLES

Table 1	Definition of Key Terms	7
Table 2	Regulatory Focus Measurement	40
Table 3	Shopping Involvement Measurement.....	41
Table 4	Perceived Functional Value Measurement.....	42
Table 5	Perceived Experiential Value Measurement	44
Table 6	Perceived Social Value Measurement	45
Table 7	Adoption Intention Measurement.....	45
Table 8	Sample Profile	51
Table 9	Brands/Retailers for VFR Experience	53
Table 10	Confirmatory Factor Analysis Results	55
Table 11	AVE Values and Squared Correlation of Each Latent Variable	56
Table 12	Path Coefficients between Latent Variables	56
Table 13	Measurement Invariance Test: Regulatory Focus	62
Table 14	Multi-group Analysis Results: Regulatory Focus	63
Table 15	Measurement Invariance Test: Shopping Involvement.....	66
Table 16	Multi-group Analysis Results: Shopping Involvement.....	66
Table 17	Summary of Hypotheses Testing	68

CHAPTER 1: INTRODUCTION

Background

With the rise of digital technologies, e-commerce is showing exponential growth. In fact, approximately 78 percent of fashion sales are digitally influenced or made online (Achille, Remy, & Marchessou, 2018). However, because consumers cannot physically try on products and assess the fit of products before purchase, about 70% of returns occur in online channels (Beck & Crie, 2018). Thus, Virtual Fitting Room (VFR) technology is increasingly gaining attention in the marketplace as it presents great potential to overcome fit-related problems in the online shopping process. Referring to Alfredo and Rodriguez (2016), VFR has great potential to be the online or in-store equivalent of a real fitting room. VFR technology provides virtual product trial experiences by simulating avatars based on consumers' input of body measurements and/or photographs (Blazquez, 2014; Lee & Xu, 2019). It can virtually translate physical fitting experiences into virtual spaces with the use of multiple complementary technologies that provide realistic sensory elements (Alfredo & Rodriguez, 2016; Blazquez, 2014).

Originally developed as a tool to improve the fit of products to meet consumers' needs, VFRs in online channels can benefit consumers if the fitting experience they provide is functionally similar to the in-store fitting experience. Specifically, considering that more than half of consumers pointed out the lack of physical apprehension of style and fit as the primary problem of online shopping, VFRs could satisfy their functional fitting needs (Kim & Forsythe, 2008). Previous research suggested that consumers' functional/utilitarian perceptions could influence them towards adopting VFRs (Kim & Forsythe, 2008; Lee, Kim, & Fiore, 2010). VFRs also have immense potential to provide affective experiences to consumers, due to their playful and experiential features (Lee et al., 2010; Rzepka, 2011). For example, consumers can perceive

enjoyment as they experiment with their appearance by trying on different styles with new or different products which are virtually simulated (Lee et al., 2010). More than just a source of hedonic enjoyment, VFRs can also enable consumers to experience immersion with enhanced interactivity (e.g., human-human, human-computer, and computer-computer) offered in the virtual hyper-media environment (Hoffman & Novak, 1996; Huang, 2003; Koo, 2009). In addition, visualized images can be shared via tools that connect consumers to social media (Grieder, Buck, Banfi, Kment, & Fitzner, 2014; Javornik, 2016). In this manner, consumers can have social experiences and express their self and social identity by displaying and sharing their visualized images (Gao, Brooks, & Brooks, 2014; Pagani, Hofacker, & Goldsmith, 2011; Thorbjørnsen, Pedersen, & Nysveen, 2007). Recognizing the great potential of VFRs, global fashion retailers (Rebecca Minkoff, Uniqlo, Lyst, to name a few) have increasingly begun to provide VFRs to consumers in order to respond to the demand for fitting experiences in the online retail environment (Lee & Xu, 2019).

While VFRs have started to become available in the online fashion retail environment, they are still in the early stages of consumer adoption and are yet to be widely implemented in the fashion industry. Moreover, research fully investigating influential factors and examining consumers' adoption of VFR technology is limited. Specifically, despite the potential to improve consumer experiences with multifaceted benefits, previous research did not provide comprehensive understanding with regards to diverse factors that can amalgamate different consumer responses in the VFR experience. In existing VFR-related literature, previous studies have largely focused on technical and functional aspects of VFRs, investigating methods of improving congruity between visualized models and consumers (Gültepe & Güdükbay, 2014). Few researchers empirically examined consumers' usage intention toward VFRs (Huang & Qin,

2011; Kim & Forsythe, 2008) with the use of established models, such as the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1992) or the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003). Because these models usually underestimate affective aspects (Behling, 1992), researchers using these models found that utilitarian motivations and perceptions dominate the use of VFRs in online channels (Huang & Qin, 2011; Kim & Forsythe, 2008).

Consumer experiences are integrative in nature due to consumers' processes of multiple values, derived from their core functional, experiential, and social needs as postulated in the customer value frameworks (Park, Jawarski, & MacInnis, 1986; Smith & Colgate, 2007; Sweeney, Soutar, Whiteley, & Johnson, 1996). In previous studies on consumer experiences, researchers primarily incorporated factors associated with utilitarian and hedonic dimensions to explain the integrative nature of consumer experiences (Fiore & Kim, 2007, Kim & Forsythe, 2008). Lee et al. (2010) also found that consumers perceive both functional and experiential value towards image interactive technologies in the online environment. In addition to functional and experiential value, social value can also be one of the primary dimensions that consumers expect and perceive. Consumers have inherent desires to fulfill internally generated needs for self-enhancement, group membership, or ego-identification to enhance their social self-concept (Park et al., 1986; Sweeney & Soutar, 2001). In the context of interactive services, social sharing was found to be one of the expressive elements of communication that can motivate consumers to use products, services, or technologies (Pagani et al., 2011; Thorbjørnsen et al., 2007). As social communication allows consumers to express their identity by following fashion and trends or adhering to in-group norms, social sharing of visualized fits and styles of a virtually simulated model can function as a means to display one's self, communicate with others, and integrate

social networks (Thorbjørnsen et al., 2007). Thus, in order to reflect the integrative and multifaceted nature of shopping experiences, it is important to address consumers' perceived functional, experiential, and social value together to comprehensively understand consumers' varying beliefs and expectations toward VFRs. The same idea is suggested in the customer value framework, which classifies customer value into functional, experiential, and social aspects (Park et al., 1986; Smith & Colgate, 2007).

Moreover, extant studies on consumers' VFR adoption behavior have overlooked the fact that consumers' perceptions are subjective in nature as they can vary by individuals who prioritize a set of goals in different ways (Kim & Forsythe, 2008; Lee et al., 2010). VFRs are relatively new to the consumer market; thus, they can be unfamiliar to consumers, posing constraints on cognitive processing capacity (Kramer, 2011; Lee, Xu, & Li, 2020; Wang & Lee, 2006). The newness of VFRs can induce individuals to rely on enduring traits, which act as motivational orientations for processing objects, thereby influencing individuals' perceptions (Jia, Wang, Ge, Shi, & Yao, 2012; Song & Qu, 2019). For example, when making the decision to use VFRs, individuals might view this unfamiliar technology either as an exciting opportunity for experimentation or, conversely, as a risky choice—depending on their inherent traits. It seems plausible then that a consumer's psychological motivation varies by individual, and such differences control one's perceptions in relation to experiences (Song & Qu, 2019). In addition, VFRs aim to provide tailored experiences, which require a better understanding of inherent traits that can immediately affect decision-making (Arora et al., 2008). In technology adoption literature, research has primarily focused on how technology impacts motivation rather than on how users perceive technology (Choi, Im, & Kim, 2014). From the user perspective, consumers can have stable, relatively enduring motivational orientations at the trait level, regardless of the

specific activities in question (Choi et al., 2014). To fill this void, regulatory focus, an enduring goal-specific motivational orientation akin to personality traits (Higgins, 1997; Park & Ryu, 2018), and shopping involvement, an enduring situational trait (Im & Ha, 2011), were proposed to predict and affect consumers' internal process and experiences (Bosnjak, Galesic, & Tuten, 2007; Mowen, 2000; Rawat & Mann, 2016). In addition, these two traits were proposed to explain differences in consumers' adoption intention derived from their perceptions, as the variation arising from personality traits is "at the heart of consumer attitude formation and behavioral intention" (Dabholkar & Bagozzi, 2002, p. 187). Even if one's attitudes and behavioral intentions are predicted by expectations and perceptions toward a technology, individual traits can also exert significant influences on the strength of relationships between individual perceptions and intention because people tend to place different importance on values—based on their dominant traits (Chen & Tsai, 2008; Harris & Hagger, 2007; Song & Qu, 2019). This study proposed consumers' traits, including chronic regulatory focus and shopping involvement, as key influential factors that can have an effect on consumers' perception and adoption intention toward VFRs.

Statement of Purpose

Despite increasing availability and presence of VFRs in the marketplace, they are still in early stages of consumer adoption. As consumers are the final determinants of market demand, it is important to understand the VFR adoption process from the user perspective. Therefore, the purpose of this study was to investigate the importance of consumer experiences on consumers' adoption of VFRs from the perspective of regulatory focus and shopping involvement via VFR

perception. To investigate psychological mechanisms behind consumers' VFR adoption in a comprehensive manner, the objective of this study was to:

1. Examine influences of consumers' perceptions of functional, experiential, and social value on the intention to adopt VFRs
2. Examine influences of consumers' regulatory focus on perceived functional, experiential, and social value toward VFRs
3. Investigate the moderating effect of chronic regulatory focus and shopping involvement on the relationship between perception and adoption intention

This study began by qualitatively exploring consumers' perceptions toward VFRs through a pilot study involving focus group discussions to understand consumers' subjective knowledge and preconceived notions toward VFRs. Next, in the main study, we examined relationships between regulatory focus, perceptions, and adoption intentions toward VFRs and evaluated individual difference variables that may explain differences in consumers' decision-making and subsequent adoption.

Significance of the Study

Online fashion retailers have increasingly started to utilize VFRs to meet ever-growing consumer demand for fitting experiences. However, unless consumers adopt VFRs, their investment could be redundant. To increase consumers' adoption, it is important for online fashion retailers to understand underlying psychological mechanisms that bring consumers' adoption of VFRs. Little is known about the inherent reasons why consumers attend to different components of VFRs and convey varying beliefs toward VFRs. Although previous studies addressed the influences of consumers' perceptions on their intention to adopt VFRs by focusing

on what a technology can do for consumers (Kim & Forsythe, 2008; Lee et al., 2010), barely any research addresses the trait-level reasons that affect consumers’ perceptions and subsequent adoption intentions. There is no research which connects consumers’ enduring traits (i.e., regulatory focus) with their perceptions and adoption of VFR, however, consumers’ experiences are dependent upon their enduring motivational orientations (Choi et al., 2014; Mowen, 2000). Results of this study can address strategic issues related to designing and marketing VFRs as it can provide valuable information about trait-level reasons why consumers show varying beliefs and expectations, thus, addressing who are more likely to be adopters for what reasons. Specifically, this information can be used by online fashion retailers to capture individuals’ demands which differ by their traits so that they can develop segmented marketing strategies to increase consumers’ adoption. Further, these findings can also enhance the design effectiveness of VFRs by clarifying key influential perceived value that drive consumers’ adoption.

Definition of Key Terms

The following Table 1 provides definitions of key terms that are applied throughout the dissertation.

Table 1. Definition of Key Terms.

Virtual fitting room (VFR) technology	A technology that provides virtual try-on experiences to consumers for online or in-store shopping (Blazquez, 2014; Lee & Xu, 2019). VFR technology allows consumers to see a virtual garment on an avatar which is developed based on consumers’ body measurements which are captured by various methods, including body scanning, photos, or manual entry of body matrix (Lee & Xu, 2019).
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Table 1 (continued).

Perceptions of technology	Individuals' beliefs and expectations toward a technology, derived from subjective knowledge and preconceived notions (Koo, 2009). Consumers' perceptions of VFR technology can be informed by perceived functional value, perceived experiential value, and perceived social value in this study.
Perceived functional value	Consumers' beliefs and expectations towards functional performances of VFRs (Koo, 2009).
Perceived experiential value	Consumers' beliefs and expectations toward experiential process of performing activities in VFRs (Koo, 2009).
Perceived social value	Beliefs and expectations toward VFRs relating to consumers' desire to fulfill internally generated needs for self-enhancement, group membership, or ego-identification (Rintamäki, Kanto, Kuusela, & Spence, 2006).
Regulatory focus	"The basic motivational orientation that affects how individuals pursue their goals" (Park & Ryu, 2018, p. 1). Two chronic regulatory foci, including promotion focus and prevention focus, have different dimensionality, being independent of each other (Fellner, Holler, Kirchler, & Schabmann, 2007).
Shopping involvement	Individuals' long-term and enduring tendencies to perceive shopping as relevant, important, connected, and related to their life (Abdul-Ghani, 2009; Zaichkowsky, 1985).

Table 1 (continued).

Intention to adopt VFRs	Individuals' likelihood to adopt VFRs in the online apparel shopping process (Venkatesh et al., 2003).
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CHAPTER 2: LITERATURE REVIEW

In this chapter, a review of the literature related to the purpose of the study is provided. First, an introduction of the VFR technology is provided. Next, research on consumers' perceptions of VFRs are explored, namely perceived functional, experiential, and social value. Following that, research on consumers' regulatory focus and its relationship with consumers' perceptions and adoption are presented. Lastly, research on consumers' shopping involvement are explored. Based on the literature and relative to the objectives of the study, several testable hypotheses are developed.

Emerging Virtual Fitting Room (VFR) Technology

In the fashion shopping process, the fitting room is an important environment for consumers' buying activities, allowing them to see, touch, and sense the products (Ayalp, Yildirim, Bozdayi, & Cagatay, 2016). Researchers found that consumers spend about a third of their shopping time in the fitting room, and the conversion-to-purchase rate was about 67% when consumers were given an opportunity to try on a product, about seven times higher than consumers who could not try on products before making purchases (Holmes & Smith, 2011; Laney, 2017). For fashion consumers, the attractiveness of sensory and aesthetic features of products alone is not enough to make a purchase decision because overall attractiveness derives from the interplay of sensory features of the products and consumers' bodies (Fiore & Jin, 2003). Hence, in the fitting room, consumers assess their appearance along with chosen products to ensure the right fit and decide whether to buy or not (Baumstarck & Park, 2010). Despite the importance and effectiveness of fitting experiences in the shopping process, a conventional type

of physical fitting cannot be implemented in the online space due to the inability to make physical interactions, which means online purchasing poses greater purchase risks to consumers.

Thus, consumers increasingly demand in-store style fitting experiences even in the online shopping environment to decrease the risk of limited product information (e.g., look and fit) (Shin & Baytar, 2014). While it is difficult to provide direct experiences with products, recent advances in virtual technologies, specifically VFRs, have great potential in allowing consumers to virtually try on products before purchase (Lee & Xu, 2019).

In previous studies, researchers revealed technological variations that can exist among a number of VFR solutions in the current marketplace due to differences in body measurement capturing mechanism (e.g., body scanner, self-administration), visualization technology (e.g., AR [camera-based technology], VR [3D simulation]), and interactive technology (e.g., recommendation system, social sharing) (Javornik, 2016; Lee & Xu, 2019; Merle, Senecal, & St-Onge, 2012). Specifically, Lee and Xu (2019) identified seven types of VFRs, which are 1) Full 3D body scanner, 2) 3D avatar, 3) 3D customer model, 4) Photo-accurate 3D customer model, 5) Robotic mannequin, 6) Augmented Reality (AR) fitting room, and 7) Virtual Reality (VR) fitting room. While each type of VFR has potential to bring differences in consumer experiences due to variations in accuracy, attractiveness, and interactivity, the research revealed the common aspect of identified VFR types, which is associated with its ability to let consumers to see garments on an avatar that is their size (Lee & Xu, 2019). Researchers argued that VFR technology provides virtual product trial experiences that are intended to be comparable to in-store fitting experiences by asking consumers to input their body measurements and/or upload photographs of themselves (Blazquez, 2014; Lee & Xu, 2019; Merle et al., 2012). The inputting of body dimensions, ranging from manual keying-in of one's body metric data to automatic and more sophisticated

body scanning, or uploaded photographs creates a virtual visualization of the consumers themselves, and an overlay of products on their virtual models allows them to, in turn, have functional experiences through examining how the product fits (Blazquez, 2014; Lee & Xu, 2019). Furthermore, as some VFRs allow consumers to rotate their image, to change avatar features such as hair color, and fabrics, and to share images in social media, consumers can have multifarious experiences in the VFRs (Lee & Xu, 2019).

Several fashion retailers have started to adopt VFRs for their online, as well as in-store businesses (P&S Intelligence, 2019). A variety of global fashion retailers, ranging from luxury fashion brands such as Rebecca Minkoff and Ermenegildo Zegna to fast fashion brands such as Uniqlo and H&M, provide VFRs in their online retail stores to satisfy consumers' demand for fitting experiences as well as showcasing VFRs in their key brick-and-mortar stores to attract consumers' initial trial (Lee & Xu, 2019). With increasing utilization in the fashion retail industry, the VFR market is showing faster growth in the regions of North America and Asia-Pacific due to the high internet penetration rate and the expansion of e-commerce (P&S Intelligence, 2019). In particular, the Asia-Pacific region (especially China, Japan, Korea, and India) is expected to grow at the highest rate with an increasing number of retailers adopting advanced virtual technologies, whereas maximum contribution is expected from the North American region in terms of market size by 2024 (Research and Markets, 2019).

Previous studies revealed that VFRs, which provide personalized virtual models on which 3D visualizations of products can be fitted, can generate more utilitarian shopping value than 2D image interactive technologies (e.g., 2D image enlargement) (Kim & Forsythe, 2008; Lee et al., 2010). Specifically, VFRs allow consumers to have enriched product information through visual cues because consumers can examine fit using virtual models that are congruent with themselves,

that can be rotated, and even be seen from a close-up view or different angles (Gao et al, 2014; Li, Daugherty, & Biocca, 2001; Merle et al., 2012). Further, when VFRs are coupled with advanced technologies, consumers can receive personalized recommendations using their virtual profiles, which do not require them to directly interact with salespersons (Beldad, Hegenr, & Hoppen, 2016; Grieder et al., 2014).

In addition to the aforementioned functionality, consumers can have entertaining and hedonic experiences by being immersed in VFRs because VFR technology was proposed to create a shopping environment that is close to reality (Kim & Forsythe, 2008; Merle et al., 2012; Peng & Ke, 2015). Papagiannidis, Pantano, See-To, Dennis, and Bourlakis (2017) argued that experiences in immersive 3D virtual environments can increase engagement and enjoyment, leading to greater satisfaction and purchase intention. Also, Merle et al. (2012) found a significant influence of model-self congruity of VFRs on both utilitarian and hedonic perceptions, combining cognitive, affective, and conative responses. Moreover, enhanced interactivity of VFRs—which can range from mix-and-match system to a social sharing system—can satisfy the consumer’s experiential and social presence needs by providing engaging and integrated experiences (Moon, Kim, Choi, & Sung, 2013; Peng & Ke, 2015; Roggeveen, Dhruv, Townsend, & Kirshnan, 2015). According to Javornik (2016), VFR technology offers interaction through virtual models, 3D simulations of products, and creation of virtual space, which can also be connected to physical space when augmented reality is used, as well as social space if social sharing is available. Hence, interactive and collective features of VFRs also have tremendous potential to offer social and hedonic experiences (Deighton & Kornfeld, 2009; Javornik, 2016). With enriched functionality, including experiential and social

aspects that derive from its interactivity, VFRs can benefit consumers by rendering multifarious fitting experiences approaching the physical fitting experience in shopping channels.

Consumers' Perceptions of Virtual Fitting Rooms (VFRs)

The values a technology provides to consumers are key determinants of technology adoption (Verhagen, Feldberg, Hooff, & Meents, 2012). Typically, previous researchers have dichotomously classified values perceived by consumers from a technology into utilitarian/functional and hedonic/experiential value in the online environment (Babin, Darden, & Griffin, 1994; Davis et al., 1992; Van der Heijden, 2004). The reason for this classification is that consumer experiences are multifaceted and dynamic in nature, intertwined with multiple values including utilitarian and experiential aspects (Fiore & Kim, 2007). Similarly, Koo (2009) described individuals' perceptions toward a technology as what they think a technology can do for them in terms of their beliefs and expectations toward functional performance and experiential process when performing activities. However, research also suggested that incorporated social communication tools can allow consumers to satisfy social needs, hence, providing social value in VFRs (Lee & Xu, 2019; Pachoulakis & Kapetanakis, 2012). While stimuli presented in online environments were largely comprised of ambient and design factors that did not allow interactions (e.g., Mummalaneni, 2005; Kim, Kim, & Lennon, 2006), recent addition of social sharing features have begun to significantly impact consumer processes (Flavian & Guinaliu, 2005; Ku, 2011). Social benefits conceptually differ from experiential benefits in that social (expressive) benefits are not always associated with hedonic benefits (Rintamäki et al., 2006). However, few studies associated social and relational benefits with experiential and hedonic value (Chandon, Wansink, & Laurent, 2000; Iyanna, Bosangit, &

Mohd-Any, 2012). Social benefits are more likely to be associated with benefits derived from meeting one's expressive needs. Consumers have an inherent desire to enhance self- and social-identity through self-expression in social contexts (Park et al., 1986; Smith & Colgate, 2007). In fact, social needs, along with functional and experiential needs, are the three basic consumer needs used to represent key value dimensions in customer value frameworks (Park et al., 1986; Smith & Colgate, 2007). Given that consumer's belief and expectations toward social/expressive benefits are a strong determinant of behavioral intention for goods and services (Pagani et al., 2011), consumers' perceived social values can be key to the VFR adoption process. That is, virtually simulated visuals such as 3D presentation or advanced interactive functions in VFRs may allow individuals to perceive functional, experiential, and social value through virtual experiences created by a combination of visual, tactile, and behavioral simulation techniques as well as through the incorporation of social media sharing systems (Brandhofer & Reinauer, 2016; Li et al., 2001; Park, Stoel, & Lennon, 2008).

Perceived Functional Value

Functional (utilitarian) benefits are characterized as instrumental and extrinsic, and perceived when consumers' task-related needs are fulfilled (Rintamäki et al., 2006). Functional benefits are perceived by consumers through cognitive processing of the quality of outcomes (i.e., usefulness) and effort required to employ a strategy (i.e., ease-of-use). According to TAM, usefulness and ease-of-use significantly contribute towards functional benefits perceived by consumers (Davis, 1989; Kim, Chan, & Gupta, 2007). This model proposes perceived usefulness and perceived ease-of-use as positive predictors of attitudes toward the use of a new technology, hence, as an influence on their use intention (Davis, 1989; Davis et al., 1992).

Referring to Nikou and Economides (2017), perceived usefulness refers to “the degree to which an individual believes that the use of a particular technology will help them to perform certain tasks” (p. 84). When using VFRs, garments on an avatar can provide more detailed and realistic product information as well as fit-related information compared with information typically provided in current online shopping channels (Alfredo & Rodriguez, 2016; Lee & Xu, 2019; Park et al., 2008). Thus, in the context of VFR, perceived usefulness refers to the degree to which consumers believe and expect that the use of VFRs will be functionally helpful in performing fitting (Kim & Forsythe, 2008). Ease-of-use refers to “the degree to which an individual believes that the use of a particular technology is free of effort” (Nikou & Economides, 2017, p. 84), because more and better information can reduce cognitive effort in shopping processes (Park et al., 2008; Park & Stoel, 2002). In the context of VFR, perceived ease-of-use is defined as the extent to which consumers believe and expect that using VFRs will be effortless (Kim & Forsythe, 2008).

In VFR-related literature, perceived usefulness and ease-of-use were revealed as strong predictors of VFR adoption (e.g., Huang & Qin, 2011; Kim & Forsythe, 2008). Specifically, Kim and Forsythe (2008) found positive influences of usefulness and ease-of-use on the intention to use VFRs, as suggested in the TAM (Davis, 1989). In case of Huang and Qin (2011), performance and effort expectancy, which are similar to perceived usefulness and ease-of-use, respectively, positively influenced the intention to use VFRs. Also, several researchers addressed positive influences of functional benefits of VFRs on consumers’ conative responses such as purchase intention (Merle et al., 2012; Park et al., 2008).

Meanwhile, consumers’ perceptions of functional value encompass cognitive trade-offs between what is received and what is given (Kim et al., 2007; Park et al., 2008). In the case of

new technologies like VFRs, consumers can perceive great risks or concerns which can undermine the adoption of technologies (Chen & Mort, 2007). Thus, consumers would internally assess both functional benefits and risks of using VFRs, when evaluating their net utility. Specifically, consumers can have concerns about accuracy of fitting outcomes and security of system features of VFRs (Huang & Qin, 2011; Sohn & Sun, 2013). Consumers expect correct functioning and outcome of VFR technology, specifically, accurate representations of color, fabric, style, sizing, etc. of a virtual model and overlaid garments (Boonbrahm, Kaewrat, & Boonbrahm, 2015). For example, consumers can perceive mismatches between visually projected figures and actual figures of themselves or products (Gao et al., 2014; Kim & LaBat, 2013; Lee & Xu, 2019). Similarly, Lee and Xu (2019, p. 3) argued that “rich variations in body size and shapes as well as hair and skin color among a number of consumers” can cause inaccuracy. Also, different types of VFR technologies exist in the current marketplace with technological variations in simulation techniques and body measurement techniques which can contribute to varying degrees of accuracy (Lee & Xu, 2019). Providing accurate virtual simulation is a major challenge for VFRs (Gültepe & Güdükbay, 2014). In addition to inaccuracy, consumers might have concerns about losing security and privacy in the try-on process as VFRs involve the input of consumers’ body measurement data (Huang & Qin, 2011). Also, in case of AR-based VFRs, which utilize camera-based technologies, consumers’ privacy stands to be compromised as it requires the input of consumers’ own photos (Lee & Xu, 2019; Sekhavat, 2017). These perceived concerns have a strong inhibiting influence on the adoption intention and can thus exert a negative influence on the intention to adopt VFRs (Pavlou, 2003). Therefore, consumers’ perceived functional value of VFRs can be measured in three aspects:

perceived usefulness, perceived ease-of-use, and perceived functional concerns. Based on the literature, the following hypotheses were proposed in this study:

H1. Consumers' perceived functional value of VFRs will have a significant influence on their intention to adopt VFRs. Specifically,

H1a: Perceived usefulness will positively influence the intention to adopt VFRs.

H1b: Perceived ease-of-use will positively influence the intention to adopt VFRs.

H1c: Perceived functional concerns will negatively influence the intention to adopt VFRs.

Perceived Experiential Value

Consumers' technology adoption can occur based on the interplay of both perceived experiential and functional value (Hsu & Lu, 2004; Lee et al., 2010). That is, consumers can have affective and hedonic experiences such as enjoyment when using VFRs in addition to functional experiences (Kim & Forsythe, 2007; Li et al., 2001; Park et al., 2008). This affective and hedonic experience comes from consumers' feelings, fantasies, and fun in the shopping process (Holbrook & Hirschman, 1982). In a similar vein, previous researchers characterized experiential value as abstract, subjective, and intrinsic (i.e., self-oriented, self-purposeful) and argued that consumers typically expect and perceive experiential value in the exploration process or in entertaining environments (Babin et al., 1994; Rintamäki et al., 2006). Particularly, immersive experiences can be as critical as mere hedonic enjoyment in understanding consumers' VFR adoption as enhanced interactivity and unique experiential features of virtual environments enable consumers to fully immerse themselves into virtual spaces that provide individualization, navigability, synchronicity, and demonstrability (Huang, 2003). Similarly, Koo

(2009, p.467) argued that experiential beliefs and expectations can play a significant role in inducing individuals' intentions to use advanced interactive technologies and services as "individuals can undertake an activity for no apparent reason other than the process of performing it." Particularly, as some individuals not only evaluate their virtual fit but also personalize their model and mix-and-match products for fun (Merle et al., 2012), consumers could be concerned about their satisfaction of intrinsic motivations such as enjoyment and immersion when using VFRs (Kim & Forsythe, 2007; Lu, Zhou, & Wang, 2009).

In literature regarding VFR, several experiential values that influence consumers' use and online purchase intention were revealed, including enjoyment, control, and curiosity (Beck & Crie, 2018; Fiore & Jin, 2003; Huang & Liao, 2017; Kim & Forsythe, 2008). The rationale behind these findings lies in the state of flow, which is characterized by a sense of being in control, enjoyment, curiosity, and intense concentration. Flow (Csikzentmihalyi, 1990) has frequently been used to explain non-instrumental consumer experiences in the computer-mediated environment (Domina, Lee, & MacGillivray, 2012; Hausman & Siekpe, 2009). Specifically, studies suggested a positive influence of enjoyment, control, concentration, and curiosity on consumers' intention to use mobile payment applications (Zhou, 2003) and instant messaging (Lu et al., 2009). Also, flow showed a positive influence on consumers' shopping or purchase intentions in the virtual environment (Domina et al., 2012; Hausman & Siekpe, 2009; Huang, 2003). As VFRs can provide an immersive environment through advanced interactivity (Bouko, 2014; Fiore, Kim, & Lee, 2005b), perceived experiential value, characterized by control, enjoyment, and curiosity, could play a key role in inducing the intention to adopt VFRs.

Specifically, enjoyment represents perceptions of fun and pleasure derived from using a technology (Domina et al., 2012). In previous studies, several researchers found enjoyment as a

key perceived experiential value toward VFRs (Kim & Forsythe, 2008; Lee et al., 2010) because consumers can experiment with their appearance, using self-congruent virtual models with the addition of sensory elements and mix-and-match features (Fiore, Jin, & Kim, 2005a; Li et al., 2001; Merle et al., 2012). Next, control refers to the extent to which one exercises control over the interaction with technology (Domina et al., 2012). In addition to consumers' intrinsic desire for enjoyment, consumers have an intrinsic desire to feel in control of their well-being (Ward & Barnes, 2001). In the virtual environment, consumers can expect a sense of control, which is significantly associated with consumers' affective responses due to enhanced interactivity (Hoffman & Novak, 2009; Huang & Liao, 2017; Ward & Barnes, 2001). Similarly, Fiore et al. (2005b) argued that telepresence, "a sense of being transported to another location or the sense of being in a mediated space other than where the physical body is located (p. 41)," derived from the interactive nature of VFRs, can offer experiential value through pleasure fostered by enriched sensory information (i.e., enjoyment) and creative release involved in modifying models and products (i.e., control). Also, Fiore and Jin (2003) argued that image interactivity functions may evoke an active process (i.e., control) and enjoyment, consequently leading to consumers' approach behavior. Lastly, curiosity represents the perceptual degree of desire to develop an interest in and pay attention to novel stimulation (Beck & Crie, 2018). Beck and Crie (2018) found intrinsic curiosity as the key experiential/intrinsic driver of VFRs that decrease the cognitive charge of an immersive experience and motivate consumers to conduct exploratory browsing activities. Hence, the following hypotheses were developed in this study regarding the influence of experiential perception on consumers' adoption of VFRs:

H2. Consumers' perceived experiential value of VFRs will have a significant influence on their intention to adopt VFRs. Specifically,

H2a: Perceived enjoyment will positively influence the intention to adopt VFRs.

H2b: Perceived control will positively influence the intention to adopt VFRs.

H2c: Perceived curiosity will positively influence the intention to adopt VFRs.

Perceived Social Value

With an increasing focus on shopping as a social act, previous studies classified the total value of shopping as utilitarian, hedonic, and social (Rintamäki et al., 2006). Consumers' perceptions of social value represent consumers' beliefs and expectations toward a degree to which a product or service can satisfy their desires to fulfill internally generated needs for self-enhancement, group membership, or ego-identification, enhancing self-concepts (Park et al., 1986; Smith & Colgate, 2007; Sweeney et al., 1996). While some studies conceptualized social value as a lower-level construct of utilitarian or experiential value (Chandon et al., 2000; Iyanna et al., 2012), researchers also argued that social value is a key value dimension that can be realized from products or services along with functional and experiential dimensions (e.g., Park et al., 1986; Smith & Colgate, 2007; Sweeney & Soutar, 2001). Referring to Rintamäki et al. (2006), consumers can perceive social benefits when they can express their personal values through shopping experiences. Similarly, Arbore, Soscia, and Bagozzi (2014) argued that social benefits of using information technologies are significantly associated with identity expression, which can be derived from various personal reasons (e.g., need for identification, uniqueness, status). However, consumers' perceived social value towards technologies has been largely

neglected in the technology adoption literature, with the focus largely on functional or experiential aspects.

In the online environment, consumers' shopping experiences can entail creative and social activities through the ability to invoke both personal and collective interests (Gao et al., 2014). However, little is known about how consumers' perceived social value can affect their VFR adoption. Research in the literature primarily focused on the effect of image interactivity on consumer experiences even if interactivity in the virtual environment can entail both community building and 3D experiences (Fiore & Jin, 2003). The interactivity of VFRs is not confined to image interactivity, "the ability to create and manipulate images of a product or environment on a website (p. 38)," but can be further extended to the context of communication through social media integration (Kioussis, 2002). Similarly, Pachoulakis and Kapetanakis (2012) indicated that social sharing features started being embedded into VFRs with the incorporation of social media. Referring to Kaiser, Nagasawa, and Hutton (1991), fashion allows consumers to express themselves, playing a symbolic role in social interactions. In this way, garments on an avatar, which can be personalized by individuals through altering a product's design features, background, and context as well as by mixing and matching products based on personal preferences (Fiore & Jin, 2003; Merle et al., 2012) can serve a key role in expressing or asserting oneself in a public forum such as social media by using sharing features of VFRs (Pachoulakis & Kapetanakis, 2012; Pagani et al., 2011). That is, consumers' perception of social value toward VFRs have the potential to affect their adoption due to the ability to provide opportunities to express self- or social- identity. Similarly, several researchers found that self-expression and identification are key motivators that make consumers share and post on social networking sites,

-serving as strong determinants of intention and behavior for goods and services that are consumed in public settings (Pagani et al., 2011; Thorbjørnsen et al., 2007). Hence, we assume:

H3. Consumers' perceived social value of VFRs will have a significant influence on their intention to adopt VFRs. Specifically, perceived social benefits will positively influence the intention to adopt VFRs.

Regulatory Focus

Consumers' decisions, which entail consumers' value perceptions and behaviors, stem from a wide variety of motivations (Mariani, Gomez, & Perret, 2010). Such motivations can be distinguished based on their tendency to approach a desired state or outcome or avoid an undesirable state or outcome (Higgins, 1998). Fundamentally, consumers can have a number of personal and person-environment goals characterized by cognitive, affective, and social aspects (Eccles & Wigfield, 2002). Among these goals, people typically rely on fewer core goals, either utilitarian or psycho-social, through self-regulation (Eccles & Wigfield, 2002). Based on individual differences in approaches taken for regulation, Higgins (1997) proposed the Regulatory Focus Theory, which distinguishes two ways of regulating pleasure and pain for goal attainment by extending the Self-Discrepancy Theory (Higgins, 1987).

Specifically, Higgins (1997, 1998) distinguishes between two self-regulation systems, promotion and prevention, and argues that individuals can exhibit either high or low levels of promotion focus and prevention focus for self-regulation. Promotion focus is described as an individual's orientation towards ideal goals such as achievement and aspiration, derived from nurturance needs. Therefore, desired goal and life events are viewed as a set of gains or non-

gains (Arnold & Reynolds, 2009). Thus, promotion focus leads individuals to pay attention to the presence or absence of positive outcomes and to concentrate efforts on maximizing gains through employing approach-oriented strategies (Higgins, 1998; Pennington & Roese, 2003). In contrast, prevention focus is described as an individuals' orientation towards ought goals such as safety and responsibility derived from security needs, hence, desired goal and life events are viewed as a set of losses or non-losses (Arnold & Reynolds, 2009). Accordingly, prevention focus invites individuals to pay attention to the presence or absence of negative outcomes and to concentrate efforts on minimizing losses through employing avoidance-oriented strategies (Higgins, 1998; Pennington & Roese, 2003). While individuals can prefer one of the foci if it shows dominance over the other (Higgins, 1997), the theory postulates that promotion focus and prevention focus coexist as independent systems in every person (Fellner et al., 2007; Higgins, Friedman, Harlow, Idson, Ayduk, & Taylor, 2001). In other words, these foci are not two sides of the same coin but are proposed to have different dimensionality independent of one another (Fellner et al., 2007). Similarly, Förster, Higgins, and Bianco (2003) found that promotion-focused self-regulation is not the opposite of prevention-focused self-regulation even if they can have orthogonal relationships. Instead, the two systems were proposed to be "independent of one another and can be even pursued simultaneously" (Fellner et al., 2007, p. 110).

Meanwhile, based on their distinct goals, manifested from two regulatory foci, researchers argued that individuals strive to maintain their regulatory fit, which can be experienced when the means used to pursue a goal match the regulatory focus of that individual (Higgins, 1997). Thus, regulatory fit indicates increased motivational intensity as people tend to "adopt goal pursuit strategies or engage in activities that sustain their regulatory orientation" (Aaker & Lee, 2006, p. 15). Consequently, individuals can show more intense reactions if their actions are believed to fit

with their regulatory focus, increasing the strength of engagement (Aaker & Lee, 2006). Such regulatory focus was suggested to have an impact on the likelihood that one would purchase or use newly-introduced products or services when they provide values that are consistent with regulatory goals (Herzenstein, Posavac, & Brakus, 2007; Song & Qu, 2019).

In extant literature, researchers suggested that regulatory focus, conceptualized as stable and relatively enduring motivational orientations at the trait level, can exert direct influence on state-level experiences and subsequent behaviors (Atorough & Donaldson, 2012; Ha & Stoel, 2008; Song & Qu, 2019). There is evidence that stable, relatively enduring motivational orientations at the trait level also exert considerable influences on state-level experience and behavior as the antecedent (Abuhamdeh & Csikszentmihalyi, 2009; Song & Qu, 2019).

Similarly, researchers argued that individuals tend to rely on their chronic promotion focus and prevention focus in the decision-making process unless individuals are placed in a situation that can temporarily activate a particular regulatory focus through manipulation (e.g., the need sought, the standard targeted, the framing) (Higgins, 1997; Mariani et al., 2010). Taking the dispositional view, individuals' self-regulation mechanism can come from their inherent tendency to place different weight on promotion goals than on prevention goals, originating from their socialization process and interpersonal relations since infancy (Higgins, 1997). Chronic regulatory focus can be described as the stable motivational tendency of cognitive preparedness that affects how individuals pursue their goals, leading people to focus on and process salient and relevant values based on their strategic preferences (Aaker & Lee, 2001; Arnold & Reynolds, 2009; Sassenberg, Sassenrath, & Fetterman, 2015).

Because individuals differ in their chronic regulatory orientations, individuals' perceptions were found to be affected by their regulatory focus as they try to get outcomes that are consistent

with their desired end state, which was described as regulatory fit (Song & Qu, 2019). Specifically, when individuals approach strategies that correspond with their regulatory orientations, they can experience a feeling of ‘fit’, evaluating an object in a more favorable manner with positive affect and value (Higgins et al., 2001; Song & Qu, 2019; Roy & Ng, 2012). Similarly, Avnet and Higgins (2006) found that greater attention was paid to values that are relevant to obtaining respective goals, or perceiving values that fit with each regulatory focus.

There is a large body of research suggesting and supporting the significant influence of trait-level differences in regulatory focus on state-level experience (Mariani et al., 2010; Park & Ryu, 2018). With individuals’ inherent tendencies to possess either high or low levels of the two regulatory foci, described as preconceived traits, regulatory focus has been found to affect individuals’ processing—consistent with their goals (Noort, Kerkhof, & Fennis, 2007; Sassenberg et al., 2015; Wang & Lee, 2006). To be specific, promotion focus and prevention focus were suggested as key antecedents that influence individuals’ processing and perceptions of ideal-related (i.e., hedonic) and ought-related (i.e., utilitarian) components as individuals tend to seek and expect those components that fit with their regulatory focus (Aaker & Lee, 2006; Song & Qu, 2019; Roy & Ng, 2012). Researchers found that promotion focus can lead individuals to strongly perceive hedonic and experiential components (Jia et al., 2012; Song & Qu, 2019). Promotion-focused goals are a better fit with experiential components, which primarily offer gains (Arnold & Reynolds, 2009; Song & Qu, 2019). For example, Roy and Ng (2012) found that consumers’ promotion goals have a significant impact on their relative focus on experiential/hedonic benefits as compared to utilitarian benefits. Similarly, Bullard and Manchanda (2017) argued that hedonic aspects can be simply viewed as promotion-focused since they represent ‘wants.’ In contrast, researchers also found that prevention focus can lead

individuals to strongly perceive utilitarian components, which can be described as task-related and rational (Arnold & Reynolds, 2009; Roy & Ng, 2012; Song & Qu, 2019), because prevention-focused goals can be viewed as ‘needs and necessities’ (Bullard & Manchanda, 2017; Hartman, Shim, Barber, & O’Brien, 2006). For example, Thongpapanl, Ashraf, Lapa, and Venkatesh (2018) found a greater utilitarian motivation among those who place weight on prevention goals in comparison to hedonic motivation, which subsequently affected their value perceptions toward the use of mobile commerce due to regulatory fit. Other studies also showed that prevention focus plays a greater role in explaining consumers’ preferences for utilitarian attributes than hedonic attributes compared to promotion focus, which is more relevant to consumers’ perceptions of hedonic attributes (Chernev, 2004; Chitturi, Raghunathan, & Mahajan, 2007). Moreover, as promotion goal is achieved through maximizing gains and preventing the absence of positive outcomes (e.g., unrealized opportunities), promotion focus was suggested to be strongly related to individuals’ desire for social benefits (Higgins, 1997; Molden, Lee, & Higgins, 2008). For example, researchers found that individuals with promotion goals are more likely to focus on strengthening social connections, viewing social interaction as an opportunity to share similarities with others (Molden et al., 2008; Righetti, Finkenauer, & Rusbult, 2011). At the same time, these individuals regarded missed social expressive opportunities as non-gain, which they tend to avoid (Molden et al., 2008). In contrast, individuals with prevention goal tend to view social interaction as a possible threat, failing to recognize the potential benefits of social interaction, because they are more likely to focus on specific features of a task to maintain security (Förster & Higgins, 2005; Förster & Werth, 2009). Thus, they may limit their social expression and interaction.

Likewise, regulatory foci have tremendous potential to influence individuals to strongly perceive value that matches their goals, particularly when promotion and prevention goals are dominant (Arnold & Reynolds, 2009; Higgins et al., 2001; Song & Qu, 2019). Studies have found that a better fit with one's dominant regulatory focus (e.g., promotion focus) does not preclude influences of another regulatory focus (e.g., prevention focus) (Gamache, McNamara, Mannor, & Johnson, 2014; Kim & Park, 2016; Song & Qu, 2019). Studies have also revealed that the two regulatory foci are not mutually inhibitory and the dominance of promotion orientation does not necessarily suppress prevention orientation (Cui & Ye, 2017; Higgins et al., 2001). In this respect, trait-level differences in each of the two independent self-regulation systems may lead individuals to display different patterns or strengths of relations with their perceptions (Keller, Mayo, Greifeneder, & Pfattheicher, 2015).

Despite such potential theoretical interplay, there is still a lack of empirical evidence in understanding how consumers' perceptions based on a promotion and prevention focus operate in the VFR literature. It is also unclear which focus is likely to play a stronger role in the formation of functional, experiential, and social beliefs toward VFRs. While originally developed as a way to examine the fit in the online environment, individuals can use VFRs for very different reasons, and these variations in motive can reflect trait-level differences among individuals. Given the influences of regulatory focus—which manifest as one's distinct goals—on the way individuals attend to and process various components of products or services based on the regulatory fit, it is reasonable to expect that distinct regulatory focus may contribute in predicting consumers' perceptions and subsequent adoption. Hence, the following hypothesis was developed regarding the relationship between regulatory focus and perceptions:

H4. Consumers' regulatory focus will have a significant influence on their perceptions of VFRs. Specifically,

H4a: Prevention focus will have a stronger positive influence on perceived functional value than promotion focus.

H4b: Promotion focus will have a stronger positive influence on perceived experiential value and perceived social value than prevention focus.

While regulatory focus, described as chronic goal-specific motivational orientations, can influence one's perceptions of an object in terms of the extent to which one experiences regulatory fit (Arnold & Reynolds, 2009; Song & Qu, 2019), the degree to which this process is converted into behavioral intention could also differ by trait-level individual differences (Harris & Hagger, 2007; Pham & Higgins, 2005). Although the interplay of promotion and prevention foci can predict the way consumers perceive the components of an object, individuals can place different weight on multiple values derived from their needs (e.g., functional, experiential, and social), based on the dominance of respective regulatory focus (Lapa, 2018). In previous studies, researchers suggested that promotion-focused individuals are more likely to be affective-driven, compared to prevention-focused individuals who tend to be cognitive-driven (Arnold & Reynolds, 2009; Pham & Avnet, 2004; Roy & Phau, 2014). In addition, even if particular objects (e.g., goods and services) can be expected to provide values consistent with their regulatory goals, individuals show the differences in the way they view the general environment (Friedman & Förster, 2001; Song & Qu, 2019). Previous researchers found that consumers' judgment on value has the power to influence their behavioral decision when an object generates a more positive attitude by matching with their regulatory goal (Das, 2016; Roy & Ng, 2012). However,

consumers can show differences in viewing the environment as either benign or not, simultaneously, based on regulatory focus (Yeo & Park, 2006). Thus, the extent to which consumers' behavioral decision is driven by positive and negative perceptions can also differ (Yeo & Park, 2006).

Individuals with promotion focus tend to view the environment as benign and tend to show eagerness in taking risks to engage in exploratory and creative behavior (Chowdhury, Ratneshwar, & Desai, 2009; Förster, Higgins, & Idson, 1998; Sun, 2011). They view new products or services as chances for achievement, thereby placing more importance on positive components (Herzenstein et al., 2007; Trudel, Murray, & Cotte, 2012). Similarly, Molden and Higgins (2008) argued that promotion-oriented individuals tend to prioritize gain and can be eager to adopt new choices once they perceive beneficial elements even when there are risks. In Herzenstein et al. (2007)'s study, promotion-focused individuals showed greater intention to purchase newly introduced products due to lowered sensitivity to perceived risks. In contrast, individuals with prevention focus, concerned with vigilance, are more likely to view the environment as risky and hazardous (Song & Qu, 2019). Thus, these individuals can express more negative emotions towards new objects, perceiving them as challenges rather than chances (Song & Qu, 2019). As they are more cautious, they tend to worry about risks and get distressed by them, weighing more on negative components (Molden & Higgins, 2008; Trudel et al., 2012). Similarly, they are less likely to be satisfied with positive components, exhibiting a more conservative bias in decision making (Crowe & Higgins, 1997; Higgins, 2002; Song & Qu, 2019). In other words, they may miss out on choices even if a product or service is perceived as somewhat beneficial (Molden & Higgins, 2008). Consistently, Koestner, Bernieri, and Zuckerman (1992) also found a higher attitude-behavior consistency among promotion-focused

individuals compared to prevention-focused individuals. In addition, Song and Qu (2019) revealed that promotion-focused individuals are more likely to show positive emotion toward their consumption compared to prevention-focused individuals who tend to show negative emotion. In light of these arguments, the following hypothesis was developed regarding the moderating effect of regulatory focus on the relationship between perceptions and adoption intention:

H5. The influences of consumers' perceived functional value (H5a: usefulness, H5b: ease-of-use, H5c: functional concerns), perceived experiential value (H5d: enjoyment, H5e: control, H5f: curiosity), and perceived social value (H5g: social benefits) on their intention to adopt VFRs will differ by regulatory focus.

Shopping Involvement

Involvement is associated with the extent to which individuals perceive personal relevance with situations or objects on the basis of inherent personal needs, values, and interest (Zaichkowsky, 1985). In previous studies, researchers classified involvement as either situational involvement, which is a mental state of temporary interest or concern engendered by a particular situation or cause (e.g., perceived risk), or enduring involvement, which is relatively stable across situations and over time (Micahelidou & Dibb, 2006; Zaltman & Wallendorf, 1983). While situational involvement has nothing to do with cognitive elements such as values and needs, when taking a cognitive-based approach, involvement can be conceptualized as the enduring individual difference variable that comes from individuals' perceived linkage between

their needs, interest, values, and subjective knowledge (Celsi & Olsen, 1988; Michaelidou & Dibb, 2006).

Researchers argued that individuals differ according to the degree to which they perceive personal relevance for target objects (e.g., products or services) or tasks (e.g., shopping), based on their long-term interest for the target (Jain & Sharma, 2002). In the consumer domain, enduring involvement was also described as the psychological connection between individuals and the target object, which can be a product, a brand, a product category, an activity, and a purchase decision (Celsi & Olsen, 1988; Michaelidou & Dibb, 2006). Thus, when conceptualized as the individual difference variable, shopping involvement can be defined as an individual's interest in and perceptions of importance of shopping in general and the shopping process itself, which comes from "a function of the individual's strength of values and prior experiences" associated with shopping and the shopping process (Burton & Netemeyer, 1992, p. 143). Consistently, researchers described shopping involvement as one's tendency to perceive shopping as personally relevant, connected, and related to one's life or to place importance on shopping (Abdul-Ghani, 2009; Hu & Yu, 2007; Zaichkowsky, 1985).

In previous studies, enduring involvement was found to be manifested through extensive information search, knowledge, and eventually commitment toward the target (Michaelidou & Dibb, 2008). Researchers revealed that highly-involved consumers tend to show greater engagement because they are more likely to process extensive information, searching for more details and new information, as well as conscientiously evaluating that information using a series of criteria (Balabanis & Reynolds, 2001). Based on prior information searches and processing, these individuals can better understand the value of shopping with their greater tendency to invest cognitive resources and experience enjoyment across shopping situations (Balabanis &

Reynolds, 2001; Im & Ha, 2011; Yoo & Lennon, 2014). Similarly, Bergadaà, Faure, and Perrien (1995) found that individuals with high shopping involvement tend to be motivated to act rationally for their shopping purposes (e.g., economic, leisure, social), believing in their power over their own destiny, unlike apathetic individuals. Specifically, individuals with a higher shopping involvement were found to have greater economic, leisure, and social orientations in the shopping process (Bergadaà et al., 1995).

Enduring shopping involvement can be treated as the intensity of an attitude towards shopping resulting in differences in the decision-making process and subsequent behavior (Ghafelehbashi, Amin, & Fatemeh, 2011; Michaelidou & Dibb, 2006; Sherif & Sherif, 1967). Similarly, Michaelidou and Dibb (2008) described shopping involvement as a property of an attitude that provides pleasure and comes from consumers' cognition of shopping as related with the self. Conceptualized as the intensity of an attitude towards shopping, shopping involvement at the trait level can represent the long-term attachment of an individual with shopping, which can have significant consequences on individuals' decision-making and behavior (Hu & Yu, 2007; Jain & Sharma, 2002; Michaelidou & Dibb, 2008). Based on the degree to which individuals perceive shopping as personally relevant to themselves, the extent to which individuals are driven by their perceptions can differ, as the level of decision importance associated with shopping can differ (Chen & Tsai, 2008; Eroglu, Machleit, & Davis, 2001). When individuals believe that shopping can provide values that are of personal interest, they can place more weight on values provided by participating in such activities (e.g., shopping in VFRs), further conveying more positive attitudes and overt behaviors (Celsi & Olson, 1988; Chen & Tsai, 2008). Previous researchers also found that consumers can display more positive attitudes when they perceived values that are personally relevant to their self-image, conveying

greater behavioral intention due to a greater degree of psychological connection (Celsi & Olson, 1988; Chen & Tsai, 2008). Also, Burton and Netemeyer (1992) argued that individuals are less likely to convey confidence in their attitude judgment and subsequent behavior when they lack personal interest. In this way, the higher the level of involvement with shopping, the greater the likelihood that consumers' perceptions toward shopping in VFRs will lead to greater adoption intention.

In particular, a larger emphasis can be placed on intrinsic value provided in the shopping process among those who have high enduring shopping involvement compared to those who have low enduring shopping involvement (Jayawardhena & Wright, 2009; Sohn & Lee, 2017). For example, in a previous study, consumers with high shopping involvement showed greater intention to accept higher prices as they are more likely to evaluate the hedonic aspects of shopping (Gyulavári, Kolos, & Kenesei, 2011). Basically, individuals with a high level of shopping involvement are characterized as having increased engagement in shopping for economic, leisure, and/or social-oriented reasons (Bosnjak et al., 2007; Bergadaà et al., 1995). These individuals tend to regard shopping as a leisure activity or hobby, as shopping is believed to provide significant economic, psychological, and social benefits (Bergadaà et al., 1995; Sohn & Lee, 2017). They are, thus, more likely to be intrinsically driven by values in the shopping process which further direct their engaging behaviors (Jayawardhena & Wright, 2009; Sohn & Lee, 2017). In this respect, when deciding whether to use VFRs for apparel shopping, shopping involvement has the potential to play a key function that intensifies anticipatory behavioral responses as individuals with high shopping involvement are more likely to be intrinsically driven by values offered by VFRs (Jayawardhena & Wright, 2009; Kinley, Josiam, & Lockett, 2010; Sohn & Lee, 2017). In light of these arguments, we propose:

H6. The influences of consumers' perceived functional value (H6a: usefulness, H6b: ease-of-use, H6c: functional concerns), perceived experiential value (H6d: enjoyment, H6e: control, H6f: curiosity), and perceived social value (H6g: social benefits) of VFRs on adoption intention will differ by shopping involvement.

CHAPTER 3: METHODOLOGY

Research Model

This study aimed to investigate the influence of chronic regulatory focus and shopping involvement on consumers' VFR adoption via VFR perceptions. Additionally, the moderating effects of trait-level differences in regulatory focus and shopping involvement were also examined between VFR perceptions and adoption intention. Figure 1 depicts the relationships as proposed in the hypotheses.

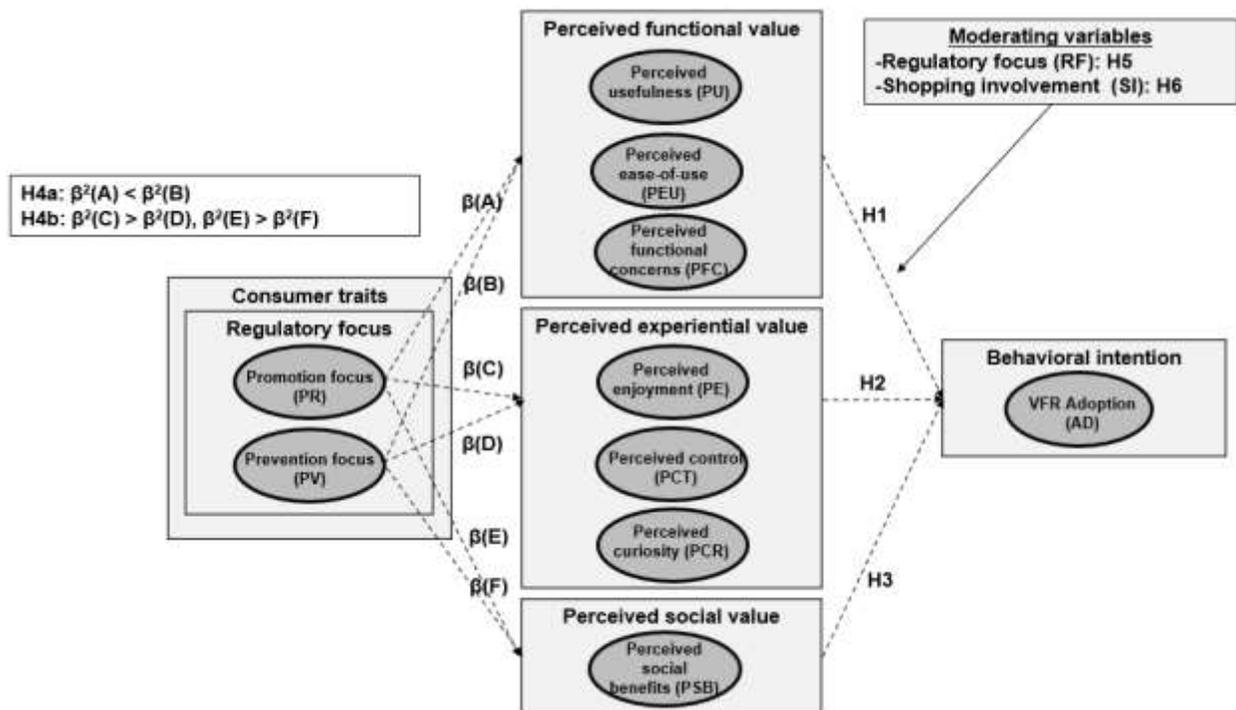


Figure 1. Research Model.

Research Design

A mixed-methods approach was used to examine the proposed research model. To empirically test the proposed relationships built upon the literature review, an online survey was

conducted. To strengthen the empirical examination of the proposed relationships, focus group interviews were conducted as a pretest to explore consumers' multifaceted demands and perceptions of VFRs. Exploratory research is useful when researchers are unsure of the depth and breadth of issues they will encounter while conducting a study (Zikmund, 1997). As VFR technology is relatively new, focus group discussions can help to capture a rich understanding of unmet demands of consumers by exploring underlying perceptions about VFRs (Strauss & Corbin, 1990). In this research, focus group interviews were conducted to validate the three dimensions of consumers' perceived values of VFRs developed based on the literature. Additionally, focus group interviews were used to form the basis of the development of the questionnaire (e.g. perceived social benefits). The qualitative information gained from focus group discussions informed the development of the measurement items to be used in the context of VFRs. Though focus group interviews helped explore the causes of behavior through consumers' thoughts and actions, further validating the research model, findings from those interviews will not be representative of the larger population, which necessitates the empirical examination of the proposed model with a larger sample.

Focus Group Interviews

Two replicated sessions of focus group interviews were conducted to gain a qualitative understanding of consumers' perceptions toward the use of VFR upon the approval of Institutional Review Board (IRB) (Appendix A). Students interested in VFRs at a U.S. university were recruited for the interviews via invitations through e-mails and paper flyers distributed in public places on campus. The reason for using student participants is because they, as young consumers tend to be tech-savvy and would have an understanding of newly emerging

technologies such as VFRs. A total of 21 students participated in two replicated focus group sessions; there were 9 male and 12 female participants. Participants experienced a brief oral presentation about VFR technology prior to focus group discussions. During interviews, researchers asked participants to talk about their perceptions of VFRs. Sample questions included “In your opinion, what would be the main advantages and disadvantages of using VFRs?” and “Are there any particular reasons that hold you back from using VFRs?” Probes or follow-up questions were also used to elicit more detailed information, as well as for clarification when needed. Both closed and open-ended questions were used to allow the collection of both standardized and unanticipated responses (Chrisnall, 1997). Each group discussion session lasted about 90 minutes and was administered in a lively and informal manner. Each participant received an appreciation Starbucks gift card of \$5.

Online Survey

An online survey was used to collect quantitative data to test the proposed model. A survey (Appendix B) was conducted with IRB approval (Appendix C) obtained through North Carolina State University prior to survey distribution. Qualtrics, an online survey software and questionnaire tool, was used to create the online survey. Respondents were provided with a web-link directing them to the questionnaire via an online data collection agency Qualtrics. The survey took approximately 15 minutes to complete thoroughly. Qualtrics automatically recorded and stored responses for data analysis. Data collection took place over an eight-week period from November 2019 to December 2019. The target population of this study is consumers between ages 21 and 64, who have online apparel shopping experiences and have, at least, heard of VFRs in the past. Convenience sampling was used to recruit participants for the survey. The goal was

to obtain a total of 450 completed surveys. During the data collection process, ongoing monitoring was implemented to delete incomplete surveys and surveys completed in an obviously careless manner.

Survey Instruments

Established scales were used and adapted to the context of VFRs to measure the following variables pertaining to this study: regulatory focus, shopping involvement, perceived functional value (i.e., usefulness, ease-of-use, functional concerns), perceived experiential value (i.e., control, curiosity, enjoyment), perceived social value (i.e., social benefits) of VFRs, and adoption intention. All items were measured using a seven-point Likert scale ranging from one (strongly disagree) to seven (strongly agree). Basic demographic information as well as information on consumers' general online apparel shopping behavior were also collected.

Regulatory Focus

Consumers' regulatory focus is individuals' enduring goal-specific motivational orientations that pertain to their self-regulation tendencies for goal attainment, and can assume two roles: promotion focus and prevention focus (Higgins, 1997, Higgins et al., 2001). This study adopted the well-known and validated chronic regulatory focus measure developed by Lockwood, Jordan, and Kunda (2002). This measurement scale consists of eight items for each focus (Table 2). The eight items for each regulatory focus are independent measures, representing different dimensionality, although promotion focus and prevention focus can show orthogonal relationships (Higgins et al., 2001; Lockwood et al., 2002). Sample questions for promotion focus from this scale are as follows: "I frequently imagine how I will achieve my

hopes and aspirations”, “I often think about the person I would ideally like to be in the future”, and “I typically focus on the success I hope to achieve in the future”. By contrast, sample questions for prevention focus are as follows: “In general, I am focused on preventing negative events in my life”, “I am anxious that I will fall short of my responsibilities and obligations”, and “I often think about the person I am afraid I might become in the future”.

Table 2. Regulatory Focus Measurement.

Regulatory focus: Promotion focus (Lockwood et al., 2002)	PR1. I frequently imagine how I will achieve my hopes and aspirations.
	PR2. I often think about the person I would ideally like to be in the future.
	PR3. I typically focus on the success I hope to achieve in the future.
	PR4. My major goal is to achieve my personal ambitions.
	PR5. I see myself as someone who is primarily striving to reach my “ideal self”-to fulfill my hopes, wishes, and aspirations.
	PR6. In general, I am focused on achieving positive outcomes in my life.
	PR7. I often imagine myself experiencing good things that I hope will happen to me.
	PR8. Overall, I am more oriented toward achieving success than preventing failure.
Regulatory focus: Prevention focus (Lockwood et al., 2002)	PV1. In general, I am focused on preventing negative events in my life.
	PV2. I am anxious that I will fall short of my responsibilities and obligations.
	PV3. I often think about the person I am afraid I might become in the future.
	PV4. I often worry that I will fail to accomplish my personal goals.
	PV5. I often imagine myself experiencing bad things that I fear might happen to me.
	PV6. I frequently think about how I can prevent failures in my life.
	PV7. I am more oriented toward preventing losses than I am toward achieving gains.
	PV8. I see myself as someone who is primarily striving to become the self I “ought” to be—to fulfill my duties, responsibilities, and obligations.

Shopping Involvement

Shopping involvement was defined as individuals' long-term and enduring tendencies to perceive shopping as relevant, important, connected, and related to their life (Abdul-Ghani, 2009; Bergadaà et al., 1995; Zaichkowsky, 1985). Shopping involvement was measured using five items from Havitz and Mannell (2005) by asking "Shopping is something that interests me a lot", "I really enjoy shopping", "I am confident that shopping is the right activity for me at this moment", "My shopping gives me a glimpse of the type of person I really am", and "I will be annoyed if shopping proves to be a poor use of my time" (Table 3).

Table 3. Shopping Involvement Measurement.

Shopping involvement (Havitz & Mannell, 2005)	SI1. Shopping is something that interests me a lot.
	SI2. I really enjoy shopping.
	SI3. I am confident that shopping is the right activity for me at this moment.
	SI4. My shopping gives a glimpse of the type of person I really am.
	SI5. I will be annoyed if shopping proves to be a poor use of my time.

Perceived Functional Value

Perceived functional value was defined as consumers' beliefs and expectations toward functional performances of VFRs (Koo, 2009). As consumers' perceptions of functional value encompass consumers' cognitive trade-offs between benefits and concerns, both positive functional value, including perceived usefulness and ease-of-use, and negative functional value, including perceived functional concerns, were measured using existing scales (Kim et al., 2007; Park et al., 2008) (Table 4). Perceived usefulness was defined as the degree to which an individual believes that the use of VFRs will help them perform fitting tasks (Nikou & Economides, 2017) and was measured using a total of three items by Davis (1998), which are

“VFRs can aid me in evaluating garment fit for online apparel shopping”, “Using VFRs will enhance my shopping effectiveness by reducing fit problems”, and “Using VFRs will increase my shopping productivity through aiding me in evaluating garment fit”. While perceived usefulness represents perceived quality of outcomes while using a certain technology, perceived ease-of-use is associated with the effort required to use a technology (Davis, 1989). Thus, perceived ease-of-use was defined as the degree to which an individual believes that the use of VFRs is free of effort in this study (Nikou & Economides, 2017) and was measured using three items by Davis (1989), which asked “I think the interface of VFRs will be clear and understandable”, “I think it will be easy to use VFRs”, and “It will be easy for me to become skillful at using VFRs”. Perceived functional concerns in this study represent the degree to which an individual perceives risks associated with the functional performance of VFRs, including risks associated with security/privacy and accuracy. A total of three items were used to measure functional concerns, including two items for security/privacy concerns from Korgaonakar and Wolin (1999) (i.e., “I have a concern when uploading my personal information (such as body measurement) when use VFRs”, “I am afraid that my personal information shared on VFRs might not be secure”) and one item for accuracy concerns from Elliott, Hall, and Meng (2013) (i.e., “The representation of the virtual garment on my avatar might not have good realism”).

Table 4. Perceived Functional Value Measurement.

Perceived functional value	Usefulness (Davis, 1989)	PU1. VFRs can aid me in evaluating garment fit for online apparel shopping.
		PU2. Using VFRs will enhance my shopping effectiveness by reducing fit problems.
		PU3. Using VFRs will increase my shopping productivity through aiding me in evaluating garment fit.

Table 4 (continued).

Perceived functional value	Ease-of-use (Davis, 1989)	PEU1. I think the interface of VFRs will be clear and understandable.
		PEU2. I think it will be easy to use VFRs.
		PEU3. It will be easy for me to become skillful at using VFRs.
	Functional concerns (Elliott et al., 2013; Korgaonakar & Wolin, 1999)	PFC1. I have a concern when uploading my personal information (such as body measurement) when use VFRs.
		PFC2. I am afraid that my personal information shared on VFRs might not be secure.
		PFC3. The representation of the virtual garment on my avatar might not have good realism.

Perceived Experiential Value

Perceived experiential value was defined as consumers' beliefs and expectations towards the experiential process of performing activities in VFRs (Koo, 2009). Consumers' perceptions of experiential value towards the use of VFRs can be characterized by individuals' perceptions of enjoyment, control, and curiosity—considering its interactive and novel characteristics (Beck & Crie, 2018; Hoffman & Novak, 2009; Kim & Forsythe, 2008). Enjoyment was defined as the degree to which an individual believes fun and pleasure can be derived from using VFRs (Domina et al., 2012). A total of three items from Davis et al. (1992) were adopted to measure enjoyment, including “Using VFRs for online apparel shopping will be enjoyable”, “It will be a pleasant experience to use VFRs for online apparel shopping”, and “I would have fun using VFRs” (Table 5). Control refers to the degree to which an individual believes VFRs give them a sense of control over the interaction, and curiosity is the perceptual degree of desire to have an interest in and pay attention to VFRs (Domina et al., 2012). Control was measured by three items from Huang (2003). Questions for control include “I think I can choose how I want my avatar to be displayed (such as posture, background)”, “I think I can modify the features of my virtual image, such as hair color and skin type”, and “I think I can manipulate the outfit of my

avatar by mixing and matching different clothing and accessory items”. Curiosity was measured using three items from Huang (2003). Also, questions for curiosity include “Using VFRs will stimulate my interests”, “Using VFRs will satisfy my curiosity”, and “Using VFRs will arouse my imagination”.

Table 5. Perceived Experiential Value Measurement.

Perceived experiential value	Enjoyment (Davis, 1989)	PE1. Using VFRs for online apparel shopping will be enjoyable.
		PE2. It will be a pleasant experience to use VFRs for online apparel shopping.
		PE3. I would have fun using VFRs.
	Control (Huang, 2003)	PCT1. I think I can choose how I want my avatar to be displayed (such as posture, background).
		PCT2. I think I can modify the features of my virtual image, such as hair color and skin type.
		PCT3. I think I can manipulate the outfit of my avatar by mixing and matching different clothing and accessory items.
	Curiosity (Huang, 2003)	PCR1. Using VFRs will stimulate my interests.
		PCR2. Using VFRs will satisfy my curiosity.
		PCR3. Using VFRs will arouse my imagination.

Perceived Social Value

Perceived social value was defined as consumers’ beliefs and expectations toward VFRs to satisfy their desire to fulfill internally generated needs for self-enhancement, group membership, or ego-identification (Rintamäki et al., 2006). To capture the degree to which an individual believes that the use of VFRs will provide social benefits through meeting the social/expressive needs, a total of four items were adopted from Alshibly (2015) (Table 6). To fit the measurement items of Alshibly (2015), which were developed to measure perceived social value in the context of social commerce, to the context of VFRs, the results of focus group discussions were used and referred in order to address consumers’ perceived social value of VFRs. Questions for perceived social value of VFR include “I think using VFRs may allow me to share my virtual image

with my friends”, “I think using VFRs will allow me to receive feedback from my friends on my virtual image”, and “My friends' feedback on my virtual image can make me feel more confident about my purchase decision.”

Table 6. Perceived Social Value Measurement.

Perceived social value	Social benefits (Alshibly, 2015)	PSB1. I think using VFRs may allow me to share my virtual image with my friends.
		PSB2. I think using VFRs will allow me to receive feedback from my friends on my virtual image.
		PSB3. My friends' feedback on my virtual image can make me feel more confident about my purchase decisions.

Adoption Intention

Adoption intention was defined as an individuals’ likelihood to adopt a technology (Venkatesh et al., 2003). In this study, adoption intention refers to consumers’ intention to adopt VFRs, and was measured by three items adapted from Nikou and Economides (2017) and Venkatesh et al. (2003), including “I intend to use VFRs in the future for my apparel shopping”, “It is very likely that I would use VFRs in the future”, “I expect that I will use VFRs the next time I shop” (Table 7).

Table 7. Adoption Intention Measurement.

Adoption intention (Nikou & Economides, 2017; Venkatesh et al., 2003)	AD1. I intend to use VFRs in the future for my apparel shopping.
	AD2. It is very likely that I would use VFRs in the future.
	AD3. I expect that I will use VFRs in the next time I shop.

Data Analysis

Focus Group Interviews

To analyze qualitative data obtained from the two focus group sessions, audio-recorded and transcribed interviews were extensively reviewed, and each line was analyzed to validate the

use of a priori themes in the research model and to improve the measurement items to be used in the survey. A content analysis was conducted to systematically review transcripts to validate the three dimensions of perceived values. Specifically, the transcripts were reviewed to check: 1) if the three dimensions of perceived values were revealed in the focus group interviews; 2) if any additional dimension, beyond the three proposed in research model, emerged in the focus group interviews. With that goal, a first draft of thematic categories was developed through comparing responses acquired from participants. Additional themes were identified during the content analysis process and added to the first draft of themes. Resulting themes were updated and reconciled while referring to the original audio recordings for clarification. Additionally, the contents of the identified themes were used as a source to provide inputs to clarify and improve the measurement items of perceived values.

Online Survey

Each returned questionnaire was coded and logged into an SPSS data file. Coded data were cross-checked. Descriptive analyses (frequency analyses) were conducted to generate respondents' profile and background information regarding their general online apparel shopping behavior such as shopping frequency as well as prior experiences with VFRs. Reliability analyses were employed to test internal consistency of survey measures. Then, to test the proposed hypotheses, Structural Equation Modeling (SEM) analysis was conducted by using AMOS 22, including the analysis of the percentage of variance explained to understand influential power of promotion focus and prevention focus on consumers' perceptions and the multi-group comparison to examine moderating effects.

CHAPTER 4: RESULTS AND DISCUSSION

In the following sections, results of focus group discussions and online survey are presented. First, findings of the focus group discussions are presented. Second, characteristics of the survey respondents are described with an explanation of the data screening and cleaning process. Third, to understand the effect of regulatory focus and shopping involvement on perceptions and adoption intentions of VFRs, the measurement model was first evaluated and model fit indices are discussed. Fourth, the results of a single group SEM analysis are presented. Fifth, the configuration and measurement invariances between models for groups with different level of regulatory focus and shopping involvement are discussed. Finally, the results of multi-group analyses to examine the moderating effect are presented. This chapter concludes with a discussion of the results.

Focus Group Interviews

The focus group interviews confirmed the three dimensions of consumer perceived values of VFRs, namely functional, experiential, and social benefits. There were varying opinions among interviewees when talking about the benefits of VFRs. Interviewees greatly appreciated the functional value of VFRs, such as the ability to quickly assess fit with accurate and detailed information on the customized model image before purchase. One interviewee said, *“The VFRs may let me know more about the contour and how it drapes rather than just pictorial image...”* while another said, *“All the problems in the online are like the fitting. I just don’t feel like confident enough with size and style..., but if they have an accurate virtual model body simulation...it will be really helpful...”* Similarly, interviewees strongly perceived functional benefits in terms of usefulness as VFR’s can provide at least a chance to examine their fit in the

virtual space. Also, interviewees believed that VFR's can provide accurate fitting experiences. For example, they projected that the customized figure of an avatar and/or a precise fitting experience could be offered by VFRs with advanced features. One interviewee said, *"With VFRs that have more precise skin tone shades and hair colors..., you can see how the fabric looks as well as how it fits."* Overall, interviewees believed that the use of VFRs can enhance their shopping effectiveness and shopping productivity. Also, they positively perceived the element of comparison shopping and ease-of-shopping offered by VFRs. One interviewee said, *"It may reduce my time-spending because I can easily screen different types of clothing."*

Despite the great appreciation of its functionality, a number of functional concerns toward VFRs were perceived at the same time in terms of accuracy, convenience, and security. Interviewees expressed significant fit-related concerns toward VFRs because they believed visuals shown in VFRs cannot replace the accurate fitting experience available in the traditional in-store fitting, which allows them to physically examine the functional fit. One interviewee said, *"I am concerned about...functional aspects...I cannot tell whether it will fit me or not"*. While interviewees agree that seeing the virtual garments on an avatar would help them to *"have a general opinion"* regarding their outfit, they questioned the fitting-wise accuracy of VFRs.

Regarding complexity that undermines the convenience and accuracy, one interviewee said, *"If I have to type all the information, such as my height and every detail about my body, it would be very time-consuming and inconvenient."* Another said, *"It would be measurable in terms of how I accurately enter my body measures and photos, but photos... I think it really depends on what I wear"*, thus, expressing concerns regarding the inaccuracy derived from the complexity of virtual fitting process. In terms of security and privacy, one interviewee said, *"Personal data can be retrieved. I would not want to go to the website or to picture myself"*

through cellphone. I think I want security...” Likewise, perceived functional concerns were primarily expressed in terms of the potential product risk, derived from inaccurate representation of the virtual garment on their avatar, or the potential information risk involved in inputting personal information, which can infringe on their privacy and security.

On the other hand, interviewees perceived significant experiential benefits, which were identified as one of the vital reasons they would use VFRs. In general, the participants perceived the experience of using VFR’s as game-like. Most of them demonstrated curiosity toward VFRs as well as enjoyment of seeing images of personalized avatars. One interviewee said, *“I have never before seen stores where VFRs are placed, so if there are VFRs, I am definitely going to try and satisfy my curiosity with it.”* Another said, *“A lot of combinations can be made, so that would be really fun. I can get instant pleasure by seeing what I could wear and how it would fit instantly.”*

Lastly, social benefits derived from the sharing system were perceived to be useful and fun because VFRs allowed users to communicate with others, giving chances for social identification and approval. They perceived the use of VFRs as an opportunity to express their self through sharing images as well. One interviewee stated the following:

A lot of the time, you would wear something to take a picture, and send the photo to the friends to hear that “Oh, I like it,” so you do not really need [to purchase] it, I mean the clothes, but you just need a picture.

Another said, *“It would be really fun to share the visual with others, I can share what I like using the visuals and can talk about which style would be best.”* Overall, interviewees agreed that VFRs were functionally, experientially, and socially beneficial in the shopping process. In light of the findings from the focus group discussions, the three dimensions of consumers’

perceived values of VFRs, including functional, experiential, and social values, were confirmed as suggested in the research model. Also, based on the results of focus group discussions, sub-dimensions of functional, experiential, and social value were identified and developed. Additionally, measurement items for each perceived value were improved and clarified.

Sample Profile for the Online Survey

A total of 5,393 subjects were contacted via emails by the sampling company contracted for this study. Ongoing monitoring was implemented to ensure the quality of the survey. The data collection process was terminated when the planned number of responses was obtained. Out of the 554 surveys collected that meets the two sampling criteria (i.e., have at least heard of VFRs, have online shopping experiences), 78 questionnaires were removed from the data pool. The following two criteria were used to screen and delete responses in the monitoring process: (1) questions for the key constructs were not answered (66 questionnaires were deleted) and (2) selected the same choice for every question (12 questionnaires were deleted). After this data screening and cleaning process, 86.64% of total questionnaires, 480 complete surveys, were retained for further data analyses.

The demographic characteristics of the sample are summarized in Table 8. Among the final sample (N = 480), there were equal numbers of female respondents and male respondents. The sample was pretty evenly distributed among all the age groups, with a relatively higher percentage for age group 25- 29, and a relatively smaller percentage for age group 21-25. In terms of education, close to half of the respondents had a bachelor's degree (31.9%) or a graduate degree (13.3%), with another third of the sample had some college education but no degree. The remaining respondents had a high school diploma or less education. Less than a third

of the respondents' annual household income was \$75,000 or more, with another 22% in the range of \$50,000-\$75,000. The remaining half of the respondents' annual household income below \$50,000.

Table 8. Sample Profile.

Demographic variables	Count (N)	Percentage (%)
Gender		
Female	240	50.0%
Male	240	50.0%
Age		
21~24	25	5.2%
25~29	81	16.9%
30~34	55	11.5%
35~39	53	11.0%
40~44	61	12.7%
45~49	46	9.6%
50~54	51	10.6%
55~59	54	11.3%
60~64	54	11.3%
Education		
Less than high school diploma	11	2.3%
High school diploma	93	19.4%
Some college, no degree	159	33.1%
Bachelor's degree	153	31.9%
Graduate degree	64	13.3%
Annual household income		
Less than \$20,000	88	18.3%
\$20,000~\$34,999	91	19.0%
\$35,000~\$49,999	60	12.5%
\$50,000 ~\$74,999	104	21.7%
\$75,000 or more	137	28.5%
Shopping frequency		
Never	2	0.4%
Less than once a month	118	24.6%
Once a month	131	27.3%
Twice a month	97	20.2%
More than twice a month	132	27.5%
Fit problem in online		
Yes	330	68.8%
No	150	31.3%
VFR experience		
Yes	172	35.8%
No	308	64.2%

Table 8 (continued).

VFR satisfaction		
Yes	156	90.7%
No	16	9.3%
VFR knowledge		
Somewhat knowledgeable	362	75.4%
Quite knowledgeable	64	13.3%
Very knowledgeable	54	11.3%
Close others using VFRs		
Yes	179	37.3%
No	301	62.7%
Total	480	100%

In addition to demographic characteristics, respondents' general online shopping behavior as well as their general experience with VFRs were also measured. Close to half of the respondents indicated that they shopped online for apparel products at least twice a month, followed by once a month (27.3%), less than once a month (24.6%), and never (0.4%). The majority of respondents (68.8%) indicated that they have experienced problems with buying apparel products online in terms of fit. Only about a third (35.8%) of the respondents indicated they have experienced VFRs in the past. Among them, majority of them (90.7%) indicated that they were satisfied with their VFR experience.

Specific popular stores in which the respondents used VFRs included, Macy's, Amazon, Kohl's, Pink (Victoria's Secret), Lands' End, etc. (Table 9). Thus, it seemed there were a variety of retailers and brands that started to adopt VFRs to enhance consumers' shopping experience. In terms of the level of knowledge of VFRs, the majority of the respondents indicated that they were somewhat knowledgeable in VFRs (75.4%), followed by those who were quite knowledgeable (13.3%), and very knowledgeable (11.3%). In addition, the majority of respondents indicated that there was no one close to them (e.g., friends and/or family) used VFRs in the past (62.7%).

Table 9. Brands/Retailers for VFR Experience.

Stores	Count (N)
Macy's	39
Amazon	23
Kohl's	9
Lands' End	6
Pink (Victoria's Secret)	6
Gap	5
Stitch Fix	5
Target	5
Walmart	5
JC Penny	4
Nike	4
Saks Fifth Avenue	4
American Eagle	2
ASOS	2
H&M	2
Nordstrom	2
Ross	2
Aeropostale	1
Birch box	1
Bonobos	1
Calvin Klein	1
Champion	1
Citi Trends	1
Gucci	1
Forever 21	1
HerRoom	1
Jean Shop (triMirror)	1
Lacoste	1
Lane Bryant	1
Levis	1
Lululemon	1
M Tailor	1
ModaXpress	1
Old Navy	1
Polo Ralph Lauren	1
Shein.com	1
Spanx	1
Uniqlo	1
UNTUCKit	1
Cannot Recall	25
Total	172

Assessment of the Measurement Model

The two-step approach of SEM suggested by Anderson and Gerbing (1988) was adopted to test H1-H4 regarding the influence of regulatory focus on consumers' perceptions, and adoption intention of VFRs. A confirmatory factor analysis (CFA) was first conducted to assess the model fit, and the results are illustrated in Table 10. Values greater than 0.90 for incremental fit indices, namely, comparative fit index (CFI) and incremental fit index (IFI), are standard cutoff points for adequate fit (Bentler & Bonnet, 1980). Additionally, values smaller than .06 for the root mean square error of approximation (RMSEA) and less than .08 for the standardized root mean square residual (SRMR) are considered an indication of acceptable model fit (Hu & Bentler, 1999). Per the model fit criteria proposed by prior studies, the overall fit of the measurement model was deemed acceptable: $\chi^2 = 1567.192$ ($df = 695$, $p = .000$), SRMR = .037 (< .08), Tucker Lewis index (TLI) = .949 (> .9), IFI = .955 (> .9), CFI = .954 (> .9), and RMSEA = .051 (< .06). Significant t-values of factor loadings (λ) indicated good convergent validity (Table 10). Cronbach's alpha (α) values of all constructs were greater than .70, composite reliability (C.R.) values were greater than .70, and average variance extracted values (AVE) were greater than .50. The results indicated that the measurement model was internally consistent, implying convergent validity for each latent variable. Correlations among the ten latent variables were less than .90, indicating the absence of a multicollinearity problem. All AVEs were greater than the squared correlations (R^2), achieving discriminant validity for each latent variable (Hu & Bentler, 1999) (Table 11).

Table 10. Confirmatory Factor Analysis Results.

Construct	Item	λ Factor loading	C.R.	Cronbach's α	AVE
Promotion focus (PR)	PR1	.857***	.950	.946	.705
	PR2	.868***			
	PR3	.877***			
	PR4	.824***			
	PR5	.874***			
	PR6	.832***			
	PR7	.797***			
	PR8	.783***			
Prevention focus (PV)	PV1	.879***	.968	.968	.789
	PV2	.904***			
	PV3	.934***			
	PV4	.932***			
	PV5	.919***			
	PV6	.884***			
	PV7	.852***			
	PV8	.795***			
Usefulness (PU)	PU1	.867***	.905	.904	.761
	PU2	.911***			
	PU3	.838***			
Ease-of-use (PEU)	PEU1	.882***	.925	.923	.842
	PEU2	.935***			
	PEU3	.873***			
Functional concerns (PFC)	PFC1	.935***	.955	.953	.877
	PFC2	.967***			
	PFC3	.906***			
Enjoyment (PE)	PE1	.903***	.940	.939	.841
	PE2	.943***			
	PE3	.904***			
Control (PCT)	PCT1	.788***	.757	.757	.557
	PCT2	.717***			
	PCT3	.732***			
Curiosity (PCR)	PCR1	.850***	.875	.874	.700
	PCR2	.849***			
	PCR3	.810***			
Social benefits (PSB)	PSB1	.905***	.886	.873	.723
	PSB2	.906***			
	PSB3	.728***			
Adoption (AD)	AD1	.861***	.933	.932	.823
	AD2	.924***			
	AD3	.935***			

Notes: ***: $p < .001$

Table 11. AVE Values and Squared Correlation of Each Latent Variable.

	PR	PV	PU	PEU	PFC	PE	PCT	PCR	PSB	AD
PR	.705									
PV	.055	.789								
PU	.196	.000	.761							
PEU	.208	.000	.444	.842						
PFC	.001	.162	.076	.075	.877					
PE	.237	.003	.530	.552	.078	.841				
PCT	.343	.005	.426	.408	.013	.423	.557			
PCR	.305	.002	.511	.533	.053	.551	.486	.700		
PSB	.245	.017	.266	.306	.006	.346	.406	.364	.723	
AD	.275	.001	.549	.500	.051	.650	.430	.643	.384	.823

Notes: The average variance extracted (AVE) are in boldface. The squared correlations (R^2) of all constructs are on the off-diagonal.

Structural Model Analysis and Hypotheses Testing

Test of Main Effects

Single group SEM was used to test H1-H4. The overall fit indices showed a satisfactory fit to the data: $\chi^2 = 1917.062$ ($df = 718$, $p = .000$), SRMR = .066, TLI = .932, IFI = .938, CFI = .938, RMSEA = .059. The maximum likelihood estimation was used to estimate the path coefficients. The SEM results are displayed in Table 12, Figure 2, and Figure 3.

Table 12. Path Coefficients between Latent Variables.

Path	Standardized estimates (β)	S.E.	C.R.	p	β^2
PU \rightarrow AD (H1a)	.260***	.039	7.062	.000	.068
PEU \rightarrow AD (H1b)	.121***	.035	3.362	.000	.015
PFC \rightarrow AD (H1c)	-.003	.022	-.105	.916	.000
PE \rightarrow AD (H2a)	.356***	.037	9.467	.000	.127
PCT \rightarrow AD (H2b)	.032	.050	.750	.453	.001
PCR \rightarrow AD (H2c)	.267***	.041	6.530	.000	.071
PSB \rightarrow AD (H3)	.152***	.030	4.143	.000	.023
PR \rightarrow PU (H4a)	.549***	.046	11.692	.000	.301
PV \rightarrow PU (H4a)	-.124**	.034	-2.842	.004	.015
PR \rightarrow PEU (H4a)	.562***	.049	12.353	.000	.316
PV \rightarrow PEU (H4a)	-.127**	.036	-2.996	.003	.016

Table 12 (continued).

PR → PFC (H4a)	-.112*	.066	-2.482	.013	.013
PV → PFC (H4a)	.434***	.054	9.518	.000	.188
PR → PE (H4b)	.592***	.049	12.870	.000	.350
PV → PE (H4b)	-.098*	.035	-2.370	.018	.010
PR → PCT (H4b)	.673***	.048	12.595	.000	.453
PV → PCT (H4b)	-.098*	.032	-2.168	.030	.010
PR → PCR (H4b)	.658***	.051	13.460	.000	.433
PV → PCR (H4b)	-.123**	.035	-2.948	.003	.015
PR → PSB (H4b)	.555***	.060	11.821	.000	.308
PV → PSB (H4b)	-.008	.044	-.177	.860	.000

Notes: *: $p < .05$, **: $p < .01$, ***: $p < .001$

Abbreviations: S.E., standard error, C.R., critical ratio

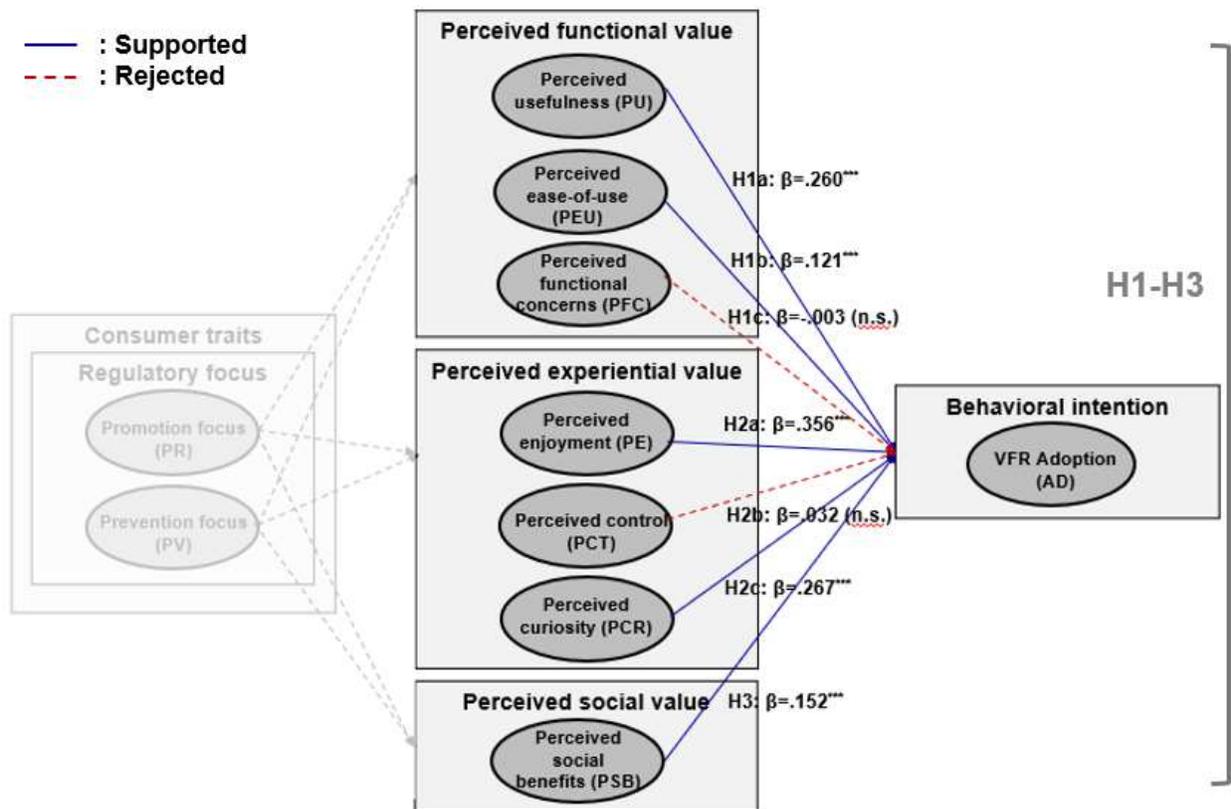


Figure 2. SEM Results (H1-H3).

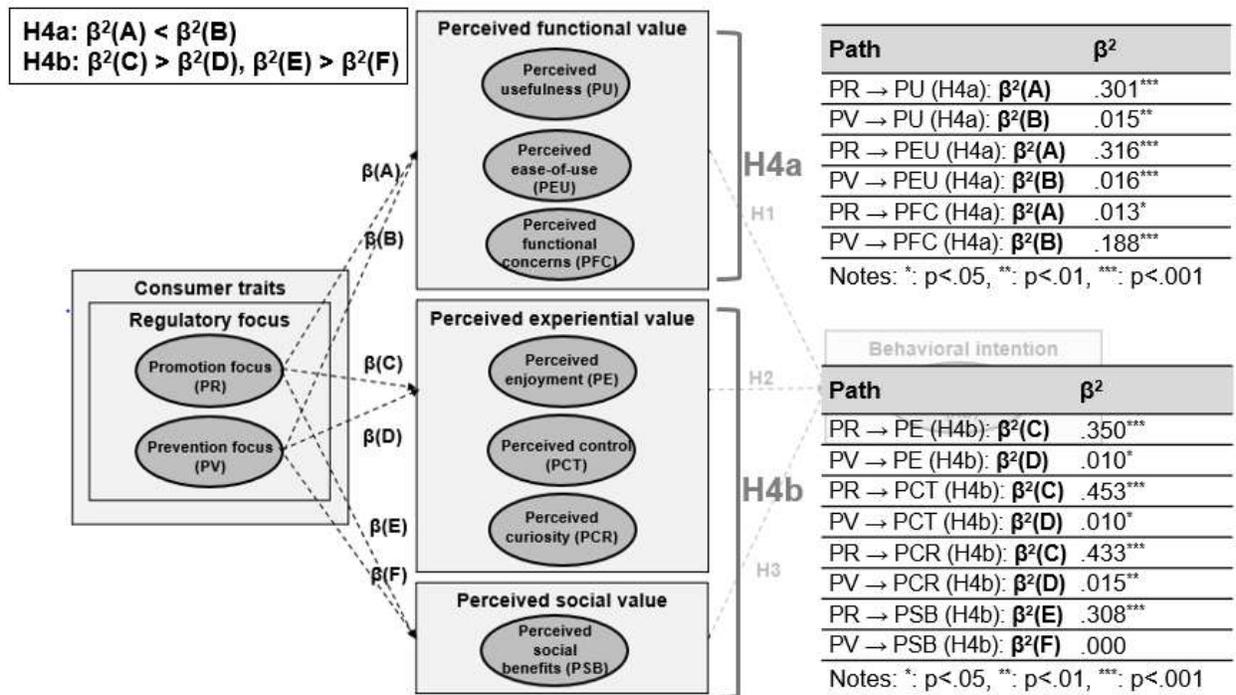


Figure 3. SEM Results (H4).

Regarding the influence of perceived functional values on the intention to adopt VFRs, perceived usefulness and perceived ease-of-use each showed a significant positive influence on the adoption intention ($\beta = .260, p < .001$; $\beta = .121, p < .001$ respectively), supporting H1a and H1b. However, perceived functional concerns did not show a significant negative influence on the adoption intention as proposed, rejecting H1c ($\beta = -.003, n.s.$).

With respect to the influence of perceived experiential values on the intention to adopt VFRs, perceived enjoyment and perceived curiosity each showed a positive influence on consumers' intention to adopt VFRs ($\beta = .356, p < .001$; $\beta = .267, p < .001$ respectively), whereas perceived control had an insignificant influence on the adoption intention ($\beta = .032, n.s.$), supporting only H2a and H2c. Also, perceived social benefits showed a significant positive influence on the intention to adopt VFRs, supporting H3 ($\beta = .152, p < .001$). Among perceived

functional, experiential, and social values, perceived enjoyment showed highest impact on consumers' adoption intention, followed by perceived curiosity.

Regarding H4, the percentage of variance explained was calculated by squaring standardized path coefficients as suggested by Overby and Lee (2006). H4a suggested that prevention focus would play a stronger role than promotion focus in perceiving functional value of VFRs. As hypothesized, prevention focus had a much stronger influence on perceived functional concerns than promotion focus did. Prevention focus explained about 18.8% ($\beta^2 = .188, p < .001$) of the variation in perceived functional concerns, and promotion focus explained only 1.3% ($\beta^2 = .013, p < .05$) (Table 12). However, contrary to expectations, promotion focus had a much stronger influence on perceived usefulness and perceived ease-of-use than prevention focus, partially supporting H4a. Specifically, prevention focus explained approximately 1.5% ($\beta^2 = .015, p < .01$) and 1.6% ($\beta^2 = .016, p < .01$) of the variation in perceived usefulness and ease-of-use, respectively, while promotion focus explained 30.1% ($\beta^2 = .301, p < .001$) and 31.6% ($\beta^2 = .316, p < .001$).

Meanwhile, H4b suggested that promotion focus would play a stronger role than prevention focus in perceiving experiential value and social value of VFRs. As hypothesized, promotion focus had a much stronger influence on perceived enjoyment, perceived control, perceived curiosity, and perceived social benefits, supporting H4b. Promotion focus explained approximately 35.0% ($\beta^2 = .350, p < .001$) of the variation in perceived enjoyment, and prevention focus explained only 1.0% ($\beta^2 = .010, p < .05$). Similarly, promotion focus explained approximately 45.3% ($\beta^2 = .453, p < .001$) and 43.3% ($\beta^2 = .433, p < .001$) of the variations in perceived control and perceived curiosity, respectively, while prevention focus explained only 1.0% ($\beta^2 = .010, p < .05$) and 1.5% ($\beta^2 = .015, p < .01$), respectively. Also, promotion focus

explained a greater portion of the variation in perceived social benefits (30.8%; $\beta^2 = .308$, $p < .001$) compared to prevention focus (0.0%; $\beta^2 = .000$, *n.s.*).

Test of Moderating Effect: Regulatory Focus

Configuration Invariance Test and Measurement Invariance Test

Regulatory focus was included into the model, as a moderating variable, for multi-group comparison analysis to examine the moderating effect on the supported main effects as described in H1-H3 (Figure 4). The median split approach suggested by Arnold and Reynolds (2009) was adopted in this study to create the subgroups for comparison analysis. Benchmarked against the median scores of prevention focus (4.769) and promotion focus (5.055), each subject was classified as high vs low in terms of prevention focus and promotion focus. Following that, three subgroups were created based on each subject's classification in those two dimensions, including a promotion group (high in promotion focus and low in prevention focus), a prevention group (high in prevention focus and low in promotion focus), and a neutral group (high in both promotion focus and prevention focus or low in both promotion focus and prevention focus). As a result, there were 277 (57.7%) respondents in the promotion group, 182 (37.9%) respondents in the prevention group. There were only 21 subjects in the neutral group. Due to the small size of the sample, this group was not included in the multi-group comparison analysis. Thus, multi-group comparison analysis was conducted only between the promotion group and the prevention group.

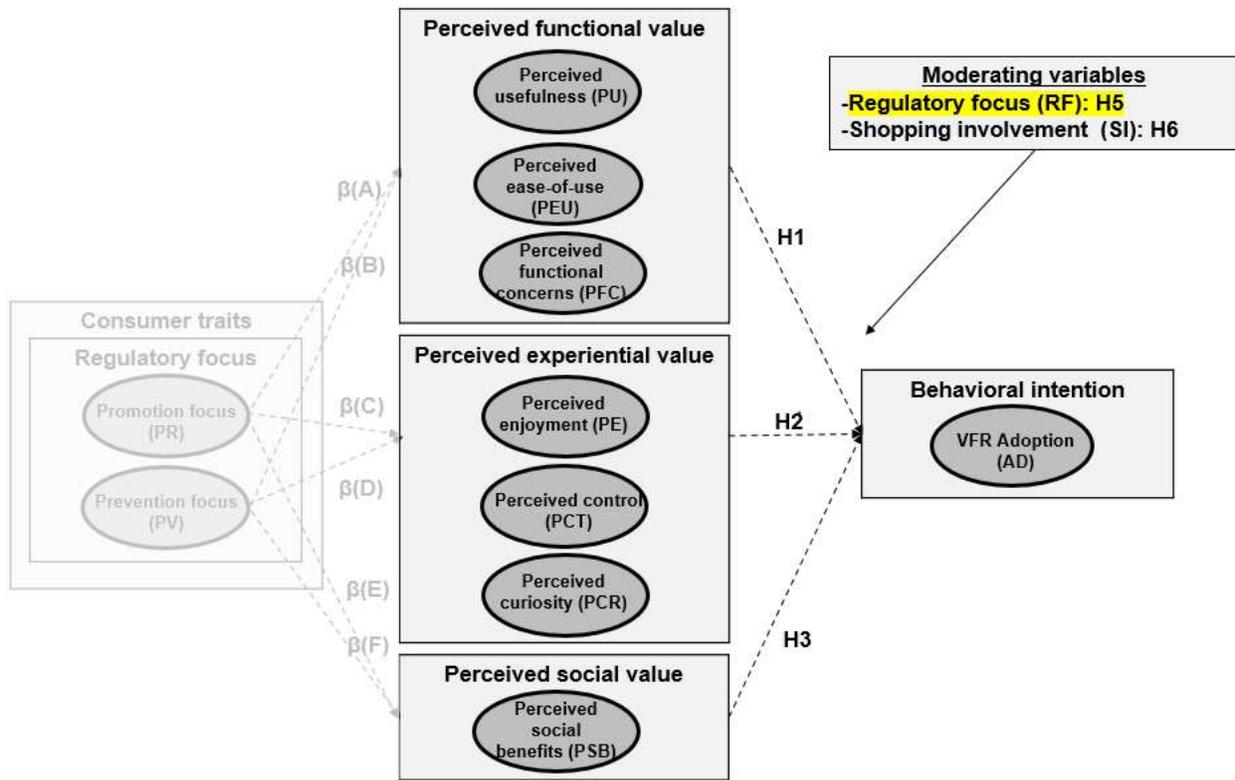


Figure 4. Moderating Effect of Regulatory Focus.

Next, following Moon's (2009) approach, the model fit of each group was first examined for each of the two groups. Both promotion group ($\chi^2 = 1503.229$ [$df = 718, p = .000$], SRMR = .075, TLI = .917, IFI = .925, CFI = .925, RMSEA = .053) and prevention group ($\chi^2 = 1283.690$ [$df = 718, p = .000$], SRMR = .069, TLI = .902, IFI = .910, CFI = .909, RMSEA = .056) showed satisfactory results. Then, the configuration invariance and measurement invariance were assessed as described below.

Model fit indices of the unconstrained model were used to test the configuration invariance (Moon, 2009), with the results of goodness-of-fit ($\chi^2 = 2787.260$ [$df = 1436, p = .000$], TLI = .911, IFI = .919, CFI = .919, and RMSEA = .046) indicating that the structural patterns are similar across groups, implying that this configural model can be a baseline to compare the constrained models (Moon, 2009). Next, since this study focused on comparing paths from

consumers' perceptions to adoption intention across groups, the equality of factor loadings between the respective two sub-groups was measured. The Chi-square difference was calculated to test the measurement invariance by constraining the factor loadings to be equal across groups (Moon, 2009), with the results ($\chi^2 = 2814.968$ [$df = 1466$, $p = .000$], TLI = .913, IFI = .919, CFI = .919, RMSEA = .045) suggesting an acceptable model fit (Table 13). Moreover, the insignificant result of the Chi-square difference test indicates that the measurement invariance was met ($\Delta\chi^2 = 27.707$, $\Delta df = 30$, $p = .586$), with the change value of CFI ($\Delta CFI = 0$) being smaller than .01 supporting the measurement invariance (Cheung & Rensvold, 2002).

Table 13. Measurement Invariance Test: Regulatory Focus.

	RMSEA	IFI	CFI	χ^2 (df)	$\Delta\chi^2$ (df)	p
Unconstrained model	.046	.919	.919	2787.260 (1436)		
Measurement invariance model	.045	.919	.919	2814.968 (1466)	27.707 (30)	.586

Test of Moderating Effect

With both configuration invariance and measurement invariance tests satisfied, constraints were imposed, with the Chi-square difference being calculated between the models for the two sub-groups. This test imposes the null hypothesis that the moderator variable does not have any effect on the proposed main effects; thus, a significant result suggests the existence of a moderating effect. The Chi-square difference was calculated for each main effect to identify the main effects that were moderated.

As shown in Table 14, the Chi-square difference between the models for the two regulatory focus groups was significant ($\Delta\chi^2 = 25.762$, $\Delta df = 7$, $p < .01$), suggesting a moderating effect of regulatory focus on the main effects of VFR perceptions on adoption intention, supporting H5.

Table 14. Multi-group Analysis Results: Regulatory Focus.

Path	Regulatory Focus								$\Delta\chi^2$ ($\Delta df = 1$)
	Promotion Group				Prevention Group				
	Estimate	S.E.	C.R.	β	Estimate	S.E.	C.R.	β	
PU →AD	.034	.094	.358	.035	.088	.063	1.399	.086	.227
PEU →AD	.116	.122	.948	.109	.408	.078	5.250***	.365	11.115***
PFC →AD	.202	.141	1.436	.165	-.283	.110	-2.565**	-.169	7.270**
PE →AD	.619	.076	8.147***	.556	.300	.114	2.626**	.288	5.198*
PCT →AD	.384	.071	5.400***	.418	.139	.107	1.301	.156	3.353
PCR →AD	.346	.088	3.929***	.323	.171	.062	2.762**	.154	2.609
PSB →AD	.434	.108	4.016***	.406	.404	.101	3.987***	.278	.040

$\Delta\chi^2 =$ for all gammas set equal across subgroups ($df = 7$): 25.762**

Notes: Chi-square and degree of freedom values for corresponding constrained relationship.

*: $p < .05$, **: $p < .01$, ***: $p < .001$

Abbreviations: S.E., standard error, C.R., critical ratio

In particular, as seen in Figure 5, the path from perceived ease-of-use ($\beta = .365, p < .001$) and perceived functional concerns ($\beta = -.169, p < .01$) to adoption intention was only significant for the prevention group ($\Delta\chi^2 = 11.115, \Delta df = 1, p < .001$; $\Delta\chi^2 = 7.270, \Delta df = 1, p < .01$, respectively), whereas the path from perceived enjoyment ($\beta = .556, p < .001$) to adoption intention was greater for the promotion group ($\Delta\chi^2 = 5.198, \Delta df = 1, p < .05$), supporting H5b, H5c, and H5d.

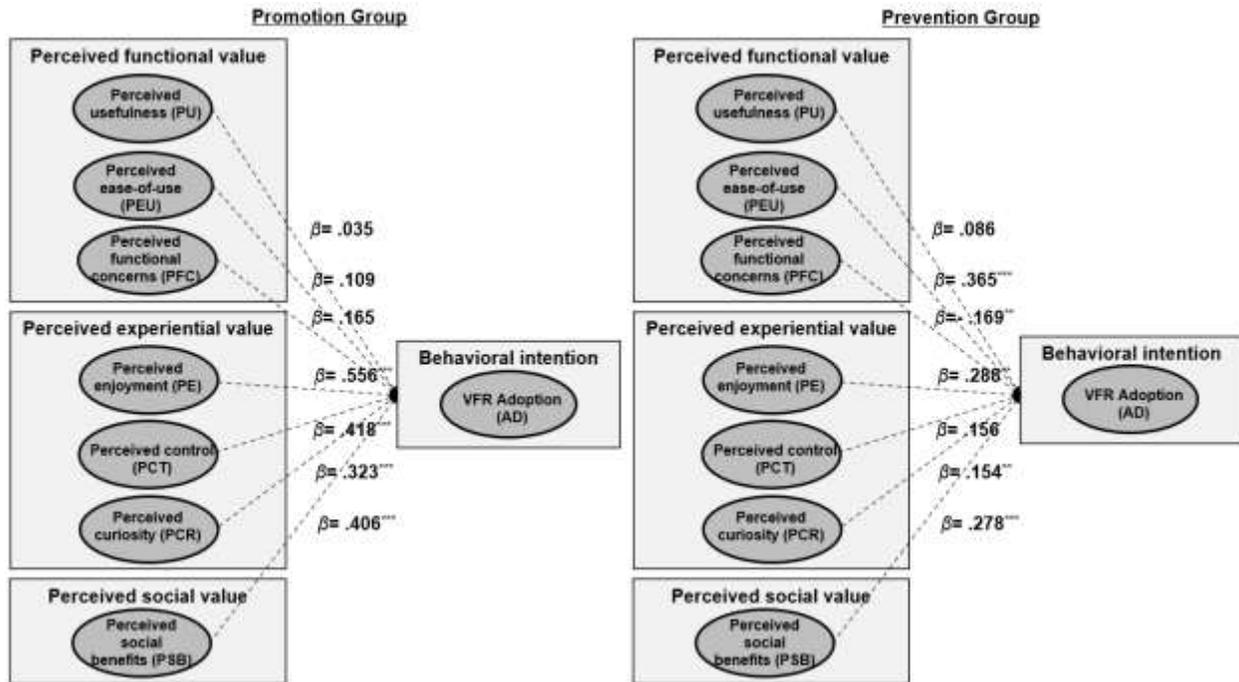


Figure 5. Multi-group Analysis Results: Regulatory Focus.

Test of Moderating Effect: Shopping Involvement

Configuration Invariance Test and Measurement Invariance Test

Similar to the test of the moderating effect of regulatory focus, shopping involvement was included in the model to examine its moderating effect on the supported main effects as described in H1-H3 (Figure 6). Therefore, the sample was divided into two sub-groups using cut-off criteria (i.e., mean = 5.211, medians = 5.200; hence, 5.21 used) based on the values of the moderator variable, with 48.5% (N = 233) being classified as a high group and 51.5% (N = 247) being classified as a low group. Next, the model fit of each group was first examined. Both high ($\chi^2 = 1453.890$ [$df = 718, p = .000$], SRMR = .073, TLI = .904, IFI = .913, CFI = .912, RMSEA = .057) and low ($\chi^2 = 1353.958$ [$df = 718, p = .000$], SRMR = .077, TLI = .917, IFI = .925, CFI = .924, RMSEA = .059) groups showed satisfactory results. Model fit indices of the unconstrained model were used to test the configuration invariance (Moon, 2009), with the

results of goodness-of-fit ($\chi^2 = 2819.370$ [$df = 1436, p = .000$], $TLI = .910$, $IFI = .919$, $CFI = .918$, and $RMSEA = .045$) indicating that the structural patterns are similar across groups, implying that this configural model can be a baseline to compare the constrained models (Moon, 2009).

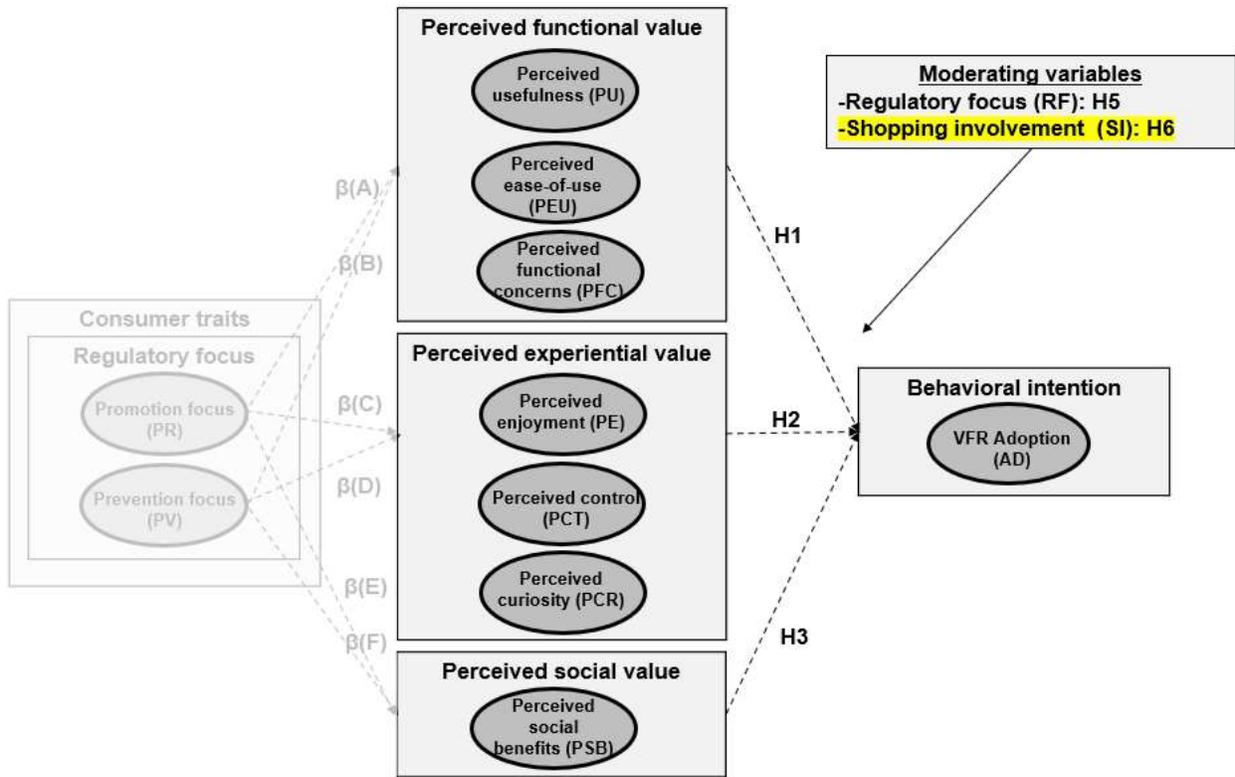


Figure 6. Moderating Effect of Shopping Involvement.

The Chi-square difference was calculated to test the measurement invariance by constraining the factor loadings to be equal across groups (Moon, 2009), with the results ($\chi^2 = 2861.746$ [$df = 1466, p = .000$], $TLI = .911$, $IFI = .917$, $CFI = .918$, $RMSEA = .045$) suggesting an acceptable model fit (Table 15). Moreover, the insignificant result of the Chi-square difference test indicates that the measurement invariance was met ($\Delta\chi^2 = 42.376$, $\Delta df = 30, p = .066$), with the change value of CFI ($\Delta CFI = 0$) being smaller than .01 supporting the measurement invariance (Cheung & Rensvold, 2002).

Table 15. Measurement Invariance Test: Shopping Involvement.

	RMSEA	IFI	CFI	χ^2 (df)	$\Delta\chi^2$ (df)	<i>p</i>
Unconstrained model	.045	.919	.918	2819.370 (1436)		
Measurement invariance model	.045	.917	.918	2861.746 (1466)	42.376 (30)	.066

Test of Moderating Effect

When both invariance tests were satisfied, constraints were imposed, with the Chi-square difference being calculated between the models for the two sub-groups. This test imposes the null hypothesis that the moderator variable does not have any effect on the proposed main effects; thus, a significant result suggests the existence of a moderating effect. The Chi-square difference for each main effect was calculated to identify the main effects that were moderated. As shown in Table 16, the Chi-square difference between the models for the two shopping involvement groups was significant ($\Delta\chi^2 = 20.118$, $\Delta df = 7$, $p < .05$), suggesting a moderating effect of shopping involvement on the main effects of VFR perceptions on adoption intention, supporting H6. In particular, as seen in Figure 7, the path from perceived functional concerns to adoption intention was significantly greater for the low group ($\beta = -.542$, $p < .001$) compared to the high group ($\beta = -.225$, $p < .001$), supporting H6c ($\Delta\chi^2 = 13.555$, $\Delta df = 1$, $p < .001$).

Table 16. Multi-group Analysis Results: Shopping Involvement.

Path	Shopping Involvement								$\Delta\chi^2$ ($\Delta df = 1$)
	Estimate	Low Group			High Group			β	
		S.E.	C.R.	β	Estimate	S.E.	C.R.	β	
PU →AD	.328	.079	4.171***	.285	.179	.071	2.528*	.170	1.712
PEU →AD	.159	.050	3.171**	.157	.018	.071	.254	.018	1.821
PFC →AD	-.661	.073	-9.113***	-.542	-.261	.078	-3.335***	-.225	13.555***
PE →AD	.194	.111	1.756	.186	.324	.135	2.394*	.261	.577

Table 16 (continued).

PCT →AD	.048	.091	.530	.032	.040	.095	.418	.036	.340
PCR →AD	.292	.101	2.888**	.280	.379	.115	3.298***	.319	.269
PSB →AD	.111	.052	2.115*	.121	.205	.100	2.063*	.237	.800

$\Delta\chi^2 =$ for all gammas set equal across subgroups ($df = 7$): 20.118**

Notes: Chi-square and degree of freedom values for corresponding constrained relationship.

*: $p < .05$, **: $p < .01$, ***: $p < .001$

Abbreviations: S.E., standard error, C.R., critical ratio

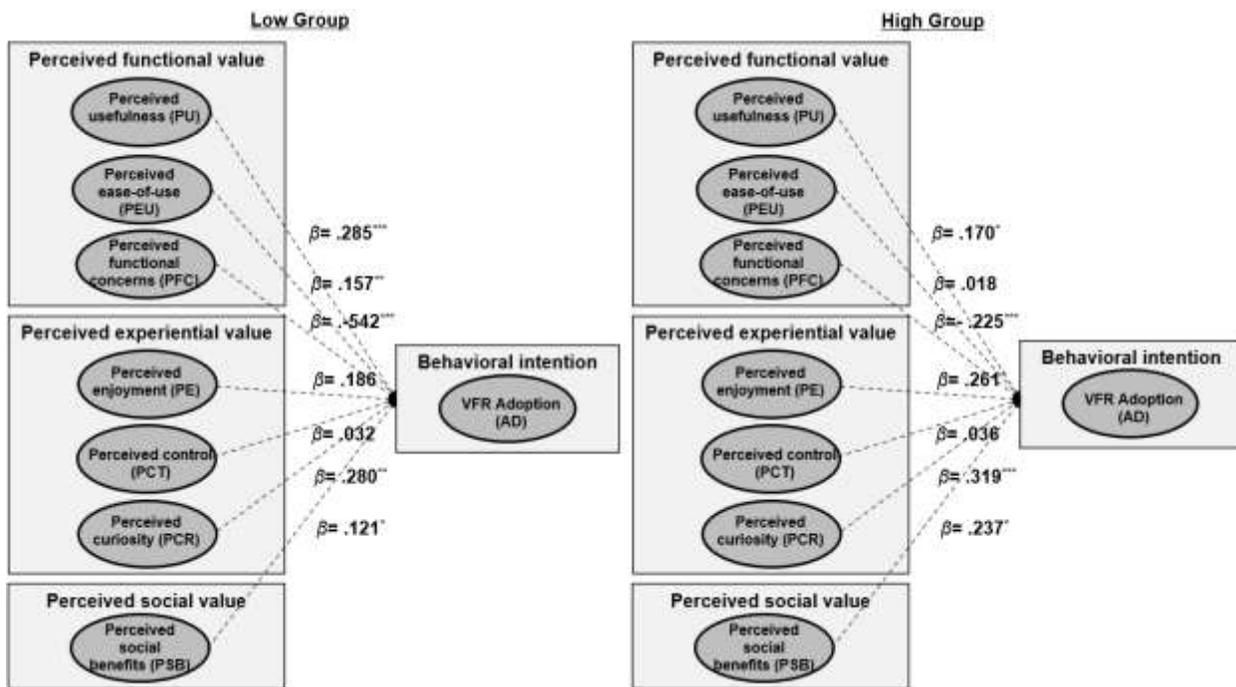


Figure 7. Multi-group Analysis Results: Shopping Involvement.

Summary of Hypotheses Testing

In summary, the Structural Equation Modelling (SEM) analysis was conducted to test the hypotheses. Table 17 provides a summary of hypotheses testing results.

Table 17. Summary of Hypotheses Testing.

Hypothesis	Statement of Hypothesis	Results
H1	Consumers' perceived functional value of VFRs will have a significant influence on their intention to adopt VFRs.	Supported
H1a	Perceived usefulness will positively influence the intention to adopt VFRs.	Supported
H1b	Perceived ease-of-use will positively influence the intention to adopt VFRs.	Supported
H1c	Perceived functional concerns will negatively influence the intention to adopt VFRs	Rejected
H2	Consumers' perceived experiential value of VFRs will have a significant influence on their intention to adopt VFRs.	Supported
H2a	Perceived enjoyment will positively influence the intention to adopt VFRs.	Supported
H2b	Perceived control will positively influence the intention to adopt VFRs.	Rejected
H2c	Perceived curiosity will positively influence the intention to adopt VFRs.	Supported
H3	Consumers' perceived social value of VFRs will have a significant influence on their intention to adopt VFRs. Specifically, perceived social benefits will positively influence the intention to adopt VFRs.	Supported
H4	Consumers' regulatory focus will have a significant influence on their perceptions of VFRs.	Supported
H4a	Prevention focus will have a stronger positive influence on perceived functional value than promotion focus.	Partially supported
H4b	Promotion focus will have a stronger positive influence on perceived experiential value and perceived social value than prevention focus.	Supported
H5	The influences of consumers' perceived functional value (H5a: usefulness, H5b: ease-of-use, H5c: functional concerns), perceived experiential value (H5d: enjoyment, H5e: control, H5f: curiosity), and perceived social value (H5g: social benefits) on their intention to adopt VFRs will differ by regulatory focus.	Supported (H5a, H5b, H5c)
H6	The influences of consumers' perceived functional value (H6a: usefulness, H6b: ease-of-use, H6c: functional concerns), perceived experiential value (H6d: enjoyment, H6e: control, H6f: curiosity), and perceived social value (H6g: social benefits) of VFRs on adoption intention will differ by shopping involvement.	Supported (H6c)

Discussion

This study aimed to shed light on the underlying psychological mechanisms that facilitate consumers' perceptions and subsequent adoption of VFRs. In order to examine the integrative nature of consumer experiences in the interactive virtual environment, three core consumer values, as proposed in the customer value frameworks (Park et al., 1986; Smith & Colgate, 2007), were incorporated into the research model for this study. Furthermore, regulatory focus and shopping involvement were proposed as key influential factors, at the trait-level, for the varying perceptions of VFRs and differences in consumers' adoption intention.

The majority of technology adoption related literature (Davis et al., 1992; Kim et al., 2007; Verhagen et al., 2012) suggests that consumers' beliefs and expectations toward a technology are key determinants of technology adoption. Indeed, the findings from this study identified three perceived values, namely, perceived functional value, experiential value, and social value as significant factors that influence consumers' adoption intention of VFRs. Perceptions of the functional benefits offered by VFRs, specifically perceived usefulness and perceived ease-of-use, significantly influenced fashion consumers' intention to adopt VFRs. These results are consistent with previous studies in that consumers showed greater intention to adopt VFRs when they believed VFRs were useful, helped them fit garments, were easy-to-use, and required little effort to engage with the technology (Huang & Qin, 2011; Kim & Forsythe, 2008). The results are also in line with the literature in that with an increased demand for an enjoyable fitting experience in both physical and online shopping environments, consumers appreciated the opportunity to fit their potential purchases in VFRs, believing them to be functionally useful and easy-to-use tools.

Contrary to expectation, perceived functional concerns did not show a significant negative influence on fashion consumers' adoption intention toward VFRs. Previous research suggested that the decision to adopt a new technology significantly depends not only on the benefits but also on the costs and risks involved (Kim et al., 2007; Park et al., 2008; Pavlou, 2003). In the case of VFRs, accuracy and security were of particular importance (Huang & Qin, 2011; Lee & Xu, 2019; Sekhavat, 2017; Sohn & Sun, 2013). Considering that VFRs are in the preliminary testing stage, which might pose greater risks to consumers, it was expected that the results of this study would suggest a negative influence of perceived functional concerns on adoption intention. However, no significant influence on adoption intention was revealed in this study. This indicates that individuals in general value and expect significant functional benefits from VFRs, enough to abate the influences of functional concerns. Similarly, Looney, Valacich, Todd, and Morris (2006) argued that an individual's perceptions of what they can accomplish through using technology exaggerate individuals' capabilities and expectation toward rewards.

Regarding the influence of perceived experiential value, there were significant positive influences of perceived enjoyment and perceived curiosity on fashion consumers' intention to adopt VFRs; however, there was no association with perceived control. As predicted, with enriched sensory elements and mix-and-match features typically provided in VFRs (Fiore et al., 2005a; Lee et al., 2010; Li et al., 2001; Merle et al., 2012), consumers showed their intent to adopt VFRs when they considered the use of VFR as enjoyable. Moreover, perceived curiosity strongly motivated fashion consumers' adoption intention of VFRs. Indeed, VFRs are characterized by their playful and experiential nature (Lee et al., 2010), involving novel and interesting interactive features, which can further lead consumers to engage in exploratory behavior (Beck & Crie, 2018) to satisfy their curiosity. Therefore, if the consumer experience of

using VFRs is enjoyable and interesting, there is a greater likelihood that they would adopt VFRs in their online shopping. While interactive and unique experiential features of VFRs have great potential to bring immersive experiences (Bouko, 2014; Fiore et al., 2005b; Huang, 2003), characterized by a sense of being in control, enjoyment, and curiosity (Domina et al., 2012), the sense of control did not exert a significant influence on the adoption intention. A possible reason might be that the expected sense of control from a VFR experience did not exceed the control experienced when using physical fitting rooms in stores. Enhanced interactive features, which contribute to perceived control, can come from both visual control and functional control. Thus, variations in the types of VFRs may lead to varying beliefs regarding the ability to exercise control over the interaction with the technology (Jiang & Benbasat, 2005; Lee & Xu, 2019). Furthermore, without detailed knowledge of VFRs, consumers at the early adoption stage may not feel a sense of control. This is typically only perceived when they have the necessary resources or capability, or both, to perform an activity (Lu et al., 2009).

In addition to perceived functional value and experiential value, fashion consumers' adoption intention was influenced by their perceptions of the social value offered by VFRs. This influence was likely due to the increasing incorporation of social media and social sharing features into VFRs (Kiousis, 2002; Pachoulakis & Kapetanakis, 2012). In other words, not only the interplay of functional (utilitarian) and experiential (hedonic) benefits, typically identified as key benefits sought by consumers in the interactive environment (Hsu & Lu, 2004; Lee et al., 2010), but also social benefits played a key predictive role in inducing fashion consumers' adoption intention toward VFRs. Since shopping is a social act, and fitting a garment is a key component in the fashion shopping process, consumers could regard the VFR experience as a social experience (Gao et al., 2014; Rintamaki et al., 2006). This result is consistent with

previous studies (e.g., Pagani et al., 2011; Thorbjørnsen et al., 2007) suggesting that perceived social value was a strong determinant of behavioral intention for purchasing goods and services in the interactive environment.

Overall, consumers' beliefs and expectations toward all three values played a key role in inducing their intention to adopt VFRs. These findings indicate that there are multiple value dimensions associated with consumers' use of VFRs, suggesting an integrative nature of consumer experiences. While consumers' perceived value significantly influenced their adoption intention, the extent to which they perceive these functional, experiential, and social values as important were not equal due to differences in their goal-specific motivational orientation (i.e., regulatory focus). As predicted, the interplay of two regulatory foci served as significant predictors of consumers' perceptions of VFRs, contributing to varying consumer experiences. The findings indicate that the two regulatory foci lead consumers to strongly perceive values that fit with their distinct regulatory goals, and that the two types of regulatory foci additively and differently contribute to consumers' perceptions of VFRs. There is a greater likelihood that individuals rely on their enduring traits when they evaluate and make decisions about a new or unfamiliar object (Song & Qu, 2019; Wang & Lee, 2006). This study found that consumers indeed rely on two chronic regulatory foci for processing newly emerging VFRs that ultimately influence their perceptions, namely prevention focus and promotion focus.

The data in this study showed that prevention focus was a stronger predictor of perceived functional concerns, however, was not a stronger predictor of perceived functional benefits, including perceived usefulness and perceived ease-of-use. Although prevention focus was proposed to be closely related with an individual's perceptions of both functional benefits and functional concerns due to the positive link with utilitarian-related (i.e., ought-related) factors

(Song & Qu, 2019; Roy & Ng, 2012), it was only a strong predictor for perceived functional concerns. Further, prevention focus did not induce individuals to believe that VFRs are easy to use. Unlike promotion focus, which can lead individuals to primarily focus on positive outcomes (e.g., perceived benefits) to maximize gains, prevention focus can lead individuals to focus primarily on negative outcomes (e.g., perceived risks) for risk aversion, even if functional components can be viewed as needs and necessities, which are typically more closely related to the prevention goal (Bullard & Manchanda, 2017; Herzstein et al., 2007).

Meanwhile, promotion focus was a stronger predictor than prevention focus of perceived experiential value and perceived social value of VFRs. Prevention focus exerted negative influences on perceived experiential value and insignificant influence on perceived social value. Individuals with prevention focus typically pay attention to and perceive risky aspects of an object. As individuals try to maintain regulatory fit (Higgins, 1997), promotion focus leads individuals to actively seek and perceive experiential and social value based on their strategic preferences. With experiential and social value viewed as wants, these preferences primarily offer gains and are associated with achieving their promotion goals (Arnold & Reynolds, 2009; Bullard & Manchanda, 2017; Molden et al., 2008; Song & Qu, 2019). In this research, promotion focus led individuals to view VFRs primarily as a potential opportunity to achieve their promotion goals rather than as a risky option.

Regarding the moderating effect of chronic regulatory focus on the relationship between perceptions of VFRs and adoption intention, significant differences were revealed between the promotion group and the prevention group. The findings showed that the adoption intention of promotion-focused individuals (i.e., high in promotion focus and low in prevention focus) was primarily driven by their feelings, fun, and fantasies (perceived enjoyment) of what VFRs can

offer. In contrast, prevention-focused individuals (i.e., high in prevention focus and low in promotion focus) were primarily concerned with functionality and driven by perceived ease-of-use when deciding whether to adopt VFRs. When a particular regulatory focus is more dominant than the other, consumers' decision-making is influenced by the value that is relevant to achieving their dominant regulatory goal (Harris & Hagger, 2007; Phan & Higgins, 2005; Lapa, 2018). The findings indicated that the promotion group was more likely to be motivated by the experiential value, particularly, enjoyment. This is because these individuals are more likely to be affect-driven and impulsive in their decision-making (Arnold & Reynolds, 2009; Song & Qu, 2019).

On the other hand, the adoption intention of the prevention group was greatly affected by functional value, especially perceived ease-of-use and perceived functional concerns, as these individuals are more likely to be cognitive-driven and cautious in making their decision (Molden & Higgins, 2008; Trudel et al., 2012). Prevention-focused individuals tend to view a new service option as a challenge rather than a chance (Song & Qu, 2019); thus, perceived functional concerns inhibited their adoption intention in this study. In contrast, perceived functional concerns did not exert a significant influence on the adoption intention of promotion-focused individuals. These individuals are less sensitive to perceived risks and tend to be more eager to take risks and engage in exploratory and creative behavior (Herzenstein et al., 2007; Molden & Higgins, 2008).

Lastly, shopping involvement explained differences in fashion consumers' adoption intention derived from their perceptions of VFRs. Specifically, the results showed that perceived functional concerns affected the adoption intention of consumers with low shopping involvement to a greater extent than those with high shopping involvement. Individuals who perceived

shopping to have great personal relevance were more likely to place greater decision importance on shopping and the shopping process itself (Chen & Tsai, 2008; Eroglu et al., 2001). Thus, high enduring shopping involvement typically manifests through an extensive information search and knowledge regarding shopping, such as researching brands, due to greater personal interest (Michaelidou & Dibb, 2006; Michaelidou & Dibb, 2008). Consumers with high enduring shopping involvement are more likely to have greater confidence in decision-making because they are equipped with information about shopping (Balabanis & Reynolds, 2001; Burton & Netemeyer, 1992). Consequently, these consumers tend to take risks in the shopping process, for example, showing impulsive or approach behaviors (or both) (Sohn & Lee, 2017), as they are more likely to value the hedonic aspects of shopping (Gyulavári et al., 2011).

Similarly, Venkatraman (1989) found that enduringly involved consumers have a greater ability to handle risks. Indeed, even if there was no significant difference, perceived enjoyment showed a significant positive influence on adoption intention, particularly in the high shopping involvement group. In contrast, consumers with low shopping involvement lacked intrinsic personal interest in shopping and were more likely to focus on functional aspects. Literature suggest that this is because they generally regard shopping as a task rather than a hobby or leisure activity (Sohn & Lee, 2017). Notably, they perceived functional concerns as more important and were less likely to convey confidence in their decision-making due to a lack of personal interest in shopping (Burton & Netemeyer, 1992; Chen & Tsai, 2008). In addition, perceived ease-of-use consistently had a significant positive influence on the adoption intention of VFRs. This was particularly evident in the low shopping involvement group who tend to be more interested in and driven by task-related functional value than an ancillary value (Rahman & Reynolds, 2015).

CHAPTER 5: CONCLUSIONS

While VFR technology is increasingly available in the marketplace, its adoption is still in the early stage with much to explore in terms of consumers' adoption behaviors. From the consumer perspective, this study investigated the adoption process of VFRs by exploring and explaining the importance of consumers' enduring traits to understand their varying perceptions of VFRs, and also by assessing the moderating effects of trait-level differences on their adoption of VFRs. The academic and practical implications of findings are provided in the first section of this chapter, followed by limitations of the study and recommendations for future research.

Implications

The results of this study provide both researchers and those making managerial decisions with insights regarding fashion consumers' adoption of VFR technology for online shopping. The current study enhances the academic understanding of the multifaceted nature of consumer experiences in VFRs. Also, this study further extends the literature on VFR adoption by taking into account not only the influential power of consumers' perceptions of technology but also their enduring traits (i.e., regulatory focus and shopping involvement), explaining the trait-level reasons behind consumers' varying perceptions and adoption of VFRs. From a managerial perspective, the findings serve as a guide for fashion firms that need to continuously embrace innovations to maintain their competitive edge and strive to encourage consumers to adopt VFRs to enhance the online shopping experience. Further, the results of this study can assist VFR providers to improve the design effectiveness of their VFRs by providing insight into the implications of enhancing certain values and experiences.

Academic Implications

The findings have important implications for VFR literature. The literature has primarily focused on technical and functional aspects of VFRs (Gültepe & Güdükbay, 2014) and overlooked the diverse value that consumers can perceive and experience in VFRs (Kim & Forsythe, 2007). Also, by adopting pre-established models (e.g., TAM), previous research had limitations in addressing consumer experiences (Kim & Forsythe, 2008). Therefore, the current study incorporated multiple value dimensions to comprehensively understand how consumers' perceived values influence their varying beliefs and expectations of VFRs. In studying the integrative nature of consumer experiences in VFRs, this study referred to the customer value frameworks (Park et al., 1986; Smith & Colgate, 2007; Sweeney et al., 1996) that suggest functional, experiential, and social values as the key values consumers perceive as important when interacting with goods or services. This study provides further empirical support for the integrative nature of consumer experiences when using VFRs by identifying perceived functional, experiential, and social values as the key drivers of VFR adoption.

Moreover, the study extends the literature on technology adoption that has primarily focused on investigating how consumers' adoption is driven by their beliefs of what technology can do for them, for example, their perceptions of key technology attributes (Choi et al., 2014; Davis et al., 1992). For innovative technologies like VFRs, it is difficult for consumers to identify what the technology can do for them due to its innovative and unknown nature (Kramer, 2011; Wang & Lee, 2006). This ambiguity leads customers to rely on enduring traits in their decision-making process (Son & Qu, 2019). In studying the potential trait-level causes that shape consumers' beliefs and expectations toward VFRs, two independent regulatory foci (promotion focus and prevention focus) were used to explain the effect of enduring traits on consumer

perceptions by corroborating the view of Regulatory Focus Theory (Higgins, 1997) that had been only attempted to a limited degree in previous research. Identifying two regulatory foci as predictors of different perceived values with varying predictive power, and comparing the strength of its influence, this study revealed that consumers' adoption of VFRs is contingent upon their goal-specific motivational orientations underlying their different perceptions of VFRs. In addition to revealing psychological motivations underlying consumers' perceptions, this study highlights that successful adoption of VFRs comes from the interplay of consumers' subjective perceptions and trait-level differences in regulatory focus and shopping involvement. Thus, by identifying that regulatory focus and shopping involvement are moderators of the relationship between consumers' perceptions of VFRs and adoption intention, this study showed that individual differences in enduring traits lead consumers to adopt VFRs for very different reasons.

Practical Implications

The findings from this study lend insight to the fashion and VFR industry that could assist practitioners in encouraging consumers' adoption of VFR technology. The findings enable fashion firms to develop and implement effective marketing strategies that promote VFRs to their target consumers through elucidating the reasons why some are more likely than others to be adopters. Also, understanding the underlying factors of VFR adoption can aid VFR service providers in designing effective VFRs to enhance consumer experiences further and increase usage.

The finding that consumers, in general, are driven to adopt VFRs based on their positive beliefs and expectations of the functional value of VFRs in terms of usefulness and ease-of-use, implies that fashion firms need to promote VFRs as a functionally helpful and effort-free tool to

try on garments in the online environment. Fashion firms should communicate that VFRs are a potential alternative to in-store fitting rooms in the online shopping process, allowing consumers to satisfy their functional and utilitarian fitting needs. Moreover, VFR providers should strive to provide the core value that determines the adoption of new technology - the functional benefits - to further enhance the functionality of VFRs. They should provide more detailed and realistic product and fit-related information through the use of advanced simulation techniques, and adopt tactics that reduce the effort required to use virtual fitting, for example, by utilizing camera-based technologies to automate and simplify the virtual fitting process (Lee & Xu, 2019). Also, the finding that perceived functional concerns did not exert a significant inhibiting influence on consumers' adoption of VFRs is encouraging. This finding implies that placing VFRs in online stores is important because consumers would likely adopt VFRs even with inaccuracy and security issues at the current preliminary examination stage, potentially due to the significant demand for an online fitting experience.

Along with perceived functional benefits, the findings suggest that the perceived experiential values of enjoyment and curiosity are important reasons for consumers to adopt VFRs. That is, consumers believed that VFRs are not only a mere functional tool but also meet their experiential needs. Aside from making VFRs attractive from the utilitarian perspective, it is also critical for the providers to make the fitting experience hedonically pleasing by incorporating added features (e.g., mix-and-match system) (Lee & Xu, 2019; Merle et al., 2012). Also, fashion firms should communicate the playful and experiential nature of VFRs by emphasizing their ability to offer game-like experiences to attract consumers and encourage the adoption of VFRs. Additionally, to persuade consumers to use VFRs, their novel and interesting interactive features should be presented and communicated to stimulate consumers' curiosity.

While perceived enjoyment and curiosity were found to drive consumers' intention to adopt VFRs, perceived control was not. Perceived control did not show a significant impact on the intention to adopt VFRs although a sense of being in control characterized consumers' immersive experiences in the interactive environment, together with enjoyment and curiosity (Domina et al., 2012; Huang, 2003). It is more likely that consumers would have a feeling of control if they are equipped with the necessary knowledge or skills in performing activities (Lu et al., 2009).

Furthermore, the finding that perceived social benefits are one of the key determinants for fashion consumers' adoption of VFRs implies that the availability of social features (e.g., social sharing) should be communicated in marketing to promote adoption. Fashion firms could assure consumers via effective marketing that VFRs employ social expressive functions such as a social sharing system (Pachoulakis & Kapetanakis, 2012), that enable users to share outfits with friends to obtain feedback. For example, a social media campaign such as a photo contest can be developed to invite consumers and their friends to try on a variety of looks, which they would typically wear, and share their Wishlist or favorite outfits on social media for discussion, to reflect the way a consumer would discuss clothing in the physical social context (Chowney, 2012). In this way, consumers would perceive VFRs as providing social experiences, where they can engage with others considered to harbor the same interests. Additionally, in line with marketing communications, VFR providers should further enhance their social interactive features by incorporating the communication and feedback capabilities of social media to provide a more enjoyable and interactive experience in VFRs.

Overall, the three values were significant drivers for consumers' adoption of VFRs, thus, it is important to market VFRs in terms of their ability to enhance the consumer experience by

fulfilling distinct expectations through balanced functional, experiential, and social features. In other words, not only it is important to meet consumers' functional fitting needs through enhancing the instrumentality of VFRs, a primary focus for many VFR industry practitioners and researchers (Gültepe & Güdükbay, 2014; Randall, 2015), but also to enhance overall consumer experiences through meeting consumers' experiential and social needs. Moreover, to further encourage consumers' adoption, VFRs should incorporate the most advanced simulation techniques (e.g., VR, AR) and interactive features (e.g., social media integration, virtual stylist, recommendation system) to best serve consumer needs and expectations (Lee & Xu, 2019).

The findings also suggest that the variations in consumers' beliefs and expectations toward VFRs arise from the interplay of the trait-level regulation foci, promotion and prevention focus. Specifically, promotion focus played a key influential role in the formation of positive functional, experiential, and social beliefs and expectations, whereas prevention focus played a stronger role in perceiving risk around functional concerns in this study. This result explains the reasons why some consumers view using VFRs as an exciting opportunity filled with experimentation, while others view VFRs as a risky option. Considering that promotion focus plays a stronger role in inducing positive beliefs and expectations toward VFRs, industry practitioners who wish to foster the market potential of VFRs may find benefit in targeting consumers who are more likely to convey greater promotion focus. While it is difficult to classify their customers into two regulatory foci, the results will allow firms to identify and better target their prospective market. One of the regulatory foci is typically more prominent through the socialization experience, in particular among different cultures and within specific demographics (e.g., age, gender) even if all people have both promotion and prevention systems (Kurman, Liem, Ivancovsky, Morio, & Lee, 2015; Song & Qu, 2019). For example, consumers

in the Eastern region are more likely to show a prevention focus, whereas those in the Western region tend to show greater promotion focus (Trudel et al., 2012). Moreover, young consumers are more likely to be characterized by strong promotion orientation as compared to older consumers (Lockwood, Chasteen, & Wong, 2005; Ryff, 1991). In this respect, practitioners may be able to maximize marketing outcomes by specifically targeting those who are more likely to build favorable perceptions toward the use of VFRs.

The results of this study also provide fashion firms with information on how to attract consumers to adopt VFRs by considering differences in consumer decision-making at trait-level regulatory focus and shopping involvement. Although the interplay of the two regulatory foci predicted the way consumers perceive different functional, experiential, and social beliefs toward VFRs in the early introduction stage, the extent to which consumers are driven to adopt VFRs based on these beliefs differed based on the dominance of their respective regulatory focus. The finding showed that the importance of enjoyment was greater for those who are high in promotion focus and low in prevention focus, suggesting a more affective processing tendency. In general, these individuals were driven to adopt VFRs because they could offer hedonic and social experiences. Therefore, to encourage consumers to adopt VFRs, a particular emphasis has to be made on enjoyable and intrinsic aspects of the VFR experience in marketing communications, particularly when targeting promotion-focused consumers. Moreover, a greater focus has to be made on providing the most hedonically pleasing VFRs among several VFR solutions to motivate these individuals to adopt the best performing VFRs as a functional tool. In contrast, prevention-focused individuals are more analytical and think about matters carefully in precise and concrete detail (Arnold & Reynolds, 2009). Consistently, the finding that perceived functional concerns exert an inhibiting influence on adoption intention only for consumers high

in prevention focus and low in promotion focus highlights their risk averse and cognitive processing tendency. Thus, fashion firms must assure consumers that their VFR performs as promised through continuous communication, emphasizing its ability to provide an accurate and secured fitting experience online, and mitigating perceived functional concerns, particularly when targeting prevention-focused individuals. To lessen the inhibiting impact of perceived functional concerns on consumers' adoption decision, VFR providers should also strive to decrease the discrepancies between the visually projected figure and the actual figure of the consumer or products. Additionally, they should consider utilizing a more secure system to protect consumers' security and privacy, since these are all issues that contribute to consumers' perceptions of functional concerns (Huang & Qin, 2011; Lee & Xu, 2019; Sohn & Sun, 2013). While perceived functional concerns were a key inhibitor for prevention-focused individuals, it appears that consumers decide to adopt VFRs for the utilitarian reason, ease-of-use, at the same time. This result implies that it is important to promote VFRs as an easy-to-use tool, to encourage these consumers to adopt VFRs. Retailers who wish to motivate prevention-focused individuals to adopt VFRs may also see more benefits from adopting VFRs that require less effort to implement such as AR-based VFRs that automatically capture consumers' body figure using camera-based technology (Lee & Xu, 2019). Overall, given the current findings, fashion firms should promote VFRs as a functionally easy-to-use and risk-free fitting tool online for prevention-focused individuals. Also, they should choose to apply VFR solutions that have better capabilities to meet consumers' utilitarian needs.

Furthermore, trait-level differences in regulatory focus and trait-level differences in shopping involvement explained the observed differences in consumers' decision-making. Specifically, consumers who are highly involved in shopping are less likely to be inhibited to

adopt VFRs due to their perceived functional concerns as compared to those who have low shopping involvement. Consumers with a greater personal interest in shopping typically seek information on an ongoing basis and conduct extensive information searches regarding their shopping, and thus tend to have greater confidence in their decision-making (Balabanis & Reynolds, 2001; Michaelidou & Dibb, 2006). These individuals consistently regard shopping as a leisure activity, hence, their behavior tends to be intrinsically driven (Sohn & Lee, 2017). Since consumers with high shopping involvement are comparatively less concerned with functional risks in the VFR experience, fashion firms may find reward by targeting those who have high enduring shopping involvement even if they need to mitigate consumers' perceived functional concerns through general continuous communications. However, it remains challenging to identify consumers who have high enduring shopping involvement and to control the extent to which they maintained an enduring involvement with shopping. In this respect, fashion firms should focus on aiding consumers to achieve an enduring level of involvement with shopping to increase the chances of VFR adoption, while bearing in mind that consumers with high shopping involvement are less likely to be affected by perceived functional concerns. In other words, fashion firms should present VFR experiences that consumers perceive as relevant to their personal shopping needs, values, and interests. For example, fashion firms should adopt a VFR solution that has the best potential to satisfy consumers' functional, experiential, and social needs as high shopping involvement is characterized as having increased engagement in shopping for economic, leisure, or social-oriented reasons (Bosnjak et al., 2007; Bergadaà et al., 1995). Also, the continuous provision of VFR promotions can be a reinforcement factor, given that consumers with high shopping involvement tend to show comparatively active responses to marketing promotions (Volle, 2001). Strengthening consumers' shopping involvement can play a key role

in increasing the adoption of VFRs as consumers with high shopping involvement are less concerned with functional risks of VFRs, while also providing a larger potential base for VFR adopters. Overall, the findings provide support for the importance of being attuned to the individual differences of target consumers, being prepared to promote value in marketing communications, and enhancing relevant features of VFRs (i.e., functional, experiential, social) sought by consumers with a different predisposition.

Limitations and Suggestions for Further Research

Despite the meaningful implications, this study bears several limitations. The first limitation lies in the convenience sampling method used to recruit the respondents. This study targeted those who had at least heard of VFRs and are online apparel shoppers; therefore, sampling from the targeted population can create unbalanced demographic data. Although the sample in general represented the typical population distribution in the U.S. (see Appendix D), consumers' true adoption intention can be better revealed by replicating the study by sampling from the general population.

The second limitation lies in the sampling criteria. This study filtered responses to include only those individuals who had at least heard of VFRs. Individuals who do not have prior experiences of VFRs might offer insights based on how they imagine interacting with VFRs. Therefore, future studies could compare those who do and do not have prior experiences and objective knowledge in using VFRs to investigate how their concrete expectations influence their adoption intention.

Thirdly, it was expected that the data would show three groups in terms of the salience of regulatory foci, namely a group with high promotion focus and low prevention focus, a group

with high prevention focus and low promotion focus, and a group with insignificant differences between promotion focus and prevention focus. However, due to the small numbers of individuals (i.e., 21 responses in the online survey) who show insignificant differences in their regulatory orientation from those, the sample was classified into two, instead of three, groups. Future research could replicate this study to compare VFR adoption behavior between those who rely on a particular regulatory focus and those who hold the same level of promotion focus and prevention focus to validate the current findings. Furthermore, considering that the adoption of VFR technology is moderated by the salient regulatory focus, it is desirable to use consumers from different markets representing larger differences in promotion focus and prevention focus to compare and confirm the moderating effect of regulatory focus. For example, future studies could examine the proposed relationships with consumer groups having different demographics and cultural backgrounds as their primary regulatory focus becomes more dominant in particular demographic or cultural groups (Kurman et al., 2015; Lockwood et al., 2005).

Lastly, in this study, a brief description of VFRs was provided at the beginning of the survey, describing the key function and features of VFRs and explaining the virtual try-on process, such as the fact that users would input body measurement or a photograph of themselves to initiate virtual fitting. While this conceptual description illustrates core VFR processes and commonly offered features of a variety of VFR solutions, consumers' perceptions of VFRs can differ according to the type of VFR they engage with due to technological variations among VFR solutions (Lee & Xu, 2019). Future studies should investigate consumers' perceptions and adoption intention toward a particular type of VFR to offset the confounding effects due to the variations among VFRs referenced by consumers when completing the survey. In addition, future studies could involve consumers who are current users of VFRs to understand how

consumers' concrete and objective expectations and evaluations toward different types of VFRs influence their adoption intention or intention to continue using the VFR technology.

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APPENDICES

Appendix A: IRB Form for Approval of Focus Group Interview

Dear Yingjiao Xu

Date: October 24, 2018

IRB Protocol 14332 has been assigned Exempt status

Title: Exploring Consumer’s Motivations and Perceptions to Use Virtual Fitting Rooms (VFRs) in Online vs. Offline Channels

PI: Xu, Yingjiao

The research proposal named above has received administrative review and has been approved as exempt from the policy as outlined in the Code of Federal Regulations (Exemption: 46.101. Exempt b.2). Provided that the only participation of the subjects is as described in the proposal narrative, this project is exempt from further review. This approval does not expire, but any changes must be approved by the IRB prior to implementation.

1. This committee complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU projects, the Assurance Number is: FWA00003429.
2. Any changes to the protocol and supporting documents must be submitted and approved by the IRB prior to implementation.
3. If any unanticipated problems or adverse events occur, they must be reported to the IRB office within 5 business days by completing and submitting the unanticipated problem form on the IRB website:
<http://research.ncsu.edu/sparcs/compliance/irb/submission-guidance/>.
4. Any unapproved departure from your approved IRB protocol results in non-compliance. Please find information regarding non-compliance here:
http://research.ncsu.edu/sparcs-docs/irb/non-compliance_faq_sheet.pdf.

Please let us know if you have any questions.

Jennie Ofstein
NC State IRB Office
919.515.8754 (email is best)

Appendix B: Survey Questionnaire

This study aims to investigate consumers' adoption process of **Virtual Fitting Rooms (VFRs)**. The information that you provide will give us valuable insights into consumers' adoption of VFR technology in the fashion industry. Your completion of the survey implies your consent for the researchers to use the data for research purpose. The data you provided will be analyzed collectively. The researchers would like to thank you in advance for your participation in this survey.

Virtual Fitting Room (VFR) is a technology that lets you see a garment on an avatar that is your size. In using VFR, you may be asked to input your body measurement and/or upload photograph of yourself. Some VFRs allow you to rotate your image, to change avatar features (e.g., hair color) and fabrics, and to share images created in the VFR on social media.

If you are between **the ages of 21 - 64** and agree to participate in this study, please select '**Yes**' below in order to proceed on to the survey. Otherwise, please select '**No**' to end the survey.

- I am between the ages of 21- 64.
 - 1) Yes
 - 2) No

Screening Questions

- Have you heard of Virtual Fitting Rooms (VFRs) before today?
 - 1) Yes
 - 2) No

- Do you have experience in shopping for apparel in online stores?
 - 1) Yes
 - 2) No

- Please indicate your age range.
 - 1) 21~24
 - 2) 25~29
 - 3) 30~34

- 4) 35~39
- 5) 40~44
- 6) 45~49
- 7) 50~54
- 8) 55~59
- 9) 60~64

- What is your gender?

- 1) Male
- 2) Female

Section One: General Shopping Behavior

- How often do you shop online for apparel products in a typical month?

- 1) Never
- 2) Less than once a month
- 3) Once a month
- 4) Twice a month
- 5) More than twice a month

- Have you ever experienced any problems with buying apparels online in terms of fit?

- 1) Yes
- 2) No

- Have you ever used Virtual Fitting Rooms (VFRs) in the past?

- 1) Yes
- 2) No

- If yes, please specify the store or platform that you used Virtual Fitting Rooms (VFRs)
-

- If yes, are you satisfied with the Virtual Fitting Room (VFR)?
 - 1) Yes
 - 2) No

- What is your level of knowledge about the Virtual Fitting Room (VFR)?
 - 1) Not at all
 - 2) Somewhat knowledgeable
 - 3) Quite knowledgeable
 - 4) Very knowledgeable

- Has anyone close to you (e.g., friends and/or family) used Virtual Fitting Rooms (VFRs) in in the past?
 - 1) Yes
 - 2) No

Section Two: Main Questions

Directions: Please indicate your agreement with the following statements on a scale from 1 to 7.

Questions: Promotion focus	1: Strongly disagree	2	3	4: Neutral	5	6	7: Strongly agree
PR1. I frequently imagine how I will achieve my hopes and aspirations.							
PR2. I often think about the person I would ideally like to be in the future.							
PR3. I typically focus on the success I hope to achieve in the future.							
PR4. My major goal is to achieve my personal ambitions.							
PR5. I see myself as someone who is primarily striving to reach my “ideal self”-to fulfill my hopes, wishes, and aspirations.							

PR6. In general, I am focused on achieving positive outcomes in my life.							
PR7. I often imagine myself experiencing good things that I hope will happen to me.							
PR8. Overall, I am more oriented toward achieving success than preventing failure.							

Questions: Prevention focus	1: Strongly disagree	2	3	4: Neutral	5	6	7: Strongly agree
PV1. In general, I am focused on preventing negative events in my life.							
PV2. I am anxious that I will fall short of my responsibilities and obligations.							
PV3. I often think about the person I am afraid I might become in the future.							
PV4. I often worry that I will fail to accomplish my personal goals.							
PV5. I often imagine myself experiencing bad things that I fear might happen to me.							
PV6. I frequently think about how I can prevent failures in my life.							
PV7. I am more oriented toward preventing losses than I am toward achieving gains.							
PV8. I see myself as someone who is primarily striving to become the self I “ought” to be—to fulfill my duties, responsibilities, and obligations.							

Questions: Shopping involvement	1: Strongly disagree	2	3	4: Neutral	5	6	7: Strongly agree
SI1. Shopping is something that interests me a lot.							
SI2. I was really enjoying doing shopping.							

SI3. I am confident that shopping was the right activity for me to be doing right now.							
SI4. My shopping gives a glimpse of the type of person I really am.							
SI5. I will be annoyed if shopping proves to be a poor use of my time.							

Directions: Based on the knowledge you have so far about Virtual Fitting Rooms (VFRs), please answer questions in the following sections imagining that you have the opportunity to use VFRs for apparel shopping. Please indicate your agreement with the following statements on a scale from 1 to 7.

Questions: VFR Perceptions	1: Strongly disagree	2	3	4: Neutral	5	6	7: Strongly agree
PU1. VFRs can aid me in evaluating garment fit for online apparel shopping.							
PU2. Using VFRs will enhance my shopping effectiveness by reducing fit problems.							
PU3. Using VFRs will increase my shopping productivity through aiding me in evaluating garment fit.							
PEU1. I think the interface of VFRs will be clear and understandable.							
PEU2. I think it will be easy to use VFRs.							
PEU3. It will be easy for me to become skillful at using VFRs.							
PFC1. I have a concern when uploading my personal information (such as body measurement) when use VFRs.							
PFC2. I am afraid that my personal information shared on VFRs might not be secure.							
PFC3. The representation of the virtual garment on my avatar might not have good realism.							
PE1. Using VFRs for online apparel shopping will be enjoyable.							
PE2. It will be a pleasant experience to use VFRs for online apparel shopping.							

PE3. I would have fun using VFRs.							
PCT1. I think I can choose how I want my avatar to be displayed (such as posture, background).							
PCT2. I think I can modify the features of my virtual image, such as hair color and skin type.							
PCT3. I think I can manipulate the outfit of my avatar by mixing and matching different clothing and accessory items.							
PCR1. Using VFRs will stimulate my interests.							
PCR2. Using VFRs will satisfy my curiosity.							
PCR3. Using VFRs will arouse my imagination.							
PSB1. I think using VFRs may allow me to share my virtual image with my friends.							
PSB2. I think using VFRs will allow me to receive feedback from my friends on my virtual image.							
PSB3. My friends' feedback on my virtual image can make me feel more confident about my purchase decisions.							

Questions: VFR Adoption	1: Strongly disagree	2	3	4: Neutral	5	6	7: Strongly agree
AD1. I intend to use VFRs in the future for my apparel shopping.							
AD2. It is very likely that I would use VFRs in the future.							
AD3. I expect that I will use VFRs in the next time I shop.							

Section Three: Demographics

- Please indicate your education level.
 - 1) Less than a high school diploma
 - 2) High school diploma
 - 3) Some college, no degree

- 4) Bachelor's degree
- 5) Graduate degree
- 6) If others, specify ()

- Please indicate your annual household income level.

- 1) Less than \$20,000
- 2) \$20,000~\$34,999
- 3) \$35,000~\$49,999
- 4) \$50,000~\$74,999
- 5) \$75,000 or more

Appendix C: IRB Form for Approval of Surveying

Dear Hanna Lee:

Date: October 16, 2019

IRB Protocol 16843 has been assigned Exempt status

Title: Fashion Consumers’ Perception and Adoption of Virtual Fitting Rooms (VFRs): A Perspective of Regulatory Focus and Shopping Involvement

PI: Xu, Yingjiao

The research proposal named above has received administrative review and has been approved as exempt from the policy as outlined in the Code of Federal Regulations (Exemption: 46.101. Exempt d.2). Provided that the only participation of the subjects is as described in the proposal narrative, this project is exempt from further review. This approval does not expire, but any changes must be approved by the IRB prior to implementation.

1. This committee complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU projects, the Assurance Number is: FWA00003429.
2. Any changes to the protocol and supporting documents must be submitted and approved by the IRB prior to implementation.
3. If any unanticipated problems or adverse events occur, they must be reported to the IRB office within 5 business days by completing and submitting the unanticipated problem form on the IRB website:
<http://research.ncsu.edu/sparcs/compliance/irb/submission-guidance/>.
4. Any unapproved departure from your approved IRB protocol results in non-compliance. Please find information regarding non-compliance here:
http://research.ncsu.edu/sparcs-docs/irb/non-compliance_faq_sheet.pdf.

Please let us know if you have any questions.

NCSU IRB Office

Appendix D: Comparisons of Sample Profile with the U.S. General Population

Demographic variables	Sample (%)	U.S. General Population (%)
Gender		
Female	50.0%	50.8%
Male	50.0%	49.2%
Age		
21~24 ^a	5.2%	11.1%
25~29	16.9%	10.8%
20s	22.1%	21.9%
30~34	11.5%	10.4%
35~39	11.0%	10.3%
30s	22.5%	20.7%
40~44	12.7%	10.7%
45~49	9.6%	11.6%
40s	22.3%	22.3%
50~54	10.6%	11.5%
55~59	11.3%	10.1%
50s	21.9%	21.6%
60~64	11.3%	8.7%
Education ^b		
Less than high school diploma ^c	2.3%	6.7%
High school diploma	19.4%	28.6%
Some college, no degree ^d	33.1%	28.2%
Bachelor's degree	31.9%	20.6%
Graduate degree	13.3%	10.3%
Others ^e	13.3%	5.6%
Annual household income		
Less than \$20,000	18.3%	14.7%
\$20,000~\$34,999	19.0%	13.2%
\$35,000~\$49,999	12.5%	12.0%
\$50,000 ~\$74,999	21.7%	17.2%
\$75,000 or more ^f	28.5%	42.9%
Total	100%	100%

Notes: U.S. Census Bureau (2019). Data retrieved from www.census.gov/library/publications.html; ^a: 20~24 in the U.S. General Population Distribution, ^b: 18 and over in the U.S. General Population Distribution, ^c: People who have completed 12th grade but did not receive a diploma are excluded, ^d: People who are in some college without degree and have associate degree are included in this category, ^e: People who have a professional degree (1.3%) and did not completed 12th grade but did not receive a diploma are excluded in the table (4.3%), ^f: People earn more than \$15,500 comprised 14.3%.