



Contents lists available at ScienceDirect

## Australasian Marketing Journal

journal homepage: [www.elsevier.com/locate/ausmj](http://www.elsevier.com/locate/ausmj)

# Augmented reality and the customer journey: An exploratory study

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## ARTICLE INFO

### Article history:

Received 12 March 2020

Revised 3 June 2020

Accepted 9 June 2020

Available online xxx

### Keywords:

Augmented reality  
Customer experience  
Customer journey  
Retail technology

## ABSTRACT

Many firms, including Amazon and IKEA, utilise augmented reality (AR) technology to enhance the consumer experience. In the retail industry, AR is gaining increasing traction as a means of improving the customer experience overall. In this research, we conduct an exploratory analysis to determine whether AR contributes positively or otherwise to customer experience. By means of semi-structured interviews, we identify seven core themes pertinent to the customer journey. Findings suggest that, prior to purchase, AR can broaden consumers' product consideration set, while narrowing the choice set. Moreover, we find evidence that AR can lessen brand value, thereby giving emerging brands the opportunity to connect with consumers. Findings indicate that, at the point of purchase, AR can help with product curation and drive hedonic value through playfulness. Finally, at the post-purchase stage, findings show that AR can influence consumer choice confidence, and can also amplify cognitive dissonance. From these themes, we draw implications for theory as well as managerial implications in terms of balancing the potential promises and perils of AR as an innovation technology.

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## 1. Introduction

Digital technologies are increasingly innovating the way businesses operate and the way consumers engage. For businesses, digital technologies are increasingly being utilised to reduce costs and augment interactions with consumers (van Doorn et al., 2016). For consumers, digital technologies are enhancing shopping convenience and delivering new channels for purchasing (Duarte et al., 2018). Recent years have seen the rapid development of technology, evidenced by the transition from staffed store checkouts to self-checkouts and on to checkout-free stores such as the Amazon Go concept (Cusumano, 2017). By 2023, it is expected that 5G-technology will underpin retailers' ability to deploy immersive communication to connect consumers and brands in new ways (Wang, 2020). This technological evolution will likely see a wide variety of brands adapt to use digital technologies and devices such as Artificial Intelligence (AI), advanced robotics, Intelligent Agents, the Internet of Things (IoT), Virtual Reality (VR), Augmented Reality (AR), and cross-reality (XR). All these technologies will, in some way, alter the interaction between consumers and companies (Larivière et al., 2017).

In this research, we focus on the potential impact that AR can have on the customer journey. AR technology is anticipated to see compound annual growth rates of up to 135% in terms of retail market spend between 2018-2023 (IDC, 2019). AR will enable retailers and brands to virtually display products, accessories, and customization - allowing consumers to imagine what these would look like prior to purchase (Pantano and Servidio, 2012). In the retail fashion industry, AR enables consumers to virtually experience events, including fashion shows and catwalks (Stromberg, 2018). In retail stores, the technology enables consumers to use virtual fitting rooms, smart mirrors and social try-on rooms (Hilken et al., 2017). Taken together, these tools allow consumers to engage in virtual try-ons of clothing, browse different colours and sizes, and even share pictures of the items via social media (Beck and Crié, 2018). In the global market, these tools were valued at US\$2.5 billion in 2017, and it is anticipated that this will increase at a compound annual growth rate of 22.7% by 2026 (Transparency Market Research, 2018).

There is no doubt that technology is having a strong impact on the retail landscape (Grewal et al., 2017), with innovation becoming especially important to customer experience in highly competitive industries such as retail (Shankar et al., 2011). Customer-oriented technologies have been bridging the gap between online and traditional retail, enabling a holistic omni-channel experience (Verhoef et al., 2015). Retail technology is increasingly seen as an interface between brand and customer interactions (van Doorn et al., 2016), which is relevant to all the stages of the customer

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\* This research is supported by an Australian Government Research Training Program (RTP) Scholarship.

<https://doi.org/10.1016/j.ausmj.2020.06.010>

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journey. It is important that marketers use innovative technologies strategically to achieve differentiation in order to maintain their marketing quality and their sales (Flostrand et al., 2019).

Along with the rapid development of retail technology, our knowledge about the role of AR is increasing (de Ruyter et al., 2018; Parsons and Descatoires, 2016), although our understanding of its impact on the customer journey in virtual try-on settings is still limited. Specifically, there is little knowledge about how and whether such technology enhances or detracts from the customer experience at different stages of the customer journey, from pre-purchase to purchase and then post-purchase. Hence, the objectives of this paper are two-fold. First, we seek to establish a consumer view of AR-enabled virtual try-on technology in the service encounter. Not only will this encourage novel academic research on the topic, it can also assist managers to adjust their focus when making strategic decisions about the development and deployment of AR systems. Second, we investigate the effects of AR on the customer experience at various stages of the customer journey – prior to, during, and subsequent to the consumption experience by identifying factors that help and hinder the customer experience. In conceptualising these differences, we identify distinct opportunities for AR to enhance and add value to the customer journey. To the best of our knowledge, no previous work integrates these various perspectives. The next section presents the theoretical background. This is followed by the research methodology, findings, and discussion of the theoretical and managerial implications. The paper concludes with an acknowledgement of the study's limitations, and suggestions for future research.

## 2. The role of AR in the customer journey

Along the customer journey, consumers are exposed to different touchpoints that determine the customer experience (Kietzmann et al., 2018; Martin et al., 2015) across pre-purchase, purchase, and post-purchase stages (Sands et al., 2016). In the pre-purchase stage, consumers can be influenced by internal and external stimuli (Pine and Gilmore, 2011) when deciding whether to engage with physical or online stores (Garaus, 2018). Internal stimuli are individual difference factors, such as purchase frequency and involvement (Puccinelli et al., 2009), while external stimuli are the environmental factors which can include design elements and technology (Jain and Bagdare, 2009). At the purchase stage, the consumer makes a choice and decides to purchase (Inman et al., 2009). It is important to understand the concept of consumer choice because, when consumers are more certain about a product and its particular features, they feel empowered and their level of choice confidence increases (Garaus and Wagner, 2016). An increase in choice confidence can occur when a consumer takes part in the creation process (Pallant et al., 2020). In addition, general positivity increases consumer confidence (Vahdat et al., 2020). However, retail technology offers consumers a multitude of items from which to choose (Swait and Sweeney, 2000), which can increase choice complexity and reduce choice confidence (Garaus and Wagner, 2016). As a result, cognitive dissonance can occur when, after a customer evaluates the purchase, she/he feels that it does not meet their expectations or that a competing choice may have been wiser (Sweeney and Swait, 2008). At the post-purchase stage, the customer might have to decide whether or not to complain (Ro, 2015), and this decision can also influence other behaviours such as product return or WOM intentions (Bolkan et al., 2012).

### 2.1. AR and the customer experience

A range of theories have been drawn upon to explain consumer responses to technology, AR in particular; these include the

technology acceptance model (Huang and Liao, 2014; Spreer and Kallweit, 2014; Pantano et al., 2017), flow theory (Javornik, 2016; Yim et al., 2017; Huang and Liao, 2017), and situated cognition theory (Chylinski et al., 2020; Hilken et al., 2017). Technology can enhance consumers' utilitarian and hedonic purchase experiences (Jones et al., 2006). The former allows consumers to achieve a specific goal (Zhu et al., 2012). Whereas, the latter consists of purely entertainment-based outcomes (Bonetti et al., 2018). Specifically, technology can integrate both utilitarian and hedonic benefits by providing an enjoyable and playful experience and delivering utilitarian outcomes by, for example, increasing choice set evaluation (Piotrowicz and Cuthbertson, 2014).

AR is an interactive technology that enables brands to digitally enhance vision (van Esch et al., 2019), resulting in the delivery of enjoyment and information to consumers. In fashion retail, AR technology can offer a virtual try-on that, by means of a digital projection, enables consumers to visualise how an item of clothing might look on them. The AR virtual try-on can be applied in both physical and online stores. In physical stores, virtual fitting rooms with smart mirrors are the most common technology types, where consumers visualise the item projected on a mirror, without needing to actually try it on (Beck and Cri , 2018). In digital settings, a website or smartphone application can allow the consumer to virtually try items by using the phone's camera or uploading a picture (Kim and Forsythe, 2008; Pantano and Gandini, 2017). Hence, AR can simulate an experience (Baudrillard, 1994) by blending the real and virtual worlds. In this way, AR enables consumers to view products in a simulated scenario (Baudrillard, 1983) and offers retailers the opportunity to strategically achieve differentiation and develop competitive advantage (van Esch et al., 2019).

Drawing on the technology acceptance model (Davis et al., 1989) and situated cognition theory (Robbins and Aydede, 2009), we propose that AR will have both positive and negative impacts on the overall consumer experience. Specifically, the technology acceptance model proposes that technology acceptance will vary based on consumer perceptions of ease of use, usefulness, and general attitude toward the use of the technology. Together, these elements drive positive and negative outcomes. With respect to situated cognition theory, customers' information processing is embedded in their physical environment and embodied through physical simulations and actions (Chylinski et al., 2020; Hilken et al., 2017). Within the context of AR, situated cognition enables customers to learn about products by linking abstract facts in real time. Hilken et al. (2017) suggest AR can embed products in personally-relevant contexts and allows the simulation of physical control over a product (i.e., being able to adjust sunglasses). Such features enhance customer engagement and enjoyment in shopping contexts. Drawing on situated cognition theory, we expect AR to have a positive impact on customers' shopping experiences.

### 2.2. How AR can enhance the customer experience

As a retail technology, AR has been gaining popularity due to its ability to overcome the inadequacies of both online and offline shopping (Javornik, 2016). The online clothing retail industry has been experiencing a high number of returns (Duarte et al., 2018); in 2015, the total cost of global return deliveries amounted to US \$642.6 billion (Statista, 2015), with a significant increase in return services in the past five years. In addition, returns generate high carbon costs, affecting sustainability (Cullinane et al., 2019). The number of product returns could be overcome using AR in a virtual try-on setting. This technology enables brands to provide more extensive product information by allowing the consumer to see different views of the item. One characteristic of AR in a virtual try-on setting is its ability to enhance information, which helps reassure consumers of their choice. By being able to interact

with a product, customers feel more confident about their choice (Kang et al., 2020; Suh and Lee, 2005).

Regarding offline shopping, one of the major concerns is related to effort, and having to physically try on clothes is not always a pleasurable experience for consumers (Barnes et al., 2016). Admittedly, online shopping is often preferred so as to overcome this issue (Hao Suan Samuel et al., 2015). AR is expected to alleviate these issues and provide a better experience by delivering a playful experience. Perceived playfulness refers to the recreational element of the shopping experience (Kang et al., 2020). This differs from the term *enjoyment*, which connotes an individual's emotional state, rather than the mere outcome derived from the use of the technology (Goetz et al., 2006). It has been shown that AR is able to deliver this playful element (Kang et al., 2020). Consequently, AR as a tool for virtual try-on in retail would offer features such as informativeness and playfulness, that could improve the customer experience (Kang et al., 2020).

AR can help consumers in a number of ways during their shopping experience. One advantage of AR is that it aligns with the growing consumer demand for personalisation (Pallant et al., 2020), with an increasing number of brands offering consumers the ability to choose different features for their own product design (i.e. Nike ID shoes). However, as previously noted, the consumer's ability to visualise the final product during the design process varies, and may deter consumers from engaging in the customisation of products (Kim and Lee, 2020; Pallant et al., 2020). Despite this, AR enables consumers to be more confident with their decision making which is important in online customisation as it may be difficult to re-sell returned items.

AR may also enhance consumers' perceived psychological ownership prior to making a purchase (Pierce et al., 2003). Research has shown that consumers who touch products can increase perceived psychological ownership as a result of the endowment effect (Brasel and Gips, 2014). In the case of online products, psychological ownership increases when products are customised (Jussila et al., 2015). AR may be one way to enhance co-creation and personalisation value (Varadarajan et al., 2010), thereby increasing consumers' feelings of psychological ownership (Jussila et al., 2015; Pantano and Servidio, 2012).

Many consumers find it important to touch an item prior to purchasing it (Liu et al., 2017). With the prominence of online shopping, many consumers engage in research shopping – searching for items on one channel and then purchasing them on another (Verhoef et al., 2007). A shopper might search online and then go to a physical store to see how the item actually looks. Consumers may find it difficult to visualise an item online and want to see it in person, demonstrating a strong need for touch. AR could diminish consumers' need for touch, thereby reducing the amount of research shopping and channel switching. Research has shown that the more direct the path to purchase, the more likely it is that a consumer will complete a transaction (Willems et al., 2017).

### 2.3. How AR can detract from the customer experience

One reason that consumers shop online is the lower perceived effort as browsing and purchasing can be undertaken easily while multitasking and require little effort and attention (Duarte et al., 2018). The use of AR as a virtual try-on tool, however, would add an extra step to a consumer's online shopping experience. Some shoppers might consider this additional step as requiring too much effort. The concept of effort is comprised of four components: cognitive, emotional, time and physical effort (Dixon et al., 2010). It has been found that AR is able to save consumers' time and effort, and improve their decision-making ability (Hilken et al., 2017).

As AR is still a relatively new technology, with few brands deploying it, it can be seen as highly novel (Javornik 2016). While

consumers might want to try AR for its novelty, it is not known whether perceived usefulness or the novelty factor alone drives trial and usage, at least in the short term. Accordingly, there might be an initially large positive increase in willingness to use AR as a virtual try-on tool; however, the magnitude of change in usage resulting from novelty might reduce to baseline levels relatively quickly after an initial roll-out (Ferraro et al., 2017). Should this be the case, when the novelty factor diminishes, the use of the technology may decrease.

Somewhat linked to novelty, playfulness is another important factor to consider. AR has a component of playfulness (Kang et al., 2020), which might lead consumers to interact for fun, but not convert to purchase. In fact, it could be seen as a game or something to share via social networks, but not as a purchasing tool. In sum, while AR is an emerging and exciting technology, there are gaps in our knowledge regarding the positive or negative effects of AR on the customer experience.

### 3. Method

To address the research question of how AR can impact the customer journey, data were collected via semi-structured interviews (Galletta, 2013). Given the exploratory nature of this research, a qualitative methodology was deemed appropriate due to its ability to acquire a deep understanding of consumers' perceptions and feelings (Guba and Lincoln, 1982; Hammersley, 2011). An inductive approach was adopted, whereby a social phenomenon is observed and trends in the data are examined (Creswell and Poth, 2016). Given the exploratory nature of this research, we conducted a small set of fifteen semi-structured interviews with consumers who have had varying levels of prior experience with AR technology in a virtual try-on setting. Although small, such qualitative sample sizes have been deemed appropriate for the investigation of emerging concepts (Guest et al., 2006; van Esch and van Esch, 2013). During the interview, respondents first described their perceptions and experiences of AR as a virtual try-on tool in general, and then were presented with an AR as a virtual try-on technology to use (see Appendix). The technology is a real AR tool embedded within the mobile app of a leading Australian online fashion retailer, which allows consumers to virtually try on a variety of sneaker shoes.

As the study was intended to be an exploration of theory (constructs and propositions), it was important to include a range of consumers with some variation in their level of experience with AR in virtual try-on settings. Therefore, a purposive sampling plan (Glaser and Strauss, 1967) was used to ensure that respondents with diverse experience with AR, ranging from no experience, limited experience, to moderate experience, were included in the sample frame. Recruitment started with post-graduate students over 18 years of age and then via snowballing. Subsequent, potential participants were identified based on their prior experience with AR. Once recruited, respondents were advised they were participating in a research project to better understand their experience with regard to shoe shopping, and were given a coffee voucher as an incentive to participate. In total, fifteen participants, aged between 23 and 51, were interviewed (Table 1 provides the sample profile). Participants were assigned pseudonyms to protect their privacy. Data collection ended once it was deemed saturation occurred and that any additional data was unlikely to change our findings.

Interviews were conducted by the lead author and lasted between 30 and 60 minutes. Interviews were audio recorded and professionally transcribed, resulting in 223 double spaced pages of text. Prior to data analysis, transcripts were checked for precision by the research team. All interviews followed the protocols pertaining to long interviews (McCracken, 1988). Data were anal-

**Table 1**  
Sample profile.

Pseudonym	Gender	Age	Occupation	Prior experience
Sophie	Female	23	Hospitality	No Experience
Peter	Male	23	Hospitality	No Experience
Barbara	Female	26	Researcher	No Experience
Karen	Female	51	Administration	No Experience
Max	Male	25	Student	No Experience
Meg	Female	34	Freelance	No Experience
Leah	Female	31	Administration	No Experience
Abby	Female	28	Researcher	No Experience
Holly	Female	27	Student	Limited
Ben	Male	25	Student	Limited
Emily	Female	29	Teacher	Limited
Julie	Female	45	Stay at home mother	Limited
Christine	Female	24	Consultant	Moderate
Josh	Male	29	Consultant	Moderate
Sarah	Female	42	Manager	Moderate

Note: Prior experience is defined as - No experience = not previously trialled AR as a tool for virtual try-on; Limited experience = trialled AR as a tool for virtual try-on on 1-2 prior occasions; Moderate experience = trialled AR as a tool for virtual try-on on 3-5 prior occasions; All respondents provide consent to participate as per the requirement of ethics approval.

used by all authors, employing open, axial, and selective coding (Spiggle, 1994). Open coding was undertaken by the first and second authors, with both discussing passages and adding insights gleaned from an understanding of the context and from personal experience. Initial coding was utilised to search for similarities and differences among the data (Charmaz, 2006). Then, following an inductive approach, pattern coding was used to identify the major themes emerging from the data (Marshall and Rossman, 2014). All authors discussed these findings. We followed best practices in qualitative analysis, such as the triangulation of data by the researchers to ensure reliability (Wallendorf and Belk, 1989). All authors agreed that the final structure of the findings would offer the best insights into the ways that AR affects the customer journey.

#### 4. Findings

Our findings reveal seven themes across three stages of the customer journey: prior to purchase, the point of purchase, and post-purchase. Below, we outline each stage of the journey and its respective themes.

##### 4.1. How AR influences the early stage of the purchase journey

We identify four ways in which AR can affect the customer experience prior to purchase. First, respondents felt that the use of AR technology to try products would likely expand the range of products they might consider and try on. Second, respondents tended to feel that AR virtual try-on technology would be useful in narrowing the choice derived from the identified consideration set. Third, we found that using AR to trial products has the potential to mitigate the value of brand. Each of these themes is explained in more detail below.

##### 4.1.2. Theme 1: Widens product consideration

AR was discussed in terms of expanding the consumer consideration set. In any purchase decision, a consumer has an initial consideration set based on their perceptions and knowledge of the product category (Hauser, 2014). Our findings revealed that when AR is used for virtual try-on, it could expand consumers' consideration set, particularly in terms of design or style. This theme was illustrated by Josh, who mentioned a prior AR virtual try-on experience, "I was changing from a very square [eye wear] frame to a round frame ... it was interesting to see how that style looked on my face as I had no experience with this style before. I actually tried

a few different styles that I had not initially considered" (Josh, 29, moderate). It was common for respondents to trial more products. As Karen notes, she would be encouraged to try different things more so than she would normally: "... in the privacy of your own home you try-on stupid glasses and then see what kind of style suits your face, it was for fun. Whereas in-store I would be probably a bit more serious. Yeah, at home you can try the ones that you wouldn't without looking like a crazy lady" (Karen, 51, no experience).

We found that AR virtual try-on led consumers to try products, styles, and designs they might not normally consider. In terms of product style, participants were willing to experiment with more eclectic styles compared to what they would typically consider. Consumers reported that AR would help them to change their image and trial new styles. Julie expresses this when commenting that she was interested in trying shoes she had not previously considered: "Brands like Reebok and Converse I've seen them so often I wouldn't want to virtually try these on. But for brands I am not so familiar with, it would be nice to try these on with an augmented reality app" (Julie, 45, limited).

Our data reveals a consistent theme of consumers wanting to use AR to experiment with new styles in a virtual try-on setting. As evident, AR allows consumers to broaden their consideration set and experiment – often in the comfort of home rather than in-store. This distinction between the in-store and at-home experience was important, as consumers reflected on the benefits of having less social pressure when trying products on at home by means of AR. As Meg commented: "...the confidence of trying new things, being able to do that and going, 'Oh, that actually looks really good!' Because when I'm in a store, especially let's say for glasses, I get a bit shy trying new styles, even if the shop assistant says 'try this one, this might look good' I get nervous. So, I think using AR would be cool in this regard" (Meg, 34, no experience). Meg's sentiments align with those of others who saw the advantage of trialling new styles in their home: they felt safe in a familiar environment without the societal norms of a retail setting. Consumers are social beings who feel judgement, pressure, and the need to behave appropriately in a social setting (Fishbein and Ajzen 1975); hence, AR enables consumers to feel more comfortable and expand their consideration set.

##### 4.1.2. Theme 2: Narrows the choice set

Apart from expanding the consideration set, conversely, AR was seen as helping consumers to narrow their choice set. Consumers found that AR was most useful in the preliminary stages of their

decision-making, when they tended to want the most options available for consideration. AR can expose consumers to a wide set of alternatives, but it can also help consumers by reducing choice overload and choice confusion (Garaus et al., 2015). The use of AR in the early stage of consumer decision-making may help consumers feel more certain about their product choice, potentially increasing choice confidence (Garaus and Wagner, 2016). As Ben noted, AR can assist in narrowing his choice set: *"It could be a cool way to narrow down what style you choose. Like, it's quite overwhelming when you're looking at all the glasses in a store in front of you. So, I think then it would be cool to have an idea of what brands and what styles you like before you go into store"* (Ben, 25, limited). The narrowing of the choice set was a common theme discussed by respondents. While AR may assist consumers to narrow their choice set, its usefulness might be decreased in settings where there are fewer options to begin with, such as mainstream smartphone models (Puad et al., 2016). There may well be a threshold in terms of usefulness and option availability that will strengthen choice confidence.

#### 4.1.3. Theme 3: Mitigating the value of brand

When our respondents were presented with AR as a tool for virtual try-on, they reported paying little attention to brand. Following her experience with the AR tool, and when asked what shoe she had trialled, Karen commented: *"What was the brand I tried on? I don't know. I didn't notice. But that didn't come into my decision making at all because when I was scrolling through looking at the shoes, I was just looking for the ones that I liked the best, I was just too excited to try them on"* (Karen, 51, no experience). Karen's comments indicate her immersion in the AR try-on experience, which can be compared to a flow state (Csikszentmihalyi, 1990). Similar to online shopping (Mathwick and Rigdon, 2004), the use of an AR virtual try-on tool involves the process of searching for information and could be challenging as it can lead to consumer tension resulting from the complexity of the task. During this flow state, the value of the brand dissipates, with the consumer's self-consciousness disappearing and sense of time becoming distorted (Csikszentmihalyi and LeFevre, 1989).

These findings are supported by Holly's experience. She noted: *"Honestly, I didn't even know what brand I was looking at. I was basically choosing based on the design - I liked the plain white shoes and their style ... I have no idea what brand they were"* (Holly, 27, limited). Holly's comments indicate active engagement and flow (Csikszentmihalyi and LeFevre, 1989). We found that for many of our interviewees, use of the AR tool decreased the importance of brand prior to purchase. Participants seemed to care more about the style of the product and the style being available for virtual try-on. Our respondents described the encounter as exciting and reported being lost in the experience - paralleling moments of flow - which, for some, obviated the importance of the brand. This could be an opportunity for new and emerging brands to gain access to new customers; however, it may pose a challenge for established brands, with consumers considering hitherto unknown brands.

#### 4.2. How AR impacts the point of purchase

Three themes emerged that revealed ways in which AR influences the point of purchase. First, AR as a means of enabling virtual try-on was perceived to add value as a tool for curation, in particular the curation of outfits rather than the assessment of individual items. Second, AR was seen as enhancing the hedonic experience by delivering playfulness and enjoyment at the point of purchase. Third, while elements of play were inherent in the use of AR at the point of purchase, it was discussed that this hedonic benefit may be a short-term gain in customer experience value. As

such, the magnitude of change for any positive benefit will likely return to baseline very soon after the deployment of AR quickly becomes the new normal. In the following sections, we elaborate on each theme.

##### 4.2.1. Theme 4: AR's role in curation

Consumers tended to think that AR would be a useful virtual try-on tool that could assist them with the curation of outfits, as it enabled them to see, virtually, how items go together. Respondents discussed that a key benefit of AR is that it enables them to determine an item's aesthetic appeal, rather than the functional benefit of 'fit'. It was most common for consumers to discuss AR as a means of gaining value via the curation of products worn together. As Peter stated: *"When I want to buy something to see if it suits me if it's something that I would look good with, but I wouldn't know how it fits me though"* (Peter, 23, no experience). Online shopping can pose challenges in terms of size and fit (Kim, 2016). However, consumers see value in AR being able to provide a visual representation of the products worn together. As Christine stated: *"The main benefit is that you can see whether or not it just suits you from a visual point of view. [...] so, from a visual thing, I think you care about how the glasses look on you, and it's less dependent on fit. I think for clothes too it's more important to look good"* (Christine, 24, moderate).

The benefit of curation at the point of purchase is further highlighted by Sophie, who noted: *"[It would be useful] to see if it's something that would look good with my outfit when I am about to buy it"* (Sophie, 23, no experience). This is because AR offered a less onerous environment than one where customers have to remove their clothes in order to put together and try different outfits. Reducing the need for effort in the shopping experience is important given that consumers strive to maximise their time and minimise the effort required to achieve a goal (Roy et al., 2018). Effort consists of cognitive, emotional, time and physical components; hence, AR technology gives consumers the opportunity to see how different items would look combined, without the need to physically try them on, which would be a waste of time (Chen and Wang, 2010).

Consumers tried on a specific item to see if it would go with an outfit they had thought of, but could not visualise, such as Christine: *"I can see how it could fit a need where you already have an outfit planned. And you need a pair of shoes to go with the outfit. Because you don't have a pair, or your last pair died or something like that. You have like a certain something in mind. Like, it's a visual function. You have an outfit in mind going for an event or whatever. And then you need to see if it looks good with the outfit that you had in mind at home"* (Christine, 24, moderate). Therefore, AR may provide opportunities for retailers to sell across categories.

##### 4.2.2. Theme 5: AR drives hedonic value through playfulness

It was common for our respondents to identify playfulness as a key benefit of utilising AR at the point of purchase. Engaging in innovative technology, such as AR, enhances consumer enjoyment and sense of fun (Kang et al., 2020). Perceived play comprises intrinsic enjoyment and escapism (Mathwick and Rigdon 2004), the former referring to the entertainment that is derived from the use of AR (Bloch et al., 1986), the latter referring to a state of psychological immersion that allows shoppers to temporarily "get away from it all" (Lombard and Ditton, 1997). Sophie's comment highlights the appeal of playfulness and its ability to immerse her, stating: *"It's fun, I suppose sometimes shopping online can be boring, because you're just going click, click, click... But here [with AR] you can sort of have an experience, because it's engaging, it is easy to get caught up in it and lose time!"* (Sophie, 23, no experience).

Despite the potential benefits of playfulness at the point of purchase, there are also downsides. First, it was mentioned that

playfulness could override the perceived usefulness of AR. That is, playfulness draws consumers into the element of fun (Kang et al., 2020), but can also override the purpose of purchase. Reflecting on the usefulness of AR as a virtual try-on, Abby commented: *"I don't think I'd find this technology [AR] particularly useful in retail, but it definitely does make the shopping experience more fun"* (Abby, 28, no experience). Second, the benefit of AR at the point of purchase may not be long-lasting for retailers, relative to its investment. It is known that innovation drives excitement for consumers (Pantano, 2014), which was evident in our data indicating that participants displayed high levels of enthusiasm using AR. However, many commented that the novelty effect of AR might wear off – meaning that there was a balance between AR's elements of perceived play (hedonic) and perceived usefulness (utilitarian). As illustrated by Max: *"I mean, for me, it's like 'whoa, new, new!', I would use this just to check it out. But I don't think it would help me make a decision to buy them"* (Max, 25, no experience). In general, participants were willing to try the tool and went in with an open mind, given its novelty. However, the novelty meant that there was likely a short-term gain in terms of customer experience rather than the more long-term intrinsic value of the technology. Leah commented on the novelty factor: *"It was fun, but I don't know how much of that is probably just the novelty, because I haven't done that before"* (Leah, 31, no experience). It is possible that the associated novelty might mean that there is a short-term gain in any customer experience value – with the resulting magnitude of change returning to baseline relatively quickly (Ferraro et al., 2017). Based on the assimilation-contrast theory (Sherif et al., 1958), magnitude of change is based on the perceived difference between an initial reference point and any subsequent information (Ferraro et al., 2017). In this case, the AR technology results in an initial increase which is likely to decrease rapidly once the novelty and playfulness wear off.

#### 4.3. How AR impacts post-purchase

A key theme emerged about the role of AR beyond purchase, revealing two ways in which AR can influence the customer experience at point of purchase. First, we found that virtual try-on with AR can increase consumer choice confidence, given consumer's ability to derive information in a virtual setting which simulates reality. Second, we found that in some situations, the use of AR for virtual try-on can actually amplify consumer cognitive dissonance. We elaborate on each theme below.

##### 4.3.1. Theme 6: Consumer choice confidence

We find that respondents perceive the benefit of AR technology when it enhances their customer experience or makes the customer journey more seamless (Puccinelli et al., 2009). In traditional settings, when consumers make online purchases, they have very clear expectations about what they will receive. Upon receipt of the item, consumers may have different reactions, including delight or disappointment (Barnes et al., 2016; Sweeney and Swait, 2008). After using AR technology as a try-on tool, our respondents reflected on their expectations post purchase. For many, the AR experience, in comparison to simply seeing a two-dimensional image, gave them greater confidence in their choice. The use of AR was discussed as potentially reinforcing their decisions across the customer journey (prior to purchase and purchase), making them more comfortable with the final product received. Emily expressed this sentiment when stating: *"I feel it gives the reassurance of how it is going to look. Especially for a product that I haven't tried before. Like a first-time customer"* (Emily, 29, limited).

##### 4.3.2. Theme 7: Amplification of cognitive dissonance

Given the high level of choice confidence, some consumers might experience a higher level of cognitive dissonance when they receive a product that does not meet expectations. Cognitive dissonance is the result of an immediate post-purchase comparison of what was purchased versus the other alternatives that were available (Powers and Jack, 2013). We find that the amplification of cognitive dissonance has both a product dimension and an emotional dimension (Elliot and Devine, 1994; Sweeney et al., 2000). Product dissonance is the cognitive aspect of dissonance related to the product trialled with AR and subsequently purchased, that can result in an emotional dissonance upon product receipt if expectations are not met. Ben reflects on the disappointment that could arise from the discrepancy between expectations and the actual item: *"If we had both bought it using the virtual try-on technology, and assumed it would have looked like that, we would have been really disappointed because it looks really different"* (Ben, 25, limited).

When shopping online, consumers acknowledge the possibility that the item might differ slightly in some respects from what is expected. Therefore, one of the main aspects that our respondents looked for in an online retailer is flexibility regarding returns. This is because consumers know that the actual item might differ from the image; hence, should they not be satisfied with it, they can return it at no cost to them and with relatively little effort. On the other hand, when AR is used to try an item virtually, consumers may feel more assured of what the item looks like and of their choice, and hence more certain that they will like it. In situations where this is not the case, it is possible that there is an amplification of cognitive dissonance; therefore, consumers may seek to undo the effects of their regrettable choice by returning the product in question (Gilovich and Medvec, 1995; Zeelenberg et al., 1996). Leah's comment illustrates this potential for increased disappointment: *"I guess if it did give them a false sense of assurance, that could make it more negative later if they decided that they regret the purchase. Because they'll be like, 'oh, but I tried it and it was it seemed good.' And then now they may regret it even more"* (Leah, 31, no experience).

## 5. General discussion

The aim of this study was to acquire an understanding of the promises and perils associated with AR. In particular, this research focused on customer experiences across the customer journey, using AR technology as a tool for virtual try-on settings. Adopting a qualitative research methodology, interviews were conducted during which participants revealed several key themes. In terms of how AR can help the customer experience, we found four common themes: AR can expand the consumer's consideration set, is most useful earlier in the decision-making process, is considered useful as a tool to curate outfits (rather than only individual products), and is seen to enhance the hedonic aspects of the customer experience. We also identified barriers, or ways in which the technology could harm the customer experience. Specifically, AR has the potential to mitigate the value of brand, can amplify cognitive dissonance, is not perceived as beneficial by all shoppers, and there may be only a very short-term gain in any customer experience as a result of novelty. In concluding, we outline implications for theory and practice before discussing limitations and future research directions.

### 5.1. Implications for theory

This research has several implications for theory. First, previous research has shown that a greater variety of products on offer can have negative effects, potentially leading to choice confusion (Garaus et al., 2015). Our findings indicate the potential for AR

**Table 2**  
AR's role in the customer journey.

	Prior to Purchase Need/ want recognition and Consideration	Point of Purchase Evaluation and Purchase decision	Post-Purchase Beyond the point of purchase
AR's application in the customer journey	Provides potential benefit to consumers in product search and subsequent consideration set.	Provides ability for consumers to visualize product combinations in a playful and engaging way.	Enhance consumer post-purchase evaluations by facilitating virtual trial.
Objective of AR	Allow consumers to discover, be inspired, and curate product choices and combinations.	Balance of utilitarian (seeing products) and hedonic (playfulness) elements at the point of purchase.	Facilitate choice confidence beyond purchase.
Potential role of AR (identified themes)	<ul style="list-style-type: none"> <li>• Widens product consideration</li> <li>• Narrows the choice set</li> <li>• Mitigating the value of brand</li> </ul>	<ul style="list-style-type: none"> <li>• AR's role in curation</li> <li>• Drives hedonic value through playfulness</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer choice confidence</li> <li>• Amplification of cognitive dissonance</li> </ul>
Illustrative examples	<ul style="list-style-type: none"> <li>• The Iconic Visualise</li> <li>• Warby Parker Virtual Try-On</li> </ul>	<ul style="list-style-type: none"> <li>• Maybelline Virtual Makeover</li> <li>• Ikea Place</li> </ul>	<ul style="list-style-type: none"> <li>• Zeekit x ModCloth</li> <li>• Gap DressingRoom</li> </ul>

to enhance consumer choice confidence and subsequently reduce choice confusion. Further, we find that AR can enable consumers to more effectively narrow their choice set when faced with a wide range of options. We know that if customers are presented with a great number of choices at the consideration stage of the purchase journey, this choice overload can negatively influence their ability to make a choice. Our findings suggest that AR can help to overcome this choice overload and may be able to strengthen consumers' choice confidence by narrowing the number of choices offered to a consumer. When customers are faced with a large opportunity set, they could feel choice confusion resulting from choice overload. AR can help to mitigate this by enabling consumers to narrow their options. Furthermore, by being able to visualise the product, consumers may feel more confident about the product (i.e. style, specifications) that otherwise would reduce choice confidence.

Further, we find that AR can assist consumers to mitigate cognitive dissonance by increasing the level of choice confidence following a purchase. Specifically, we find that AR can help to decrease cognitive dissonance by providing greater certainty about purchases made online. However, it is possible that when an item does not meet the consumer's expectations after she/he has used AR, their cognitive dissonance may be greatly amplified; in this instance, the increase in choice confidence can lead to greater disappointment. Hence, this research provides a more nuanced understanding of how cognitive dissonance may be influenced in conflicting ways by innovative and sometimes disruptive technologies. Finally, our study contributes to the growing stream of research on the blending of real and virtual worlds. Building on Baudrillard's (1983) notion of hyperreality, AR plays a role in the integration of the real and the virtual. We show that this blending can both enhance and harm the customer experience. This distinction between real and virtual will become increasingly blurred and has implications for the way that retailers engage consumers via AR.

## 5.2. Implications for practice

From a managerial perspective, caution should be exercised when deciding whether or not to implement AR for the purpose of virtual try-on. Rather than AR being purely a means of enhancing the customer experience, we found that it can equally help and harm it. Hence, it is important that managers be aware of the positive and negative aspects of AR. Ultimately, given that AR is in the

early stages of development, we would argue that early adopters should proceed with caution. One positive aspect for managers concerns viral sharing. With AR being relatively new and attracting wide attention, consumers are likely to share their experiences among their network and spread positive WOM. However, it begs the question: will this technology drive purchase or merely increase consumer engagement? Further, AR is likely to deliver an initially large increase in key outcomes; however, it is unknown for how long any increase can be sustained prior to a return to the baseline. Our research suggests that the novelty appeal may be short-lived at this stage. While we do find that AR can extend a consumer's consideration set, we find that this is most likely when AR is used at home. When used within a store, social norms may influence the way consumers behave (Fishbein and Ajzen, 1975), since many expressed a preference for engaging with this technology in private where they felt freer to experiment.

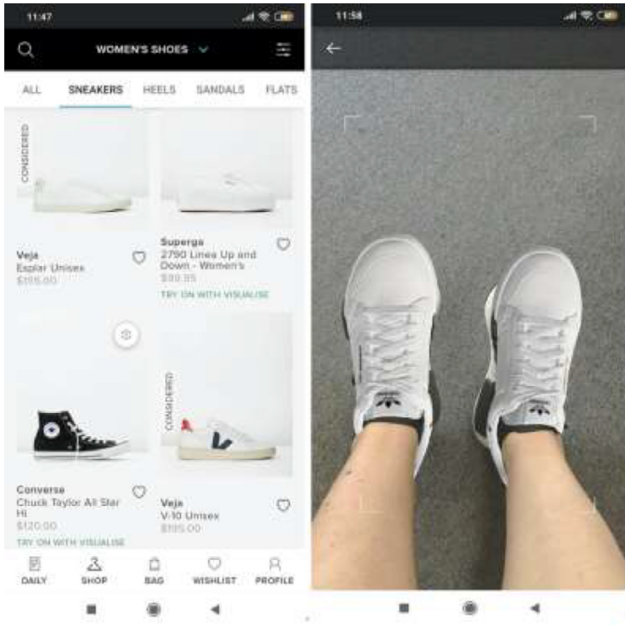
Finally, we found that consumers paid more attention to style than brand when engaging with AR for virtual try-on. This could be potentially harmful to established brands, and may require them to consider innovating their style and design rather than relying on the built-up equity inherent in their brand. To enhance the customer journey, established brands might also consider offering consumer benefits such as flexible returns, which gives consumers the confidence to buy the product and return it free of charge if it does not fit. Conversely, if consumers are paying less attention to brand, this provides an opportunity for new and emerging brands. For these operators, AR encourages flow and immersion which can prompt consumers to focus on style attributes. In Table 2, we synthesise our findings, integrate key literature, and highlight current best-practice in guiding practitioner decision-making across the customer journey.

## 5.3. Limitations and future directions

This study, like all, is subject to certain limitations. As it is a qualitative study, we are able to provide initial conceptualisations; however, further research should consider ways to quantify our findings and validate them by means of a larger sample. In addition, our sample size means that our results are exploratory rather than definitive – future work could focus on different consumer segments or design experimental scenarios to test our initial findings. Further, the scenario we presented to respondents was hypothetical and did not require consumers to make an actual purchase.

However, to address this limitation, we chose for our sample respondents who had made a purchase of footwear in the past three months and represent a range of people with various levels of experience using AR as a tool for virtual-try on. Future studies extending ours to real applications of behaviour in AR are called for. Finally, while we suggest that novelty will wear off, as we did not conduct a longitudinal study, we cannot validate this assumption. Further research over a longer time period with actual shoppers or data from an online retailer would be useful in this domain.

**Appendix A. Illustrative example of AR as a tool for virtual try-on**



**Appendix B. Interview discussion guide**

Interview section	Guiding interview questions
General background	<ul style="list-style-type: none"> <li>• Can you tell me your shopping behaviour for clothing and accessories?</li> <li>• Thinking about making a clothes and accessory purchase, could you talk me through your typical experience, from the point at which you recognise you need the product, to the point at which you make the purchase.</li> </ul>
General experience with technology in retail	<ul style="list-style-type: none"> <li>• Have you heard of retail technology? / What retail technology have you heard? Beyond online shopping, have you used technology in store?</li> <li>• Could you tell me about the kinds of technology you have used for shopping to make a purchase?</li> </ul>
Experience with AR as a virtual try-on tool	<ul style="list-style-type: none"> <li>• Have you heard of virtual try on technology?</li> <li>• If no experience/ knowledge – provide a brief explanation and show demo video <a href="https://www.youtube.com/watch?v=HoSjmiVLsLU">https://www.youtube.com/watch?v=HoSjmiVLsLU</a></li> <li>• Tell me, what you think about this kind of technology?</li> </ul>
AR virtual try-on trial	<ul style="list-style-type: none"> <li>• I'll get you to use an AR for virtual try-on tool from an online retailer. You can browse through all the sneakers and choose the ones you would like to virtually try on and then tell me what you think.</li> </ul>

(continued on next page)

Interview section	Guiding interview questions
AR virtual try-on experience	<ul style="list-style-type: none"> <li>• Tell me about your experience</li> <li>• How do you feel about this AR virtual try-on technology in comparison to online shopping? And in comparison to an in-store experience? What do you see as the main benefits?</li> <li>• What do you see as the main negatives? When would AR as a virtual try-on technology be most useful?</li> <li>• If you could describe the kind of person that would use this technology, what would they be like?</li> <li>• What kind of brands would benefit most for this kind of technology?</li> <li>• How do you feel as a result of using this technology? If you were buying these shoes, how would you feel like owning them?</li> <li>• Do you feel like these shoes are yours already?</li> </ul>

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