

Department
of Business and Management

Chair of Consumer Behavior

**The Impact of Mobile Augmented Reality on women's
Willingness to Buy a Make-Up Product: an Investigation of
the Effects of Perceived Playfulness and Body Image.**

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INDEX

INTRODUCTION.....	4
1. RELEVANCE	6
1.1 The omnichannel tendency	6
1.2 The Augmented Reality revolution	7
1.3 The Mobile Augmented Reality.....	11
1.3.1 Instagram filters: the most popular example of mobile AR	13
1.4 The spread of Augmented Reality into the make-up industry	14
1.5 The psychological perspective	17
2. THEORETICAL BACKGROUND.....	20
2.1 Overview about Augmented Reality	20
2.1.1 Augmented Reality definitions.....	20
2.1.2 Augmented Reality literature review	21
2.2 Overview about Perceived Playfulness	25
2.2.1 Perceived Playfulness definitions	26
2.2.2 Perceived Playfulness literature review	27
2.3 Overview about Body image	31
2.3.1 Body image definitions	31
2.3.2 The relationship between facial satisfaction and body image	32
2.3.3 Body Image literature review	32
2.4 Research model development	37
3. QUANTITATIVE RESEARCH	38
3.1 Methodology and Data Collection	38
3.1.1 Stimuli	39
3.1.2 Measurements and survey structure	42
3.2 Data analysis.....	44
3.2.1 Data cleaning and preparation.....	45
3.2.2 Descriptive statistics	46
3.2.3 Reliability Analysis	48
3.2.4 Independent t-test	50
3.2.5 Moderated Mediation analysis with PROCESS Model 7	52
3.3 Results discussion	58

4. CONCLUSIONS	61
4.1 Theoretical and managerial implications	61
4.2 Limitations for future research.....	63
4.3 Conclusions	63
 REFERENCES.....	 65
 APPENDIX.....	 76
Survey Structure	76
SPSS Output.....	83
Interviews	96
 SUMMARY	 117

INTRODUCTION

The following paper will take into account a specific sector of the retail industry, the cosmetics one, and on how companies in this sector have started to focus their value proposition on Augmented Reality tools, such as virtual-try-ons, to innovate and adapt to the increasing competition. Psychological variables such as body image and facial satisfaction will also be considered, and evidence will be given on how the possibility to virtually try on a make-up product through an Instagram filter - one of the most modern Augmented Reality technology applications - allows those with an unfavourable body image to appreciate and perceive more the "fun side" of the online experience based on the presence of Augmented Reality, having a positive and significant impact on the purchase intention of the make-up product.

The first chapter will provide data and practical evidence highlighting the relevance of such a topic: even before the recent events surrounding the pandemic, the shift from offline to online channels was a reality of which companies were aware and which they supported with ever-increasing investments to improve the functionality of their websites. The spread of COVID-19 has only accelerated a transition that began many years earlier and has led companies to place increasing importance on their online shops. In this paper, we will see that, nowadays, there are many sites that allow users to try on make-up through Augmented Reality tools in order to help them choose the product to buy: the online shopping experience is thus made as smooth as possible. We will also discuss some of the advantages that the inclusion of virtual-try-ons on beauty firms' websites has brought with it, such as the optimisation of make-up trial times and the convenience of purchasing directly from home, which are recognised and appreciated by all types of consumers.

In the second chapter, we will analyse the main academic theories, proven by previous studies, which have been taken into consideration with the aim of providing the right theoretical basis in order to develop a research model and propose the main hypothesis to be tested. Specifically, we will explain the effects of mobile Augmented Reality on women's willingness to buy a make-up product during an online shopping experience; we will also see how AR is able to act as a "distractor" of attention for women with an unfavourable body image, helping them to divert attention from their face and concentrate it on the virtual make-up, making the experience delightful and more evanescent and consequently increasing their purchase intentions.

The third chapter will be devoted to quantitative research: the main stimuli will be implemented, including the creation of an Instagram filter capable of virtually reproducing a lipstick in three

different shades, data will be collected through an online survey and then analysed with SPSS in order to determine whether the proposed hypothesis have been verified.

In the fourth chapter, considerations on managerial implications and limits for future research will be advanced and final reflections on the results obtained will be reported.

1. RELEVANCE

1.1 The omnichannel tendency

Nowadays, guaranteeing a seamless and smooth customer experience is no longer considered a distinctive feature to offer in order to stand out from competitors, but a common basis from which to start developing a unique value proposition. Features and technologies that used to be considered as “points of differences” for firms have now become what unites them. Indeed, the convergence of physical and digital consumer experience (omnichannel) turned out to be the top priority for almost all the industrial sectors (Hagberg, J., Sundström, M., Nicklas, E-Z., 2016). Omnichannel retailing reflects an integrated shopping process that presents a unified view of a product or service to the consumer in terms of purchase, return, and exchange regardless of the channel (Chong, A., 2018).

This omnichannel tendency is even more clear in the retail industry, where we assist to an early adoption of Augmented Reality (Scholz, J., Duff, K., 2018) and where these new technologies and tools are seen as the future of the retailing itself (Grewal, D., Roggeveen, A. L., Nordfalt, J., 2017). Technology-based reality and applications have the unique power to enhance sensory perceptions, giving consumers the opportunity to live multisensory experiences (Poncin, I., Mimoun, M. S. B., 2014). For example, it is becoming common for fashion retailers to use new technology to help customers engage in virtual fashion shows (Deloitte, 2016).

One consumer segment in particular has been increasingly influenced and captivated by technological improvements and omnichannel experiences: in fact, it was found that Millennials, who comprise the largest shopping audience, show greater purchase intentions in omnichannel retailing rather than pure online and pure brick-and-mortar retailing for what concerns hedonic products, while they prefer both omnichannel and pure online retailing rather than pure brick-and-mortar retailing for what concerns utilitarian products (Chong, A., 2018). This demonstrates how crucial is the omnichannel experience especially when purchasing hedonic products, which are the ones that generate emotional arousal with benefits evaluated primarily on aesthetics, taste, symbolic meaning, and sensory experience (Ai Ching Lim, E., Hoon Ang, S., 2007).

To confirm such finding, another study based on three experiments was conducted to examine consumer responses to technology interfaces (AR/VR and mobile apps) for hedonic and utilitarian products. The results show that AR is easier to use (vs. app), and users find AR more responsive when buying a hedonic (vs. utilitarian) product (Anubhav, M., Anuja, S., Nripendra, P. R., Yogesh, K. D., 2020). This happens since utilitarian products provide functional benefits and users can fairly

evaluate a product on parameters like quality and performance without consuming it. Conversely, consumers must consume or use a hedonic product to evaluate their performance (Voss, K. E., Spangenberg, E. R., Grohmann, B., 2003). Thus, as multisensory interfaces like AR-based ones offer an environment of playfulness, interactivity and entertainment, this resonates with the characteristics of hedonic products and enhances users' overall experience.

A typical example of hedonic products are the ones related to the beauty and make-up market, whose revenue is expected to reach US\$511,401m in 2021 and to grow annually by 4.8% (CAGR 2021-2025) (Statista). According to these data, the beauty sector is one of those with the fastest growing rate in the retail industry, highlighting the relevance of the product category chosen.

This trend has also been accentuated by the pandemic, which has caused the spread of a phenomenon called the *lipstick effect*, referring to women's willingness to spend money on appearance-enhancing items despite their economically driven financial limitations during times of economic recession, like the one related to COVID-19 pandemic (Netchaeva, E., Rees, M., 2016). However, not all sales channels saw a revenue growth: indeed, physical channels are giving way to digital ones. In particular, there are some areas in which the pandemic could alter the beauty industry in fundamental ways, accentuating two central tendency: the continuous rising of digital and the acceleration of innovation. Due to COVID-19, consumers across the globe indicate they are likely to increase their online engagement and spending. On the operations side, this will translate into an increasing usage of Artificial Intelligence for testing, discovery, and customization, since concerns about safety and hygiene are inexorably disrupting product testing (Gerstell, E., Marchessou, S., Schmidt, J., Spagnuolo, E., 2020).

Understanding the increasing importance of online presence over physical one, several leading beauty and personal care brands have decided to shift part of their investments in physical shops to online stores. It is the case of German retailer Douglas, which decided to close 500 of its 2.400 stores around Europe in response to more consumers spend shifting online, a trend that has been accentuated by the spread of the pandemic. Douglas' online sales have grown tremendously in recent years, allowing the e-commerce business to reach €1 billion of revenues in 2020. In contrast to these numbers, its physical stores performance decreased of 15.8% in fiscal 2019-2020, which explains the decision of shifting the attention on how to improve the online service (BW Confidential, 2021).

1.2 The Augmented Reality revolution

Given the above-mentioned omnichannel tendency, it is important to consider the key role of Augmented Reality (AR) as an enabler of omnichannel experiences across the customer journey

(Hilken, T. et Al, 2018). AR can be considered as a persuasive set of ‘smart’ technologies whose purpose is to seamlessly merge online and offline customer experiences by using an intuitive, context-sensitive, and socially connected interface (Hilken, T., De Ruyter, K., Chylinski, M., Mahr, D., Keeling, D.I., 2017). This should not be confused with the concept of Virtual Reality, which is instead a technology that “provides the effect of immersion in an interactive three-dimensional computer-generated environment in which the virtual objects have spatial presence” (Bryson, S., 1995). On the other hand, Augmented Reality is characterized by the presence of virtual components or objects placed inside the context of a user’s surroundings (Jacob, H. S., James, E. G., Thomas, O. M., Jeffrey, L. J., Iopa, W., 2019). AR is closer to the user, bringing artificial creations into concrete contexts and fostering the fusion of the imaginary and the real worlds. Defined also as the “silent revolution”, AR is completely reinventing the whole customer journey and, like every revolution that has preceded it, AR leads to significant changes, redrawing the competitive forces and scenarios within the retail industry and deserving the definition of “disruptive technology”.

To facilitate online decision making, many firms such as L’Oréal, IKEA, Sephora, Ray-Ban, American Apparel, Adidas and Dior, have decided to adopt a strategy based on service augmentation, aimed at simulating some aspects of the service that are normally experienced inside the physical store. Because this technology offers a ‘try before you buy’ experience, marketers and retailers saw a great potential into AR in terms of online conversion rates’ improvement and return rates’ reduction (Dacko, S. G., 2016). One of those retailers is Neil Trevett, President of The Khronos Group, who believes that investing in AR can bring consistent benefits to firms: “I think retailers have enough experience with the existing technology to know they can deploy AR, and it’s proven to improve sell-through and reduce return rates. This is why there is urgency seen from retailers to get those millions of products available in 3D and seamlessly, efficiently flowing through to end-user experiences.”

AR is no longer seen as the end point, but as the place to start. “We now consider virtual make-up try on to be the base of any experience. At the end of the day the only barrier to buying [a product] is wondering what it will look like”, said Lubomira Rochet, Chief Digital Offer at L’Oréal: offering consumers the chance to see what the 'end result' would look like directly on their faces and before making the final purchase gives the company a significant boost in terms of competitiveness, making it possible to develop and ensure a customer journey of superior quality.

In the beauty sector in particular, Augmented Reality was able to bridge a gap that was a major concern for consumers who had to imagine the make-up on their faces without actually seeing it, and it is on this specific industry that the thesis project will be focused on.

Launched in 2019, L’Oréal’s AR makeup experiences have proved the success of the technological revolution by showing relevant results: website engagement time doubled and the conversion rate

almost tripled (Cook, A. V., Ohri, L., Kusumoto, L., Reynolds, C., Schwertzel, E., 2020). Other noteworthy results have been achieved by Sephora: between 2016 and 2018, more than 200 million shades of make-up were tested through their Virtual Artist app as a result of more than 8.5 million visits to the new AR feature (Rayome, A. D., 2018). From Sephora executives' point of view, companies that will succeed will be those to understand that it is important to introduce technology not because it is cool or new, but because it makes shopping more fun and efficient for consumers. Positive results have been reached also in other industries: thanks to the combined use of Augmented Reality and 5G, an emerging technology able to convey data from sensors on machines to computers at super-fast speeds, the Japanese multinational Yamazaki Mazak Corporation managed to reach a productivity increase of 2 per cent and a consequent improvement in customer experience (Midlands Business Insider, 2021). Thus, the possible fields of application for Augmented Reality technologies are almost infinite: anyway, although the already existing positive findings, much of its potential has not yet been realised and exploited.

The enormous scope for development and the wide range of applications make Augmented Reality a particularly popular topic, on which further research should be carried out. AR apps are expected to grow in popularity by 31% annually until 2021 (Rauschnabel, P. A., Felix, R., Hirsch, C., 2019) and are expected to have a strong future in fashion and beauty retailing. Thus, future perspectives confirm an always positive and increasing trend in the adoption of AR technology: the worldwide spending on Augmented Reality and Virtual Reality (AR/VR) is expected to accelerate out of the pandemic, growing from just over \$12.0 billion this year to \$72.8 billion in 2024 (International Data Corporation, 2020). Other estimates are even more optimistic, as Augmented Reality and Virtual Reality market is expected to reach \$94.4 billion of revenues by 2023, witnessing a CAGR of 73.8%, and \$161.1 billion by 2025 (Vynz Research, 2020). It is a real technological explosion, driven by three major factors: an increase in smartphone penetration, the advancement in Internet connectivity and the improvement in computer technology (Research and Markets, 2018).

Insights from GfK Retail Trend Monitor 2017 revealed that, among all the technologies to focus future investments on, Augmented Reality was the one with the biggest investment or relevance gap considering a 39.9% impact on retail in 2017 and a future investment focus of 64.8% in 2020 (gap=30). To understand how the technology evolution would transform the shopping experience, 346 participants (173 retailers, 173 experts) were asked to indicate what would be the most likely retail outcome caused by the adoption of AR: 47.7% of them chose a more entertaining shopping experience, 34.4% opted for an improvement in in-store look and feel, and 26.7% for an increase in in-store footfall rate (GfK's Retail Trend Monitor 2017).

In 2020, 46 percent of retailers has planned to deploy Augmented or Virtual reality in their businesses (Cook, A. V., Ohri, L., Kusumoto, L., Reynolds, C., Schwertzel, E., 2020). The fact that many companies are deciding to invest increasing portions of their R&D budgets in promoting Augmented Reality-integrated services is the proof that such a technological change cannot be ignored, but accompanied and followed. Even Freda Ng, Chief Digital Officer at Watsons International's, the world's largest international health and beauty retailer, agrees to recognize the huge potential of AR technology, with a special focus on the retail industry: "AR will continue to gain traction in retail. As customers are now more conscious about safety, AR gives a timely option for them to try on the products virtually instore or online before checking out," said Ng (WRBM Global Cosmetics, 2021). A study conducted on 3,938 Internet users in the US and UK provided further insights on this phenomenon: it appeared that more than 30% of respondents said that AR has the strongest potential in enhancing shopping activities. They also found that AR solutions simplify their choices by helping them to virtually test out products from the comfort of their home (GlobalWebIndex, 2018). In addition to improving customer experience, another reason why beauty and cosmetics companies should adopt these technologies is the fact that women tend to spend less and less time on their everyday make-up: the Big Fabulous Beauty Survey (2020) revealed that the average woman takes just 11 minutes to create her perfect look, compared to the findings of Euromonitor International's Beauty Survey of 2016, which found that women around the world dedicate at least 15 minutes to apply make-up. The rate of competition is thus increasing, and beauty companies have to do their utmost to offer the best possible service.

The reasons behind AR success are partially explained by Rogers Innovation Diffusion Theory, which describes the five characteristics of a technology that determine its acceptance: relative advantage (the extent to which it offers improvements over available tools), compatibility (its consistency with social practices and norms among its users), complexity (its ease of use or learning), trialability (the opportunity to try an innovation before committing to use it) and observability (the extent to which the technology's gains are clear to see) (Martínez, H., Skournetou, D., Hyppola, J., Laukkanen, S., Heikkilä, A., 2014). The degree of popularity achieved by AR technology shows that it possesses all the characteristics required for success.

However, the potential of such technology has not yet been fully expressed. It will be necessary to wait a few more years before its adoption reaches its peak: in fact, the vast majority (36.9%) of Extended Reality (XR) professionals expect the mainstream consumer adoption of AR worldwide as of 2019 to take place within 3-4 years, between 2022 and 2023 (Statista).

In order to further determine its relevance in today's business environment, it is crucial to take into account the amount of investments that retail companies are making in these new immersive

technologies: indeed, investments in Augmented and Virtual reality (AR/VR) technology worldwide in 2024 is expected to reach 2.7 billion U.S. dollars in retail showcasing. This number is not so high when compared to the gaming industry, where the investments will reach 17.6 billion U.S. dollars (Statista), but there are other considerations to be made: the gaming sector has always been more prone to this kind of investment, since the very existence of the product on which the whole industry is based on is closely linked to the use of Artificial Intelligence and other technologies related to it. In the retail industry, on the other hand, Augmented Reality appears to be a real revolution, allowing brands that decide to adopt it to differentiate themselves from their competitors. The above-mentioned data should therefore be considered in a relative sense.

Fariza Yaha, owner of several Limoni franchisees and member of the Board of Directors at Lubi, was interviewed in order to enrich this thesis project by offering her personal opinion about the potential evolution of virtual try-ons. In her perspective, they are the future of the beauty industry: “I assume they have not been a great success for what concerns physical and traditional channels. I read a lot of potential for digital channels, they are the future! [...] The newer the technology, the more innovative the image of the company. In the case of AR this association is even stronger, because it is a technology in which the user can really immerse himself or herself and therefore perceive it to the full”, said Fariza. “Nowadays, appearing innovative in the eyes of customers is crucial for every firm. Augmented Reality is one of the latest emerging technologies, so I would definitely recommend incorporating it into the value proposition, especially in the make-up industry, where many companies have already done so.”

1.3 The Mobile Augmented Reality

Another aspect to look at is the type of device involved: in today's environment, more and more people are online, precisely the 58.8% of the world's population (Internet World Stats), and a significant percentage of this population prefers to surf on the Internet via mobile rather than desktop. In Italy, the percentage of mobile users is equal to 47% and it is expected to grow to the point of exceeding that of desktop users (StatCounter).

Actually, it is not surprising that the past use of computers has now given way to consumers' need to be able to access the widest range of services anywhere at any time: the flexibility of use of mobile devices appears to be the most appreciated quality and the one that makes the difference in choosing between mobile and desktop. Mobile Augmented Reality is also very low cost, if not completely free, compared to more permanent or special-purpose technologies (Craig, A. B., 2013).

Apps or websites that are not perfectly adapted to the mobile layout can cause a huge damage in terms of online sales and brand visibility: indeed, from July 2019, Google has enabled the Mobile-first Index (process of indexing a website using a user agent that simulates smartphone navigation) for all new site, with the aim of giving priority to mobile content.

Thus, it seems to be crucial for firms to focus their efforts on the adoption of a specific kind of Augmented Reality technology: the mobile AR, an increasingly recognised approach having potential for enabling smart retail. Furniture retailers have since launched MAR apps which help to “bring products home” prior to actually making the real purchase (Tabusca, A., 2014).

In 2020, around 1.73 billion of people used Mobile Augmented Reality through their smartphones and by 2023 there will be an estimated 2.4 billion Mobile Augmented Reality users worldwide, a rise of 2.2 billion from the 200 million seen in 2015 (Statista). This is perfectly in line with the always positive growth trend of Mobile Augmented Reality market, which is projected to grow from USD 7.6 billion in 2020 to USD 29.5 billion by 2025 at a Compound Annual Growth Rate (CAGR) of 31.1%, according to MarketsandMarkets official report.

The Mobile Augmented Reality (MAR)-based apps and mobile advertising market were largely more than \$732 million in 2017; their main purpose is to supplement the real world of a mobile user with computer-generated virtual contents (Chatzopoulos, D., Bermejo, C., Huang, Z., Hui, P., 2017). What makes MAR so unique is that it combines real and virtual objects in a real environment; furthermore, it is interactive in real time, registers and aligns real and virtual objects with each other and runs and/or displays the augmented view on a mobile device (Renevier P., Nigay L. (2001).

The always increasing ubiquity of smartphones has led to a surge in interest in mobile AR apps (Dacko, S. G., 2016): thanks to the fast digitalization process, AR usage was able to impact the consumer journey, especially within retail’s online and mobile environments (Poushneh, A., Vasquez-Parraga, A. Z., 2017; Scholz, J., Smith, A. N., 2016).

In 2019, more than 1 billion smartphones and tablet devices were capable of delivering augmented experiences, and within 2020 almost 100 million consumers were expected to shop using AR-based apps either online or in-store. The consumer interest and appetite are in continuous growth: since 2018, the number of mobile AR users has nearly doubled with respect to 2019, with usage and popularity driven largely through social media (Cook, A. V., Ohri, L., Kusumoto, L., Reynolds, C., Schwartzel, E., 2020).

In view of this growing trend, in-depth research focused on mobile make-up apps based on Augmented Reality technology could lead to interesting findings in terms of purchasing behaviour and user experience.

1.3.1 Instagram filters: the most popular example of mobile AR

Above the currently existing social networks, Instagram is largely considered to be one of the most popular. It is a mobile social platform that allows its users to edit and share visual content, such as photos and images: this appeals to young people between the ages of 18 and 29 specifically, who represent over one-third of Instagram users (Madden *et al.*, 2013). Recent research suggests users' overwhelming preference for Instagram as their favourite social media site, surpassing Facebook, Twitter, and other sites (Shane-Simpson, C., Manago, A., Gaggi, N., Gillespie-Lynch, K., 2018). As it is possible to notice from the chart below, the number of monthly active Instagram users reached 1 billion within June 2018, and it was expected to reach 1.16 billion by the end of 2020 (Statista, 2018).

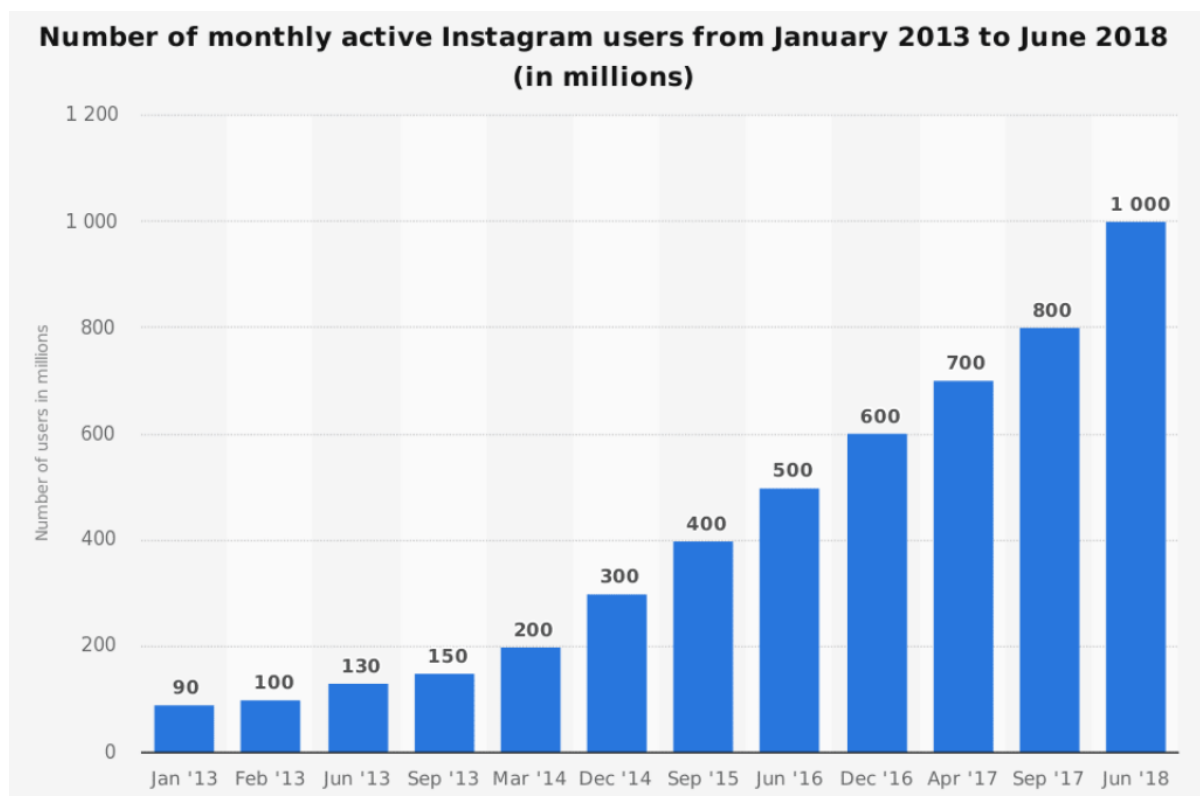


Chart 1: Monthly active Instagram users

Among active users, half of them uses Instagram Stories daily (see Chart 2): In January 2019, photo sharing platform Instagram reported 500 million daily active Stories users worldwide, up from 400 million global DAU in June 2018 (Statista, 2019). Stories are a feature of the app allowing users post photo and video sequences that disappear 24 hours after being posted.

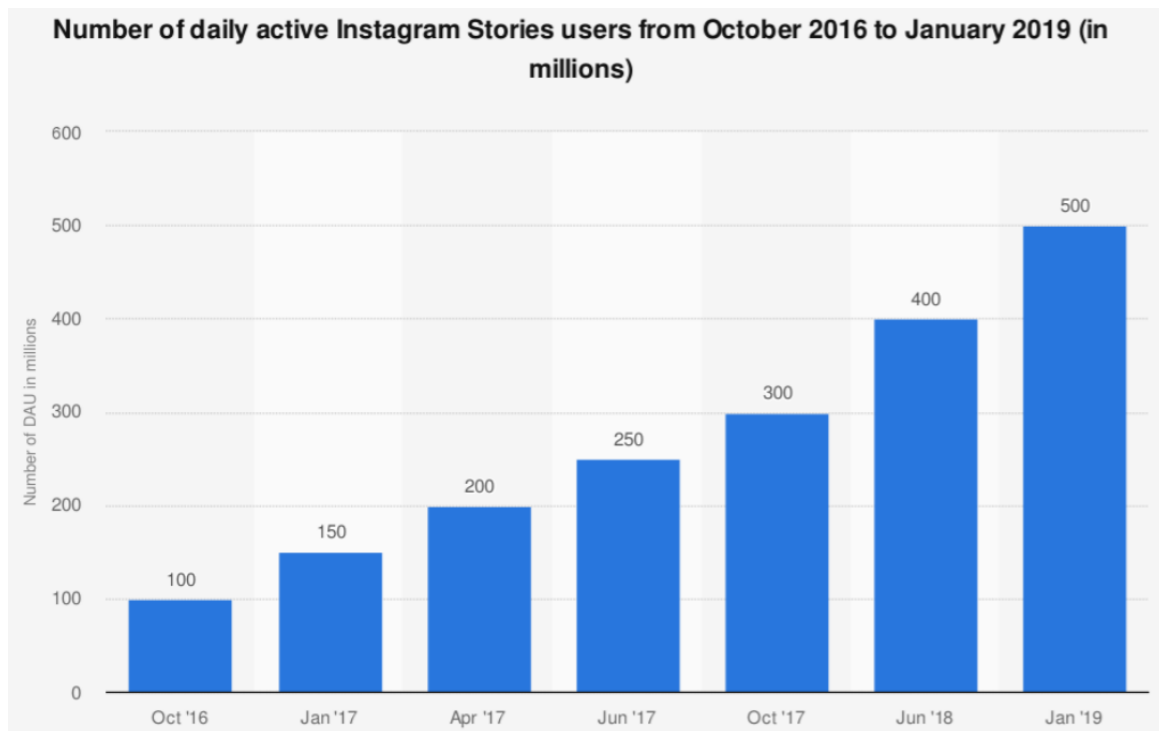


Chart 2: Daily active Instagram Stories users

One of the reasons why Instagram Stories are so popular is that Instagram started adding on them some special features such as Instagram filters, that allow users to change the colour and resolution of photos before they share them on their homepage or in their account stories (Sheldon, P., Bryant, K., 2016). Besides changing the colour of the photo, the filter feature can also bring Augmented Reality to enable users to see digital content in the real world in three dimensions (Carmigniani et al., 2011). AR Instagram filters have rapidly spread among users because they look interesting and fun to play (Karundeng, F., 2020). Specifically, through the Spark AR application, which was launched in August 2019, anyone can create AR filters for free and share them with all Instagram users.

Taking into account such a success, Instagram filters can be considered in all respects one of the most popular mobile Augmented Reality applications, enabling immersive and particularly entertaining experiences, which allow users to absorb themselves in a new dimension and focus all their attention exclusively on the filter they are using, without caring about the surroundings or even their own physical appearance.

1.4 The spread of Augmented Reality into the make-up industry

Augmented Reality is revolutionising the way people come into contact with make-up products, reshaping the entire customer journey. Although not entirely new, this technology has never been so widely exploited in the beauty industry as in recent years.

In the traditional store, the customer is invited to choose the make-up product on the basis of the impact he or she thinks it would have on his or her face. Users rarely get the chance to try a lipstick directly on their lips, or to apply an eyeshadow to their eyelids: the choice is therefore based on a simple impression, on the idea of how the product will look when worn.

In the online store, on the other hand, the options available are even fewer than in the physical shop: the customer is deprived of the opportunity to experience the texture of the product, its smell or otherwise have a more sensory experience before proceeding with the purchase. Moreover, the vision of the product is limited to that of the two-dimensional images proposed by the website, depicting for example palettes of different colours or several shades of lipsticks. Thus, the impossibility of testing the product has made the ecommerce channel unattractive to many consumers.

The COVID-19 pandemic has amplified the importance of product testing in this sector, forcing people to stay in their homes and rely solely on the images on the website to choose which product to buy.

Fortunately, for several years now we have also seen the introduction of the latest technologies in the cosmetics industry: with the advent of Augmented Reality, the consumer experience has been made not only more efficient, but also more fun. Thanks to the presence of AR, consumers having an online shopping experience are given the opportunity to see the beauty product projected directly onto their face, with a very realistic rendering in most cases: in fact, technological developments have made it possible to continuously refine the final effect reproduced by Augmented Reality.

It is also a popular opinion that such a way of trying on a make-up product is fun and enjoyable: this is because the user has the feeling of a completely new and innovative experience, and the curiosity and desire to try out new technologies, followed by a sense of pleasant surprise, make it all exciting and memorable.

Augmented Reality technology has been exploited by many famous brands, most notably Sephora, L'Oréal, MAC, Chanel and NYX Cosmetics, who have decided to offer their customers a service that is as up to date as possible and focused on the integration of online and offline channels. Indeed, with the outbreak of the pandemic, which made it necessary the adoption of various measures to contain in-store contagions, several companies have chosen to promote the use of these tools to a greater extent: a necessary response to the needs of consumers who, before buying a make-up product, would like to assess whether it is suitable for their face or skin colour.

Sephora, for example, launched in 2018 an Augmented Reality app to allow customers to test different products using their smartphone cameras. Users could choose to upload a previously taken photo of themselves and observe the effect through a makeup overlay, or activate their camera at the time of testing.

In the same year, L'Oréal bought ModiFace, a global market leader in Augmented Reality and Artificial Intelligence application for the beauty industry: this represents the first time ever L'Oréal acquired a tech company. Thanks to ModiFace technology, the user can try on hundreds of looks in a matter of minutes: this technology has been recently refined to adapt to all skin tones and to show a look in real time from different angles. However, L'Oréal's first entry into the field of Augmented Reality dates back to 2015, when the French company launched Make-up Genius: the basic idea was to turn the smartphone into a real mirror, in which users can see their own face reflected and try out a huge range of make-up in a short space of time. The app is capable of tracking movements and capturing over a hundred facial expressions, and is even able to detect the texture of the skin to offer fully realistic 3D modelling: this illusion works through the application of motion capture techniques that build up an internal 2D model of a person's facial features in real time.

The result was so positive that in 2017 L'Oréal decided to announce a global partnership with Perfect Corporation to integrate the cosmetics collections of L'Oréal brands around the world with YouCam Makeup, the award-winning Augmented Reality-based beauty app. New features were added such as the ability to acquire product information and the possibility to make a purchase directly through YouCam Makeup or in the physical shops, allowing the online and offline worlds to be integrated in unique and innovative ways, creating valuable and seamless experiences for the consumer (L'Oréal, 2017).

Initially, investors were sceptical about the real impact of such a technology on the company's sales: the risk was that this tool would become a way for users to have fun while trying out beauty products, without leading to any real gains for the company. However, a research conducted in 2017 on 25,000 Japanese female subjects and published by Perfect Corp showed that the choice to invest in AR based beauty tech is actually driven by concrete market trends and consumer preferences, and not just by the need to provide consumers with a fun and innovative experience. Results revealed that users of YouCam Makeup app are 1.6 times more likely to purchase beauty products, as compared to those who do not use the app, and that they spend 2.7 times more money on beauty products, compared to those who are not experiencing virtual try-on (Perfect Corp, 2017).

Finally, a recent innovation is the introduction of Augmented Reality make-up directly within the Google search engine. Specifically, the feature will give access to virtual make-up from L'Oréal, MAC Cosmetics, Black Opal and Charlotte Tilbury by simply searching for a product from one of these brands. In addition, Google will also start showing expert advice on beauty, including online influencers. All of this will be available within the Google Shopping experience from the smartphone, demonstrating how the importance and innovative scope of AR is now widely recognised.

1.5 The psychological perspective

In such a frenetic context, based on rapid changes and individual's ability to adapt to them, there are factors that remain beyond this technological evolution, and which can have an impact on the effects caused by the adoption of these new technologies. The way in which people see their body may have implications on their intentions to purchase products that involve a direct consideration of the body itself, with a special focus on contexts characterized by the presence of Augmented Reality. Unfortunately, many firms that have adopted AR programs to promote their products still not recognize the importance of this "psychological perspective" (Yi-Cheon Yim, M., Park, S.-Y. 2019). "With specific reference to these new technologies, it is possible that the psychological side has not yet been properly analysed, and that we need time to get a complete picture of the situation", said Mattia De Magistris, a brilliant recent graduate in psychology from La Sapienza University in Rome and specialised in social neuropsychology.

As companies prefer to focus on making the experience as interactive as possible by enhancing the underlying technology, aspects such as individuals' body image and, more specifically, their facial satisfaction tend to take a back seat. In order to make sure they are offering the user the most cutting-edge services, they end up neglecting certain personal dimensions of users that can actually influence their final purchasing decisions.

Again, a particular kind of stakeholder involved in this issue are companies operating in the beauty sector, which more than many others have a predominantly female clientele: indeed, it has long been demonstrated that women generally hold more negative body attitudes than men due to socially and culturally driven body ideals (Feingold, A., Mazzella, R., 1998), meaning that the psychological side of the technological evolution could rationally have a greater impact on females rather than males. It is a widespread belief that girls tend to be more concerned about their physical appearance than boys are (Lerner, R. M., 1985). Consistent with this assumption, Petersen (1981) has found that boys tend to have higher scores than girls on scales tapping satisfaction with appearance.

Statistically, women find it more difficult to accept their bodies and the way they look: a study conducted on 1,053 Swiss women revealed that 71% were dissatisfied with their body and wanted to be thinner, although 73% of them were at normal weight (Allaz, A-F., Bernstein, M., Rouget, P., Archinard, M., Morabia, A., 1998). The way women see their bodies also includes the way they see their faces and, usually, if the body is associated to an unfavourable perception, the same applies to face: indeed, face-esteem is part of one's body image, which in turn indicates the conscious representation of one's body and one's emotional attitude towards one's own body (Felisberti, F. M., Musholt, M., 2014).

Confirming women's decreasing body confidence, the global research "The Real Truth About Beauty" conducted in 2004 by Dove, the famous healthcare brand, pointed out that only 4% of women around the world consider themselves beautiful and only 11% of girls globally are comfortable describing themselves as beautiful. Moreover, 72% of girls feel tremendous pressure to be beautiful, 80% of women agree that every woman has something about her that is beautiful, but do not see their own beauty and 54% of women agree that when it comes to how they look, they are their own worst beauty critic (Dove, 2006).

Several studies have identified body image as a variable that influences, at least as much as the presence or absence of AR technology, the decision to purchase a high body-involving product, underlying the relevance of this construct throughout the customer journey (Rosa, J. A., Garbarino, E. C., Malter, A. J., 2006). Dove has completely understood how much body and face esteem was a critical element to manage, and the results of its campaign demonstrate that customers actually develop more positive attitude toward brands that show them how much they care about their clients: sales for Dove jumped from \$2.5 to \$4 billion in the campaign's first ten years, Dove bars became the number one preferred soap brand in the U.S. and Unilever's best-selling product company wide. In addition to this, over 50% of the women who visited Dove Ad Makeover created a message, but most importantly, 71% of the women polled said that they felt more beautiful (Zed, O., 2019). Therefore, facial satisfaction, considered as part of the broader body image concept, seems to be a factor to be leveraged and considered in the development of a marketing strategy, as it can bring significant benefits to companies in terms of sales and reputation.

Despite many researchers have been conducted numerous studies to investigate the consequences of Augmented Reality adoption into the retail industry and the influence of body image on purchase intentions, very little is known about the role of this psychological variable in augmented contexts, further justifying the purpose of this thesis project. That is, to have a deep understanding of the key factors that drive consumers' purchasing decisions for high body-involving products, such as make-up, during AR-based shopping experience, it is necessary to have a clear picture of both the technological (e.g. how AR display products) and psychological aspects (e.g. how users actually see themselves through AR). Being aware of this psychological perspective is the first step companies can take to gain a complete knowledge of their customers, and to meet their needs.

Based on what stated so far to describe the proposed area of study and underline the relevance of the thesis project's topic, the research objective is to deeply analyse the impact of mobile Augmented Reality on women's willingness to buy a make-up product into an online shopping context,

considering both the mediating role of perceived playfulness and the moderating effect of body image, with the final aim of providing further insights about a such discussed phenomenon.

In order to provide statistically significant results, an in-depth study of the theoretical background of the variables involved is mandatory.

2. THEORETICAL BACKGROUND

The literature is full of research focusing on the impact of AR within the customer journey. However, only recently, with the onset of the pandemic, have studies started to explore online scenarios, moving away from the more traditional applications of Augmented Reality such as "magic mirrors" inside physical stores. Moreover, most research analyses the influence of Augmented Reality on consumers' affective responses, neglecting the potential impact on more practical aspects such as purchase intention. Furthermore, although many studies acknowledge the importance of the construct of Perceived Playfulness when taking part in an AR-based experience, few insights are provided regarding the impact of external variables (such as individuals' perception of their own body and how it appears to others) on the perception of this sense of playfulness. Finally, those few relevant insights are often contradictory, even supporting completely different hypotheses. Therefore, the most interesting contribution of this research paper consists in shedding light on the influence of these psychological variables by obtaining meaningful results from the participants' sample.

2.1 Overview about Augmented Reality

Past literature is full of different AR definitions, thus it is worth mentioning a few of the most popular ones in order to have a clear understanding of what is meant by Augmented Reality. As the study of the paper will focus on the comparison between the presence and absence of Augmented Reality within make-up applications, it is also crucial to grasp the main differences between an AR-based context and a simple physical reality one. Indeed, the purpose of the present research is to investigate how consumers' responses and, precisely, their purchase intentions vary between two different interfaces: the first of a multisensory nature, more commonly known as virtual-try-on, and the second more traditional, characterised by the simple viewing of the make-up product on a website.

2.1.1 Augmented Reality definitions

One of the earliest definitions of Augmented Reality is the one that describes it as "any system that combines real and virtual content, is interactive in real time, and is registered in three dimensions" (Azuma, R, 1997). It is further represented by a "real-time direct or indirect view of a physical real-world environment that has been enhanced by adding virtual computer-generated information to it" (Carmigniani, J., Furht, B., 2011). AR is also described as an "immersive technology" that blurs the

boundary between the physical and virtual worlds and enables users to experience a sense of immersion (Suh, A., Prophet, J., 2018). According to Zhou *et al.* (2008), “Augmented Reality is a technology which allows computer generated virtual imagery to exactly overlay physical objects in real time. Unlike Virtual Reality, where the user is completely immersed in a virtual environment, AR allows the user to interact with the virtual images using real objects in a seamless way”. Therefore, AR provides users with “information that is directly registered to the physical environment” where “the digital information appears to become part of the real world, at least in the user's perception” (Schmalstieg, D., Hollerer, T., 2016). As a result, AR allow consumers to enhance their current perception of reality (Graham, M., Zook, M., Boulton, A., 2013). In the specific context of retail, AR involves any technique and approach that combines computer-generated and real-world image and/or location information for a richer, more immersive retail experience (Liao, T., 2015).

All the above definitions agree in describing AR as an environment enhancing technology: this is precisely one of the key differences between Augmented Reality and Reality. The latter is defined as “the quality or state of being real” (Dictionary, M. W., 2002), while real is in turn defined as “occurring or existing in actuality” (Merriam-Webster, D., 2018). Since human’s perception of the physical world implies its actual existence, physical reality can be seen as the environment individuals naturally perceive, without any additional information provided by technologies (Steffen, J. H., Gaskin, J. E., Meservy, T. O., Jenkins, J. L., Wolman, I., 2019). The role of Augmented Reality is therefore not to distort the vision of what surrounds us by recreating a completely artificial environment (as happens with the presence of Virtual Reality), but to enrich physical reality with virtual components without causing a detachment from reality itself.

2.1.2 Augmented Reality literature review

As previously said, online retailers are increasingly using AR technologies to solve mental and physical intangibility issues in a product evaluation. Moreover, these technologies are easily available and accessible to consumers via their smartphones: this has made them a much-discussed topic on which numerous studies and experiments have been conducted.

However, the use of Augmented Reality in retail did not start from the need of consumers to compensate for the impossibility of testing a product in the physical shop or simply from the increased convenience consumers benefit during an online shopping experience. Among the first forms of AR are those introduced within the physical store. Research developed in the 2000s on AR used in a physical retail environment, for example through interactive displays, which predicted users interacting with steerable technology and triggering the information they need on the product,

promotions and location (Sukaviriya *et al.*, 2003), highlighted both its functional and hedonic aspects that have revolutionised the traditional retail experience.

The first product category to be integrated into these forms of AR was clothing: early applications of AR in retailing include virtual try-on using personalised or non-personalised virtual models to simulate the appearance of apparel product combinations on a body form, rotating the model through front and back views that can be enlarged (Lee, H.-H., Fiore, A. M., Kim, J., 2006): a high perception of interactivity and a sense of amazement were the natural consequences of introducing such a cutting-edge technology into an industry that was foreign to it.

There were also contrasting views on the long-term benefits of AR, ranging from it being perceived as being exclusively a promotional tool (Woods, A., 2009), to boosting positive consumer-brand relationships, favourable attitude toward the brand (Owyang, J., 2010) and consumer satisfaction by generating an experiential value effect (Chou, H. J., 2009). Bulearca and Tamarjan's (2010) study also revealed that using AR as an ongoing marketing process, and not just as a part of one particular campaign, was beneficial for companies and brands in terms of increased customer loyalty. Research on in-store and online adoption of AR evidenced consumers' positive responses to the technology, making them engage with retailers and more willing to go shop at stores offering this technology (Pantano, E., 2015; McCormick *et al.*, 2014).

The presence of AR tools can impact different stages of the customer journey: a study conducted by Romano, Sands and Pallant (2020) revealed that, prior to purchase, AR can broaden consumers' product consideration set, while narrowing the choice set. Moreover, they found that AR can lessen brand value, thereby giving emerging brands the opportunity to connect with consumers. 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.

Researchers describe AR make-up applications as effective tools to convey detailed product information in a short period of time (Smink *et al.*, 2019; Yaoyuneyong *et al.*, 2016) and reduce perceived purchase risk (Alimamy, S., Deans, K., Gnoth, J., 2017). Given that customer's willingness to purchase products is a rational process, where customers choose products that have the highest value (Zeithaml, V. A., 1988) and the lowest perceived risk (Bauer, R. A., 1960), using tools that help consumers perceive a lower risk throughout the shopping experience can positively and significantly influence their willingness to buy the product.

Research increasingly takes into account the role of AR in improving how customers feel about their purchase decisions. For example, Dacko (2017) reports that customers expect the use of mobile AR applications in shopping malls could bring significant benefits, such as a considerable increase in

their purchase confidence and purchase satisfaction, while Hilken *et al.* (2017) and Heller *et al.* (2019) demonstrate that AR offers customers greater comfort with online purchase decisions.

Mobile marketing and retailing studies have focused on AR's various impacts on consumers and brands (Grewal, D., Roggeveen, A. L., Nordfalt, J., 2017; Scholz, J., Duffy, K., 2018). It has been demonstrated that AR can significantly improve online shopping experience and users' attitude toward the brand involved: in an examination of Augmented Reality Interaction Technology (ARIT) effects in an online shopping environment, Huang (2019) found that ARIT enhances brand love and leads to consumer involvement (Trivedi, J., 2020).

However, one of the most important facts that companies need to take into account is probably that the benefits of integrating Augmented Reality into their make-up and fashion apps are not only symbolic and emotional, but also financial: Augmented Reality applications were shown to actually increase profits by allowing consumers to examine product features (Rauschnabel, P. A., Felix, R., Hirsch, C., 2019) and advance consumer-brand relations (Scholz, J., Duffy, K., 2018).

Previous research has examined the impact of AR on customers' shopping behaviours and their willingness to buy the product. In this respect, effects of AR on strengthening purchase intention has been deeply analysed (Beck, M., Crié, D., 2018; Hilken, T., de Ruyter, K., Chylinski, M., Mahr, D., Keeling, D. I., 2017; Poushneh, A., Vasquez-Parraga, A. Z., 2017).

Purchase intention is considered to be an effective measure to anticipate consumers' response behavior (Li, H., Daugherty, T., Biocca, F., 2001): Zeithaml *et al.* (1996) indicated that purchase intention is one dimension of behavioural intention. As a complex kind of decision-making process that studies the reason to buy a particular brand by consumer (Shah *et al.*, 2012), it measures a combination of consumers' interest in, and possibility of, buying a product (Kim, A. J., Ko, E., 2012) and is strongly related to the individual's future purchase action (Hung *et al.*, 2011): indeed, Ghosh (1990) states that purchase intention is an effective tool to predict buying process.

The presence of AR positively affects customers' behavioural responses and attitude toward the product by helping them feeling like they are making a more informed decision and offers them a stimulating experience (Fiore, A. N., Kim, J., Lee, H., 2005). In fact, online users appear to have more need of tools such as AR in order to acquire more information about the product and make decisions with more certainty (Oh, H., Yoon, S. Y., Shyu, C. R., 2008), with respect to users taking part into a traditional and physical shopping experience.

Furthermore, AR can enhance hedonic values of the product involved, leading to an increase in purchase intentions by merging virtual information to real ones and giving the possibility to see the product in different colours and shapes, improving users' perception of reality (Huang, T.-L., Hsu Liu, F., 2014).

Poushneh and Vasquez-Parraga (2017) conducted an experiment on 99 American young consumers, who have been submitted to AR treatments (experimental group) or traditional online shopping (control group). Findings underlined that an AR-enriched UX is more entertaining and enables potential customers to have endless interaction with virtual information. Thus, AR-enriched UX produces higher user satisfaction and user willingness to buy. AR also provides users with enriched product information gained from a physical store as well as online store, empowering them to better perform their tasks and appreciate the functionality of the product more.

Dacko (2017) gave some suggestions about the number of potential benefits of AR apps for online retailers: in particular, he suggested that, by enabling users to virtually try on clothing and make-up, AR can actually improve conversion (in terms of product purchase) and return rates. Finally, he suggested that AR apps are able to guarantee a more personalized shopping experience. Quantitative analyses of 272 shopping apps and a large-scale survey were conducted in this research, leading to the conclusion that MAR apps are associated with increasingly high user valuations of retailers offering them. Specifically, 21,467 US smartphone users took part in a survey and were asked to talk about the shopping benefits they believe they will receive from using a MAR shopping app and the consequences of such benefits on the quality of their shopping overall experience. Results highlighted a greater purchase satisfaction which has to be considered a prominent consequence of using MAR shopping apps. Moreover, several MAR app retailer-specific benefits were underlined, including increased purchase likelihood, word-of-mouth and retail customer satisfaction, which resulted from the fact that MAR shopping apps are seen by users as being able to provide benefits that they would not normally get in a shopping experience: thanks to the use of such technology, users can access a more complete information and be more certain that what they are buying is what is wanted. Most importantly, the benefits provided by MAR apps lead to a change in shoppers' behaviours and translate into higher purchase certainty.

Another study conducted on 159 management graduate Indian students revealed that participants were more likely to provide WOM recommendations when they used AR interface (vs. simple mobile app) to buy hedonic products, resulting from a more positive overall experience. Hence, a multisensory environment (AR) results in a better user experience for purchasing a hedonic product; moreover, multisensory technologies lead to higher visual appeal, emotional appeal, and purchase intentions (Anubhav, M., Anuja, S., Nripendra, P. R., Yogesh, K. D., 2020).

Several studies confirmed that WOM has a positive impact on consumers' purchase intentions (Khan, S. A., Ramzan, N., Shoaib, M., Mohyuddin, A., 2015); thus, it is reasonable to suppose that, since the presence of an AR-based environment translates into greater WOM recommendations and to a general positive experience, it also leads to a greater willingness to buy the product in question.

A research study developed by Watson et al. (2018) has deeply analysed the relationship between the defining characteristic of AR (i.e. augmentation) and consumers' purchase intentions within the cosmetic industry. Specifically, findings demonstrate the benefit of using an experiential AR retail application (app) to positively impact purchase intention: precisely, augmentation creates a more positive emotional response than interactions without augmentation, and this enhanced emotional feedback creates in turn greater purchase intention for those experiencing augmentation. Hence, here again it is possible to see how the ability of Augmented Reality to create greater sensory depth is one of its main strengths, and helps to make the difference at the point of purchase.

Given the above-mentioned literature, several studies have proven that AR can significantly impact customers' purchase behaviour (Beck, M., Cri , D., 2018) by reducing perceived purchase risk (Alimamy, S., Deans, K., Gnoth, J., 2017), creating positive consumer-brand relationships (Owyang, J., 2010), improving purchase confidence and satisfaction, giving the user the possibility to have a more personalized shopping experience (Dacko, S. G., 2017) and enhancing the hedonic aspect of a shopping experience (Huang, T.-L., Hsu Liu, F., 2014). When searching for a make-up product via their smartphones, users do not have the opportunity to try on the make-up and get an idea of how it would look on them, and this often leads them not to proceed with the purchase. Since AR tools compensate for this lack by allowing them to see the final result, we expect that the presence of mobile Augmented Reality will have a positive and significant impact on women's willingness to buy the product, with respect to the simple view of the cosmetics product image on a website.

H1. The presence of mobile Augmented Reality will have a greater and more positive influence on women's willingness to buy a make-up product compared to the absence of mobile Augmented Reality.

2.2 Overview about Perceived Playfulness

With the aim of providing a solid and qualitative basis for the research model proposed in the following paragraphs, and in order to deeply understand what were the initial feelings associated to and evoked by a beauty virtual try-on experience, 10 women with a previous experience in using AR-based make-up applications were interviewed. When they were asked to briefly describe the experience, 8 women out of 10 used adjectives such as "funny" and "enjoyable" as first words, highlighting how much the playful side of such virtual try ons is top of mind for consumers using

them. The concept of Augmented Reality and playfulness are therefore perceived as being closely linked, also justifying the importance given to the latter construct in the course of this research.

Furthermore, it is appropriate to underline that all the women interviewed had previous experiences with different AR make-up apps, meaning that the perception of playfulness is not a consequence of a specific layout design, but is attributable solely to the presence of the technology in question.

2.2.1 Perceived Playfulness definitions

Ahn et al. (2007) defined playfulness as a short-term system-specific trait or state. Specifically, playfulness of a website represents how it entertains its customers or users (Qi, S., Ip, C., Leung, R., Law, R., 2010).

Moon and Kim (2001) described perceived playfulness as “the extent to which the individual perceives that his or her attention is focused on the interaction with the World-Wide-Web; is curious during the interaction; and finds the interaction intrinsically enjoyable or interesting”. Thus, they defined three dimensions of perceived playfulness: *concentration* (the extent to which a user perceived that his or her attention was focused), *curiosity* (the extent to which the user was inquisitive about the interaction), and *enjoyment* (the extent to which the user found the interaction fun or interesting). Moreover, they underlined the always increasing necessity to introduce perceived playfulness in the context of the World-Wide-Web, since they found that it had a significant positive impact on behavioural intention. Gillenson and Sherrell (2002) also found perceived playfulness to be a significant factor motivating users to use a virtual store, and highlighted that enhancing the playfulness of using such online stores should be given a high priority.

A playful experience is reflected in the intrinsic enjoyment that comes from engaging in activities that are absorbing, to the point of offering an escape from the demands of the day-to-day world (Unger, L. S., Kernan, J. B., 1983). Thus, being immersed in a playful experience implies a certain detachment from the surrounding reality: escapism is the aspect of playfulness that allows the customer to temporarily “get away from it all,” often involving an element of “pretend” (Huizinga, J., 1955). Ahn *et al.* (2007) stated that playfulness has usually implied a belief that interacting would result in enjoyment or cognitive absorption (including concentration, and curiosity), all feelings that Augmented Reality is able to stimulate and evoke.

Playfulness is considered to be closely linked to the concept of “intrinsic value” (Mathwick, C., Malhotra, N., Rigdon, E., 2001), that derives from the “appreciation of an experience for its own sake, apart from any other consequence that may result” (Holbrook, M. B., 1994): indeed, Babin *et al.*

(1994) note the subjective and personal nature of intrinsic value perceptions that result from the “fun and playfulness of an experience, rather than from task completion.”

2.2.2 Perceived Playfulness literature review

It is well known that consumers prefer a novel, vivid, and visually rich sensory environment that offers a multisensory shopping experience and enhances their cognitive and affective responses (Labrecque, L. I., 2020). Thanks to the presence of AR technology, consumers perceive a high level of enjoyment: as they participate in a playful and interactive experience, they are consequently more prone to purchase the product (Park, M., Yoo, J., 2020). Nevertheless, these results contrast with those obtained in a study conducted on 654 US female subjects (Plotkina, D., Saurel, H., 2019), which revealed that the Virtual Try-On (VTO) tool based on Augmented Reality was less enjoyable than traditional mobile commerce interfaces. This discordance might be caused by the sample diversity at the level of nationality, but also by the fact that these types of results are product-based: depending on the specific product on which the study is focused, the results might lead to completely different conclusions, stressing the need for further studies focusing on different product types.

As already anticipated, research has shown some product categories are deemed more hedonic, as their benefits naturally lie in their aesthetics and symbolic or sensory character (Lim, E. A. C., Ang, S. H., 2008). Two such product classes that have a high experiential appeal and strongly rely on a symbolic value are fashion and cosmetics (Wang, C., Chen, Z., Chan, A. K. K., Zheng, Z., 2000). When shopping for these product categories, consumers tend to be more hedonically motivated (Clarke, D. W., Perry, P., Denson, H., 2012). Thus, it is possible to assess that experiential aspects of shopping are particularly important for consumers when purchasing beauty or fashion products (Park, E. J., Kim, E. Y., Forney, J. C., 2006), such as in the context of this research study, which explores the effect of an AR make-up filter.

Emotions, like fun and playfulness, are closely related to hedonic value (Scarpi, D., Pizzi, G., Visentin, M., 2014; Jarvenpaa, S. L., Todd, P. A., 1996), meaning that the perception of playfulness is likely to be evoked during the selection and purchasing process of products such as make-up, as it contributes to enriching the experiential factor sought by hedonically motivated consumers. Consumers with a hedonic shopping motivation tend to perceive the shopping experience as an adventure (Sherry Jr, J. F., 1990). This “adventure” reflects shopping’s potential entertainment and the enjoyment resulting from the fun and play arising from the experience versus the achievement of any prespecified end goal (Hirschman, E. C., Holbrook, M. B., 1982).

Hedonistic shopping is described as the festive and ludic way of shopping, and is related to fun and playfulness rather than to task completion, reflecting the experiential side of shopping, comprising pleasure, curiosity, fantasy, escapism, and fun (Hirschman, E. C., Holbrook, M. B., 1982). AR's playful and experiential nature has the potential to enhance customers' imagination and to create the conditions that encourage customer creativity during purchase decisions (Jessen *et al.*, 2020). The level of perceived playfulness can therefore play a crucial role, being a key factor around which the whole shopping experience revolves.

This feeling of fun is therefore enhanced by the presence of technologies such as Augmented Reality, that allows consumers to enjoy a pleasant and innovative experience. Indeed, AR is a unique technology with the potential to engage customers in playful, creative, and enjoyable purchase experiences (Jessen *et al.*, 2020).

Data obtained from a survey distributed to 102 European people (Javornik, A., Rogers, Y., Moutinho, A. M., Freeman, R., 2016) measured perceptions of augmentation as well as hedonic and utilitarian value of a "Magic Mirror", a kind of AR technology used as part of smart device applications, which seeks to make the virtual make-up appear as part of the real by using a front-facing camera. Results suggested that the augmented experience was perceived to be playful and credible (see Chart 3) while also acting as a strong driver for future behavior. Shoppers thought the app realistically augmented their faces with virtual make-up in real time. They also evaluated the experience to be very playful and a large majority indicated intentions of future engagement, such as subsequent use and talking to others about the application. As shown in the graph below, perception of playfulness was the construct that rated the highest, with respect to perceived augmentation and reported convenience.

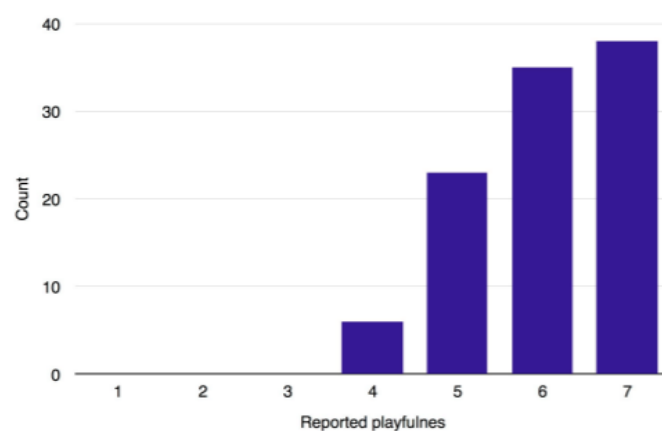


Chart 3: Reported playfulness

A regression analysis conducted on the survey data showed that perceived augmentation, evoked by the presence of AR technology, acted as a strong predictor of the playful experience that shoppers have with the application. Furthermore, both perceived augmentation and playfulness strongly correlate with visitors' intention to return to the application for further use and to talk about it to others (Javornik, A., Rogers, Y., Moutinho, A. M., Freeman, R., 2016). Thus, playfulness may be important because customers obtain pleasure in using the system as well as in purchasing the needed product (Ahn, T., Ryu, S., Han, I., 2007). Since in this research the experiment was conducted in a physical store, it would be interesting to verify whether, also in an online context, the level of perceived playfulness could explain the positive influence of Augmented Reality presence within a make-up website on the users' willingness to purchase the product.

As previously said, the sense of fun evoked by a virtual-try-on experience is more evident when the purchasing process is focused on a product considered to be hedonic, such as make-up. Moreover, the experience of AR is likely to be more hedonic than utilitarian (Javornik, A., 2016) and consumers who are hedonically oriented in their motivation to shop are more concerned with the entertainment, fun, and sensory stimulation aspects of shopping (Babin, B. J., Darden, W. R., Griffen, M., 1994). AR facilitates user involvement and thereby enhances the hedonic value of experience (Kim, A. J., Forsythe, S., 2008), thus enhancing playfulness (Huang, T.-L., Hsu Liu, F., 2014). This explains why the presence of Augmented Reality is often associated with a strong sense of entertainment and amusement.

The impact of AR on users' overall sense of playfulness is further supported by Pachoulakis and Kapetanakis' (2012) findings, where it emerged that AR used through the user's computer or phone camera, allowing he or she to virtually see how a dress would fit on them through a virtual changing room from their homes (Kumari, N., Bankar, S., 2015), was regarded as contributing to the 'fun factor' of shopping.

Living a pleasant AR-based experience is not an end in itself: perceived playfulness has also the power to positively affect users' purchase intention (Albayrak, T., Karasakal, S., Kocabulut, Ö., Dursun, A., 2020). A study conducted by Hsu et al. (2012) on 558 Taiwanese respondents has proven that the perception of playfulness during an online retailing experience can significantly and positively impact purchase intentions: Internet shoppers were also more likely to use Internet-based retailing when they felt more playful.

Different results have been achieved by Smink et al. (2019) research study, which revealed that perceived enjoyment mediation was not significant when considering the impact on purchase intentions. Online product presentation in AR enhanced the perceived enjoyment as opposed to the online product presentations without AR, which consequently enhanced brand attitude, but not

purchase intentions, meaning that the perception of playfulness is only able to trigger affective responses rather than behavioral ones.

However, Wang *et al.* (2021) found that besides and thanks to the playfulness that AR provides, AR technology can also encourage exploratory behavior in consumers, which will directly affect their intention to purchase. They also conducted a survey on 238 young women from South Korea, which were asked to answer some questions after having experienced YouCam Makeup, the previously mentioned AR-based app for beauty product, for 5 minutes. The hypothesis were supported, confirming that mobile AR services add enjoyment and playfulness to the simulated shopping experience and further improve online consumers' purchase intentions (Mathwick, C., Malhotra, N., Rigdon, E., 2001). Moreover, it was also found that consumers with a high level of fashion innovativeness have stronger purchase intentions when using mobile AR services, especially through the mediating role of perceived playfulness (Wang, Y., Ko, E., Wang, H., 2021), meaning that consumers with higher fashion innovativeness will perceive more playfulness when using a mobile AR service, thus improving purchase intentions.

Perceived playfulness' ability to be the most distinctive and recognisable feature of an online make-up shopping experience based on Augmented Reality is therefore widely recognised and supported by the research, making it the ideal factor to explain why the presence of AR in such contexts can induce the user to buy the product.

To sum up, the presence of AR is often associated with a greater perception of fun (Park, M., Yoo, J., 2020), due to its ability to amplify the experiential and sensory side of an online shopping experience (Jessen *et al.*, 2020) and its hedonic value (Huang, T.-L., Hsu Liu, F., 2014), which is closely connected to emotions like fun and playfulness (Scarpi, D., Pizzi, G., Visentin, M., 2014; Jarvenpaa, S. L., Todd, P. A., 1996), especially for categories that are deemed more hedonic such as make-up (Lim, E. A. C., Ang, S. H., 2008). Although Plotkina and Saurel (2019) research revealed that Virtual Try Ons were perceived as less fun than traditional mobile commerce interfaces, other studies (Javornik, A., Rogers, Y., Moutinho, A. M., Freeman, R., 2016; Pachoulakis, I., Kapetanakis, K., 2012) showed that the presence of AR was a strong predictor of the “fun side” of the experience perceived by users.

Perceived playfulness is also positively related to purchase intention (Mathwick, C., Malhotra, N., Rigdon, E., 2001): users will get more satisfaction from a playful and innovative experience, and will be more incline to purchase the product (Albayrak, T., Karasakal, S., Kocabulut, Ö., Dursun, A., 2020). Several studies have confirmed this tendence (Hsu, C. L., Chang, K. C., Chen, M. C., 2012; Wang, Y., Ko, E., Wang, H., 2021). All these findings led us to develop the following hypothesis:

H2. When mobile Augmented Reality is present, the perception of playfulness will increase. Moreover, the increase in the perceived playfulness will positively influence women's willingness to buy a make-up product.

2.3 Overview about Body image

In this research study, a special focus is given to the impact of the psychological perspective on the effectiveness of AR technology, underlining how individuals' view of themselves can influence playfulness' perception of an Augmented Reality online shopping experience. At present, the research is not particularly rich in studies focusing on the role of body image in contexts such as those generated by virtual make-up try-ons. An important construct missing from the Virtual Try On literature is body image (Merle, A., Senecal, S., St-Onge, A., 2012): the impact of this psychological variable on the enjoyment of the online AR experience has never been particularly addressed, due to the lack of a study filling certain gaps. Therefore, this research aims to make a substantial contribution to the analysis of this psychological perspective which has so far taken a back seat.

2.3.1 Body image definitions

Body image is commonly defined as an individual's subjectively perceived physical self, embedded in a mental construct (Myers, P. N., Biocca, F. A., 1992): this "bodily schema", or self-appearance, is the tri-dimensional image everybody has about himself and is based on both past and present perceptions of their body (Schilder, P., 2013).

Body image is different from body esteem, which entails a generally favourable perception of the body: body esteem is indeed the affective part of body image (Mendelson, B. K., White, D. R., 1982). Thus, body esteem often shows a strong correlation with esteem in regard to one's appearance (Franzoi, S. L., Herzog, M. E., 1986). It is defined as a deeply held and generalized like or dislike of the body and it is composed of three factors: physical condition, general attractiveness and physique appearance (Rosa, J.-A., Garbarino, E. C., Malter, A. J., 2006) and is an important dimension of the self-esteem construct (Heatherton, T. F., Polivy, J., 1991).

Body image is also distinct from self-esteem (Henriques, G. R., Calhoun, L. G., 1999) which, in social science, is defined as the sum of evaluations across salient attributes of individual's self or personality, thus representing the overall affective evaluations of one's own worth, value or

importance (Blascovich *et al.*, 1991). Self-esteem functions to enhance both body image and body esteem (Hermann, A. D., Leonardelli, G. J., Arkin, R. M., 2002).

A direct consequence of body image the associated level of body satisfaction: unfavourable body image is positively associated with body dissatisfaction, which is defined as “a person’s negative thoughts and feelings about his or her body” (Grogan, S., 2016). However, body image concept has not always had only negative meanings: the last ten years have seen a surge of interest in understanding a range of positive body image constructs including body appreciation, body acceptance and the broad conceptualization of beauty (Tylka, T. L., Wood-Barcalow, N. L., 2015), enabling a more complete and holistic understanding of body image.

2.3.2 The relationship between facial satisfaction and body image

“The face, as unique, physical, malleable and public is the prime symbol of the self” (Synnott, A., 1989): it is one of the key features in the determination of human physical attractiveness (Riggio, R. E., Widaman, K. F., Tucker, J. S., Salinas, C., 1991) and symbolizes the “self” more than any other part of the body. Yet facial attractiveness is difficult to quantify, since there is no one set of predefined rules governing facial harmony (Crawford, E. C., 1991).

Facial satisfaction is a multidimensional concept, comprising a number of elements that vary across different individuals: it can be generally considered as part of the broader concepts of body image and body esteem: high facial satisfaction has also been associated with improvements in self-esteem and body image (Charles Finn, J., Cox, S. E., Earl, M. L., 2003). It plays a crucial role in the determination of general appearance, which is one of the key components of body image: it is therefore a body image noteworthy shade in a study that does not involve the whole body, but is limited to the view of one's own face, on which the virtual make-up is overlapped.

However, given the lack of extensive literature on facial satisfaction (which is considered almost exclusively in medical and/or clinical contexts involving plastic surgery or other aesthetic operations) and considering its direct connection with the concepts of body esteem and body image, these terms will be quite recurrent during the writing of this research, and will often be representative and inclusive of facial satisfaction concept.

2.3.3 Body Image literature review

Consumers' perceptions of the quality of high body-involving products like clothes and make-up may not only be determined by how body-related information is presented through technology-driven media but also by how consumers perceive their bodies (Rosa, J.-A., Garbarino, E. C., Malter, A. J.,

2006). Thus, it is understandable to expect that consumers' perceptions of their bodies significantly and differently affect their responses to AR-based virtual try-on technology (Baek, T. H., Yoo, C. Y., Yoon, S., 2018). As Fiore and Kim (2005) highlighted, person variables (consumer characteristics) may influence the strength and direction of the relationship between environmental stimuli (in this case AR) and its consequences, such as the perception of playfulness and, consequently, users' willingness to purchase the product (Watson, A., Alexander, B., Salavati, L., 2018). Therefore, personal characteristics of users, such as body or face image, are important determinants of such try-ons' perceived value.

However, results on how these psychological variables influence (positively or negatively) an individual's ability to enjoy a positive and playful experience such as a beauty virtual-try-on are mixed, underlining the need for further research on this issue.

According to self-image/product-image congruity theory (Sirgy, M. J., 1982), when self-image (individuals' view of themselves) belief and product-image perception (like or dislike) are both positive ("positive self-congruity"), consumers have a positive purchase motivation since this situation increases both their self-esteem and self-consistency beliefs. However, when self-image belief is negative (low body image) and product-image perception is positive (product liking), the overall effect is negative and it consequently leads to conflicting motivations: consumers' esteem motivates them to approach (avoid) the product, whereas their self-consistency motivates them to avoid (approach) the product. Higher level of conflict is always associated to higher level of stress: therefore, considering that stressed people have a lower perception of playfulness (Hackbarth, G., Grover, V., Mun, Y. Y., 2003), it is reasonable to assume that people with an unfavourable body image would enjoy less a make-up virtual try on experience.

Moreover, "positive" life events (e.g., receiving a compliment, getting promoted, falling in love) triggered anxiety and stress in participants with low body esteem (Ayduk, Ö. *et al.*, 2013; Brown, J. D., McGill, K. L., 1989). Instead of using those instances to bolster their self-views, low-self-esteem participants dwelled on the negative aspects of those "positive" events to restore their usual understanding of themselves (Kille *et al.*, 2017), meaning that they tend to cover the enjoyable side of an experience in order to confirm their negative self-view.

On the other hand, a recent research considering the AR context has examined the crucial role of consumer's perceived body image in consumer evaluations (including the level of media enjoyment) and intention to adopt AR-based virtual try-on technology, arriving at diametrically opposed results (Yi-Cheon Yim, M., Park, S.-Y., 2019). Specifically, findings revealed that participants with an unfavourable body image who used AR recorded greater media usefulness and enjoyment, more favourable attitudes, and greater adoption intentions than participants using the traditional website.

As it is possible to notice from the figure below (see Figure 1), data suggested that, regardless of body image, participants perceived a significantly greater level of enjoyment from AR than from the website. However, the level of enjoyment perceived by people with an unfavourable body image is slightly higher, contrasting with previous research results.

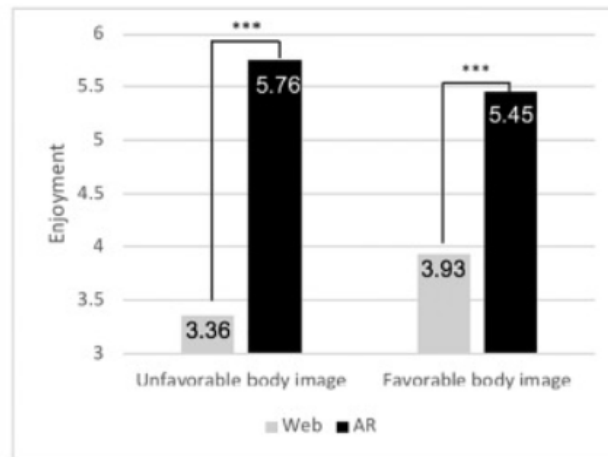


Figure 1: Comparison between Web and AR conditions

A possible explanation is that, when compared to the traditional website, AR would be perceived as a more useful tool for consumers with an unfavourable body image because it clearly portrays improved images about themselves (Yi-Cheon Yim, M., Park, S.-Y., 2019). The theory that AR is able to enhance self-viewing is further supported by Baek, Yoo and Yoon (2018), stating that viewing oneself wearing a product (e.g. make-up) is more effective than other viewing (e.g. a model wearing the product or the simple 2D image of the product) in increasing brand purchase intentions. Moreover, compared to the traditional website, AR would be perceived as a more enjoyable tool because it enables them to anticipate future rewards from the purchase (Phillips, D. M., Olson, J. C., Baumgartner, H., 1995), particularly for those with an unfavourable body image: thanks to AR, the user can more easily get a fairly realistic idea of what the product will look like once worn, amplifying the perceived playfulness of the online experience as well as the purchase intention.

People with an unfavourable body image have a greater need to get this kind of information about how their body appears: one shared idea is that individuals with a favourable body image tend to have high body-esteem based on constant monitoring of their body. Consequently, they likely have a greater amount of preconfigured information about their bodies compared to those with an unfavourable body image (Epstein, S., 1980).

However, a significant limitation occurs in Yim and Park (2019) study: the results refer exclusively to AR context of personal computer, and do not consider the context of mobile settings, contributing

to justify the need for further research. Furthermore, the product tested was sunglasses: it would be interesting to see if the same results could be obtained by focusing the study on a cosmetic product.

Conflicting results were also obtained with regard to other considerations: recently, Fardouly and Rapee (2019) compared the effect of makeup and no-makeup selfies as posted by three makeup artists. They found that exposure to a small number of no-makeup selfies interspersed with a larger number of makeup selfies did not decrease facial satisfaction, whereas viewing only makeup selfies did (Tiggemann, M., Zinoviev, K., 2019). This happens because the vision of the make-up product contributes to creating an idealised image of the user which, in turn, negatively impact women's facial satisfaction and overall mood.

However, the other side of the coin must also be considered: indeed, bottom-up attention can play a crucial role in a situation where the individual is subjected to a stimulus (in this case the presence or absence of make-up on their face) for a relatively short period of time. Attention is defined as those internal mechanisms that determine the significance of stimuli and thereby make it impossible to predict behavior by stimulus considerations alone (Kahneman, D., 1973). Visual attention is attracted by salient stimuli that 'pop out' from their surroundings; attention can also be voluntarily directed to objects of current importance to the observer (Connor, C. E., Egeth, H. E., Yantis, S., 2004). The kind of individual items to which people pay attention depends on two distinct types of attentional mechanisms: bottom-up mechanisms and top-down mechanisms. Specifically, bottom-up attention is thought to operate on raw sensory input, rapidly and involuntarily shifting attention to salient visual features of potential importance (Connor, C. E., Egeth, H. E., Yantis, S., 2004): as it has been amply demonstrated (Aglioti, S., Smania, N., Barbieri, C., Corbetta, M., 1997), this kind of fast and uncontrolled attention is triggered by low-level features, that are related to intrinsic product properties such as colour, brightness or shape. In the case of this specific research project, the low-level feature is represented by the presence of a virtually reproduced make-up product that may attract users' attention during a virtual-try-on online experience. It is very likely, in fact, that the user's attention will be captured, at least in an initial phase, by the vision of the cosmetic product that will be artificially applied on their face: this shift of attention could therefore imply that users involved in the virtual-try-on experience do not pay attention to the appearance of their face but to the AR-based make-up product.

Following this reasoning, the vision of a make-up product would not have a negative impact on their facial satisfaction or mood, making the experience much lighter, more pleasant and evanescent compared to those who already have a favourable image of their face, and are therefore less inclined to perceive Augmented Reality in its role of "distractor" of attention.

Considering the ability of Augmented Reality - used in the creation process of an Instagram filter - to defocus users' attention from their face to the make-up filter itself, it is therefore reasonable to expect that the results obtained from Yim and Park (2019) research will not only be confirmed, but that the positive influence of an unfavourable body image on perceived playfulness will also be amplified when a cosmetics product reproduced through AR is involved in the experiment.

Finally, Veldhuis *et al.* (2020) suggested that negative body image may serve as motivation and precede engagement in selfie behaviours such as the editing of photos. Taking part into an AR-based virtual try on experience has many points in common with taking selfies and modifying them by applying a make-up filter: thus, the greater engagement in selfie behaviours can be translated into the AR context in terms of greater enjoyment toward the overall experience.

Thus, research has shown that people with a low body-image are less able to enjoy a fun and pleasurable experience (Hackbarth, G., Grover, V., Mun, Y. Y., 2003), as they tend to feel more uncomfortable with their bodies (Kille et al., 2017) and, consequently, more stressed (Ayduk, Ö. *et al.*, 2013; Brown, J. D., McGill, K. L., 1989). However, different results have been yielded by more recent studies that take into account the AR context (Yi-Cheon Yim, M., Park, S.-Y., 2019; Baek, T. H., Yoo, C. Y., Yoon, S., 2018) and state that people with an unfavourable body image tend to perceive an higher media enjoyment from AR than the traditional website, since AR technology offers an enhanced image about themselves and enables them to anticipate future rewards from the purchase (Phillips, D. M., Olson, J. C., Baumgartner, H., 1995). Moreover, AR function as a driver of users' attention, whose effect is much more evident when people with an unfavourable body image are involved, as it is able to shift the focus from the unappreciated elements of their face to the virtually reproduced make-up product, which is likely to represent a salient stimulus for them (Aglioti, S., Smania, N., Barbieri, C., Corbetta, M., 1997). These studies do not specifically consider the mobile layout interface or a product belonging to the cosmetic industry, but we believe that the same results can be achieved also under the latter conditions.

Lastly, prior research has shown that virtual reality (VR) has a significant ability to generate elevated self-esteem, a sense of self-empowerment, and body satisfaction, particularly for those who are low in these self-related evaluations (Yalon-Chamovitz, S., Weiss, P. L. T., 2008). Applied to the AR context, we similarly propose that consumers with an unfavourable body image are more likely to appreciate AR tools and the sense of playfulness evoked by them. Thus, the following hypothesis has been proposed:

H3. Women's body image will moderate the relationship between the presence of mobile Augmented Reality and the perceived playfulness. Specifically, women's with an unfavourable body image will have a greater perception of playfulness when mobile Augmented Reality is present, compared to those with a favourable body image.

2.4 Research model development

In order to verify the above-mentioned hypothesis, the following research model has been developed (see Figure 2). The presence vs the absence of mobile Augmented Reality within an online shopping experience is the independent variable, while women's willingness to buy a make-up product is the dependent one. Moreover, a moderated mediation is involved: perceived playfulness is expected to mediate the relationship between the presence of mobile Augmented Reality and women's willingness to buy a make-up product - thus explaining why women subjected to the AR stimulus will be actually more prone to purchase the product - and body image (favourable vs unfavourable) is expected to moderate the relationship between the presence of mobile Augmented Reality and perceived playfulness, since the more unfavourable body image, the higher the perception of playfulness.

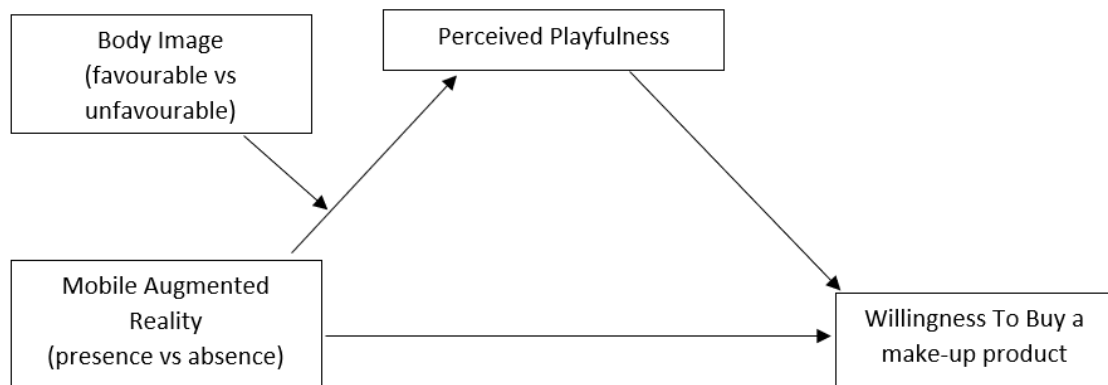


Figure 2: Research Model

3. QUANTITATIVE RESEARCH

The last part of the thesis project is dedicated to the exposition of the methodology adopted to conduct our quantitative analysis, the data collection through an online Qualtrics survey (see Appendix) and the coding process of variables involved in the research model. Afterwards, before going more in depth in the analysis of data, we will provide the description of our sample, in terms of gender, age, and actual status; we will explain how the stimuli in the questionnaire were created and controlled; we will show the measurement scales adopted for the main variables and how they have been translated and readjusted for this specific research; finally, we will describe in detail the structure of the questionnaire and its main blocks of questions, with the final aim of understanding how mobile AR can impact women's willingness to buy a make-up product through perceived playfulness and when women's body image can influence their perception of playfulness in an AR-based online shopping experience.

3.1 Methodology and Data Collection

In order to investigate the above-mentioned variables, we intend to use the descriptive research as research design, a particular kind of conclusive research that has the aim of giving details about a specific phenomenon through a structured and formal analysis, in order to enable the decision makers to evaluate alternative courses of action.

In the following study, two scenarios (presence of mobile Augmented Reality vs absence of mobile Augmented Reality) will be used. The type of experimental design chosen is the between-subjects design, meaning that each participant will take part in only one of the experimental conditions, in order to analyse the behavioural differences between the groups of participants in the different scenarios.

The reference sample is a non-probability sample, specifically a convenience sample, composed of the most easily accessible elements of the population: this kind of sampling technique is characterized by a non-systematic approach to recruiting respondents that often allows a potential respondent to self-select into the sample (Fricker, R. D., Schonlau, M., (2002). Participants were contacted via private messaging systems and invited to fill in the questionnaire. Population members were then able to participate in the study by accessing a link to a Qualtrics page that allowed them to view the survey. The specific type of survey used in this study is the online survey, which is chosen taking into account its main advantages, such as the potentially large amount of primary data available in the field, the

speed of response collection, the low cost and the geographical distribution of potential respondents (Bethlehem, J., & Biffignandi, S., 2011). Another important advantage of online surveys consists in allowing people to fill in the questionnaire at any moment they prefer, to take as much time as they needed to fill it in, and to do so in an environment where they felt comfortable, without feeling the pressure they might have felt in real laboratory conditions. Moreover, it is appropriate to underline that the sample will be composed exclusively of women, given that the entire study is focused on the testing and possible purchase of a cosmetic product, and that the survey will be completed exclusively through mobile devices, as this is the only type of device capable of accessing the Augmented Reality scenario.

3.1.1 Stimuli

As mentioned in the previous paragraph, the independent variable of the research model includes two different scenarios to which respondents will be randomly assigned through a Qualtrics survey according to a between-subject study design. Each of the two scenarios represents a stimulus that has been specifically created and manipulated to allow participants to identify themselves in two different contexts within an online shopping experience: the first scenario is characterised by the absence of mobile Augmented Reality, while the second by the presence of mobile Augmented Reality, which translates into the opportunity to virtually try on the make-up product through an Instagram filter created exclusively for this research project.

The first scenario involves a graphical stimulus (see Figure 3), which consists of a simple two-dimensional image created through the use of the graphic tool Canva, and aimed at reproducing the website of an imaginary cosmetics brand, Golden Makeup. The image is inspired by the structure of the websites of We Make Up and Sephora, but no recognized brand is present within the stimulus: the intention, in fact, was to keep the scenario as neutral and generic as possible, in order to avoid conditioning the answers of the participants and their perception of the online shopping experience. As can be seen from the figure below, the section that is open by default within the Golden Makeup website is that of lipsticks, as the entire study is focused on the virtual trial and possible purchase of this specific type of make-up.

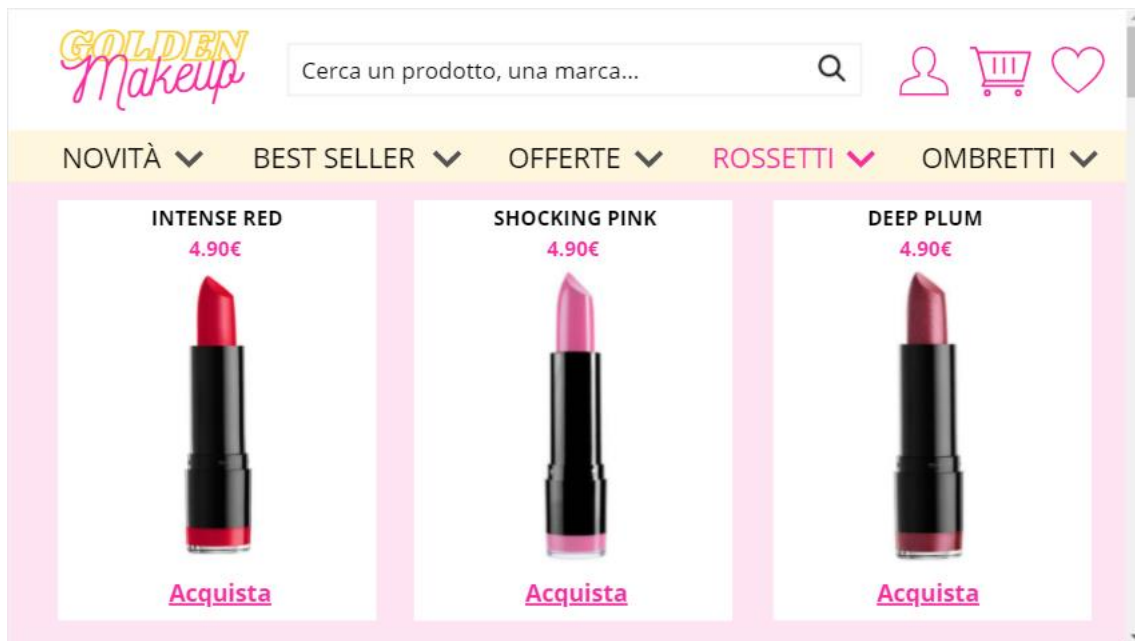


Figure 3: "Absence of AR" stimulus

The language chosen is Italian, which corresponds to the nationality of the respondents. The cosmetic product chosen for the experiment is a lipstick, shown in three different shades (intense red, shocking pink and deep plum) with the corresponding prices: the latter element was kept the same for all three lipsticks in order not to create preferences on the basis of price. The images of the lipsticks were taken from NYX Cosmetics, but they still maintain a neutral appearance because the brand name and the respective logo are not visible, and the black packaging is extremely common and adopted by many cosmetic brands.

Underneath the lipstick images, a call-to-action (CTA) inviting website visitors to buy the product they are looking for was also inserted: in this way, it was possible to recreate a realistic experience of buying a cosmetic product, allowing respondents to approach the questions following the presentation of the stimulus with the right mindset.

With regard to the second scenario, the preparation of the stimulus was divided into various phases, all aimed at the creation of an Instagram filter that would allow the respondents to experience a real Virtual Try On. As a first step, we made the shape of the lipstick by using a face mesh tracker (see Figure 4) and uploading it to Photoshop: the presence of this "mask" made it possible to draw the lipstick in the lip area and the use of a professional graphic tool like Photoshop made the final effect precise and believable.

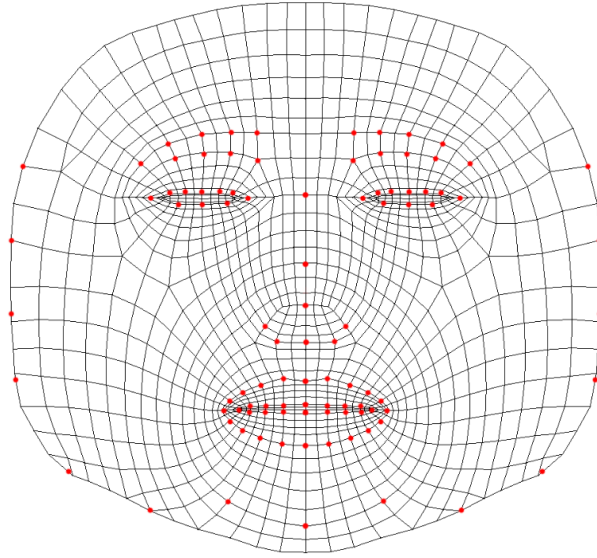


Figure 4: Face mesh tracker

Once the 2D image of the lipstick was obtained, it was transferred to Spark AR Studio, a leader in social media Augmented Reality filters: it is a software program that allows users to create Augmented Reality masks and effects to be applied live in Instagram videos and stories (see Figure 5). Thus, this programme was fundamental in giving a three-dimensional effect to the make-up previously created in Photoshop. Previously, these filters could only be created and shared on Instagram by approved brands or creators, making it an exclusive trend. However, AR filters are now within everyone's reach, and are considered a powerful marketing asset on Instagram, with more than 1 billion people using an AR effect that has been created on the Spark AR platform (De Bernardis, R., 2020).

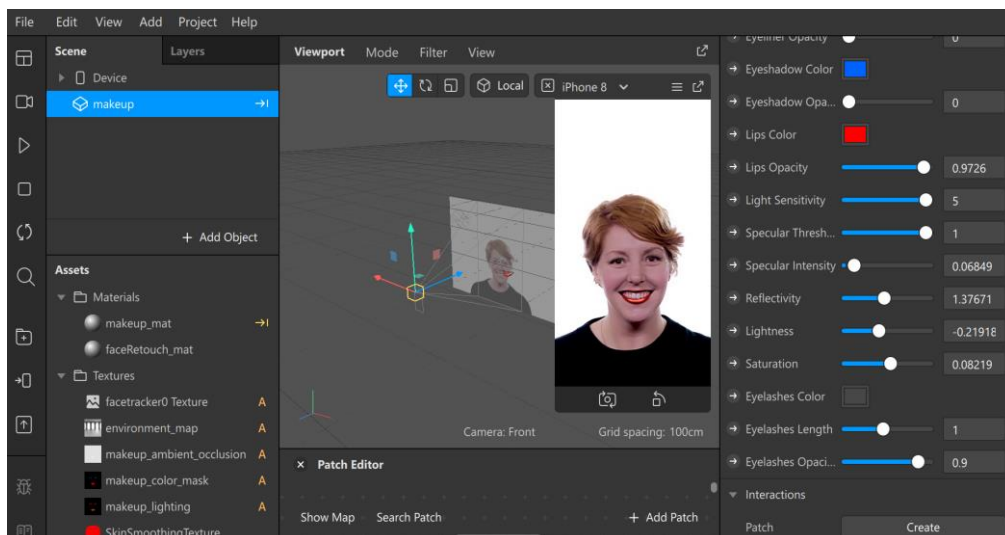


Figure 5: Spark AR Studio

In order not to create any kind of difference between the two scenarios other than the presence or absence of Augmented Reality, the same colours of lipsticks present in both scenarios within the image on the Golden Makeup website were used within the filter: the right shade was identified through a feature offered by Coolors.com, which allows users to find the exact colour of any element in an image in order to transfer it elsewhere. Finally, in order to allow those trying out the filter to see all three lipstick shades, some advanced settings were changed on Spark AR Studio: participants subjected to the “presence of mobile AR” condition only needed to tap on their smartphone screen to see the lipstick colour change.

The filter was therefore published on Instagram and then inserted through a link within the questionnaire, immediately under the image of the fictitious brand Golden Makeup created with Canva and also present in the first scenario. Thus, the key difference between the two scenarios is the presence of the link itself: in the “presence of mobile AR” scenario, respondents were told that Golden Makeup gave them the opportunity to try the lipstick directly on their face, thanks to the presence of the link on their website.

It is also important to note that the limitation imposed on the type of device to be used to complete the survey is due to the fact that Instagram filters are not reproducible via desktop, and therefore the only way to virtually test the lipstick is via mobile devices.

3.1.2 Measurements and survey structure

Before being directed to one of the two scenarios, respondents were informed that the survey was conducted by a student attending the LUISS Guido Carli University for thesis purposes; this introductory page further specified that the questionnaire was intended for women only, that it could only be completed via mobile devices and that it would take about five minutes to complete.

Secondly, they were asked whether they had an Instagram account or not: respondents who would have answered negatively, would have been automatically introduced to the scenario characterised by the absence of Augmented Reality, given the impossibility of testing the Instagram filter without having an active account on this specific social media.

Next, a block of questions concerning the body image variable was inserted: Thompson, Heinberg, Altabe, and Tantleff-Dunn (1999) extensively outlined various definitions and measures of body image. The most widely used measures are those related to satisfaction, esteem, appearance evaluation, distress, and anxiety; clearly, investigators who study what falls under the general heading of body image have the possibility to choose from a wide variety of measures. The choice of which one to use should be based most importantly on the specific construct of interest as well as on practical

considerations (Thompson et al., 1999). Based on these considerations, the measurement scale used in the survey is derived from the Body Image Satisfaction Questionnaire (BIS; Rauste-von Wright, M., 1989), which includes 26 items describing all of the body parts. Two subscales have been identified: one containing items concerning the parts of the face, and another one containing items accounting for body parts (Gatti, E., Ionio, C., Traficante, D., & Confalonieri, E., 2014).

As the only part of the body involved in the experiment of this thesis project is the face, only the subscale “face” (containing 6 items) was included in the questionnaire. The subscale was also adapted and translated into the Italian language. Specifically, a 7-point Likert scale was used: respondents were asked to indicate how satisfied they were from 1 (strongly unsatisfied) to 7 (strongly satisfied) with the following elements characterizing their face:

- “l’aspetto generale del volto”;
- “il naso”;
- “le labbra”;
- “il profilo”;
- “la forma della testa”;
- “la pelle”.

After that, respondents were sorted into one of the two scenarios described in the previous paragraph: in both cases, they were asked to imagine that they were looking for a lipstick from Golden Makeup, a cosmetics brand, and that they were on its website to consider buying one of the lipsticks on the page. Only in the case of the Augmented Reality scenario, they were told that the Golden Makeup website also gave them the opportunity to virtually try on the lipsticks using an Instagram filter. In the latter case, before allowing them access to the filter, they were also given some instructions to follow in order to correctly view the effect on their face and then return to the questionnaire page.

After being subjected to the stimulus, respondents were presented with the items that form the construct of perceived playfulness, whose scale was adopted from Moon and Kim (2001). They studied the impact of perceived playfulness on individuals’ attitudes considering a WWW context, which seems to be in line with the purpose of this thesis project that takes into account an online shopping experience.

Participants were asked to think back to the experience they had just had and to state how much they agreed on a scale of 1 (strongly disagree) to 7 (strongly agree) with the following statements:

- “Durante l’esperienza online, non mi sono reso conto del passare del tempo”;

- “Durante l’esperienza online, non mi sono reso conto di nessun suono esterno”;
- “Durante l’esperienza online, mi sono dimenticato delle cose che ho da fare”;
- “Mi ha fatto piacere prendere parte all’esperienza online”;
- “Mi sono divertito a prendere parte all’esperienza online”;
- “Prendere parte all’esperienza online mi ha reso felice”;
- “L’esperienza online ha stimolato la mia curiosità”;
- “L’esperienza online ha aumentato la mia voglia di esplorare”;
- “L’esperienza online ha suscitato la mia immaginazione”.

The last variable included in the questionnaire is the willingness to buy, the scale of which was adopted by Dodds, Monroe and Grewal (1991). As with the mediator and moderator, a 7-point Likert scale was used to measure the items of the construct. Participants were asked to state how much they agreed on a scale of 1 (strongly disagree) to 7 (strongly agree) with the following statements:

- “Ho intenzione di comprare almeno un rossetto”;
- “Comprerò almeno un rossetto”;
- “C’è una forte possibilità che io possa comprare almeno un rossetto”.

In order to understand respondents’ online habits, as well as their level of knowledge of technologies such as Augmented Reality applied in the beauty field, some "Grand Tour" questions were introduced: in particular, respondents were asked how much time they spent on average during the day using the Internet, how often they bought cosmetic products online, and what degree of knowledge they have of Augmented Reality in the cosmetic sector.

Following this, a manipulation check was included to verify the respondents' level of attention during the completion of the survey.

Finally, the last questions were focused on the demographic characteristics of the respondents such as gender, age and current occupation.

3.2 Data analysis

The process of data analysis begins with the cleaning and preparation of the data themselves in order to make the results as consistent and precise as possible; this is followed by descriptive statistics to define the characteristics of the sample and reliability analyses on the measurement scales of the three constructs present in the research model, in order to verify their internal consistency; finally, the

proposed hypotheses will be tested by means of an independent t-test as regards the main relationship between the independent and the dependent variables and through the use of PROCESS Model 7 to test the significant existence of a moderate mediation model.

3.2.1 Data cleaning and preparation

The questionnaire remained active on Qualtrics for a period of 10 days, the time needed to reach a number of responses deemed sufficient for the validity of the results.

Before proceeding with the analysis, a pre-processing of the data was mandatory: it is an essential step in the marketing research process, as any incompleteness, error or inconsistency in the data can lead to distorted results and final conclusions. Data pre-processing consists of a series of changes necessary to organise the information collected during the data collection phase, with the aim of providing a complete data set that is easily accessible, contains information that is relevant to the study in question and can therefore be used effectively for the subsequent stages of analysis (Pyle, D., 1999).

The first changes made to the dataset fall under the data cleaning process. A total of 539 responses have been collected, of which 93 still “in progress”: the latter were excluded from the analysis as they were incomplete. The data were then transferred to SPSS, a commercially distributed software suite for data management and statistical analysis (Frey, F., 2017). At this point, further cleaning was necessary: 37 responses were removed from the dataset because the respondents in question had not passed the attention check entered at the end of the questionnaire. Finally, 5 answers were further excluded, corresponding to those in which the respondents had indicated "male" as their gender: since the questionnaire was only aimed at women, it was not possible to take into account the answers of a male audience. Thus, the final number of answers to be submitted for analysis was 404.

As a final step in the preparation of the data, a number of columns, which were considered superfluous because they contained information about the participants which was not relevant for the research, such as their IP address, were removed from SPSS.

We then moved on to the creation of the independent and dichotomous variable called "AR", determined on the basis of the scenario to which respondents have been assigned in the survey: this dummy variable was associated with the value “0” in the case of a scenario characterised by the absence of mobile Augmented Reality, and “1” in the case of the presence of mobile Augmented Reality.

3.2.2 Descriptive statistics

The first analysis carried out on the reference sample concerns descriptive statistics. In contrast to inferential ones, descriptive statistics do not allow researchers to draw any conclusions or make any inferences about the data: they are simply the numerical procedures or graphical techniques used to organise and describe the characteristics or factors of a given sample (Fisher, M. J., & Marshall, A. P., 2009). Thus, through descriptive statistics it is possible to organize, summarize, and present data in a convenient and informative way.

As expected, 99% of the sample is made of female subjects, while the remaining 1% prefer not to specify the gender. With regard to current employment, the vast majority of them (69.8%) is made of students, 18.3% are employees, 4.5% are unemployed, 4.2% are freelancers and only 3.2% are businesswomen (see Table 1).

Qual è la tua attuale occupazione?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Studentessa	282	69.8	69.8	69.8
	Dipendente	74	18.3	18.3	88.1
	Libera Professionista	17	4.2	4.2	92.3
	Imprenditrice/P.IVA	13	3.2	3.2	95.5
	Disoccupata	18	4.5	4.5	100.0
	Total	404	100.0	100.0	

Table 1: Current Employment

Participants were also asked to indicate their exact age in the questionnaire: the data showed that the highest percentages were recorded at 23 (18.8%), 22 (16.1%) and 20 (8.9%) years of age. This is in line with our expectations, as the questionnaire was administered mainly to university students.

For what concerns the “Grand Tour” questions, respondents were asked questions about their Internet use, their online shopping habits and their level of knowledge about Augmented Reality in the cosmetics sector. As shown from the tables below, 43.1% stated that they use the Internet two to four hours a day, 41.6% declared that they buy cosmetic products online from 1 to 3 times a year, and 34.4% stated that they have scarce knowledge of AR.

Quanto tempo durante la giornata dedichi mediamente all'utilizzo di Internet?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Meno di un'ora	8	2.0	2.0	2.0
	Due ore al massimo	62	15.3	15.3	17.3
	Dalle due alle quattro ore	174	43.1	43.1	60.4
	Sono sempre connesso	160	39.6	39.6	100.0
	Total	404	100.0	100.0	

Table 2: Daily Internet usage

Quanto spesso ti capita di acquistare prodotti di cosmetica online?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non ho mai acquistato prodotti di cosmetica online	76	18.8	18.8	18.8
	Da 1 a 3 volte all'anno	168	41.6	41.6	60.4
	Da 4 a 7 volte all'anno	93	23.0	23.0	83.4
	Da 8 a 11 volte all'anno	46	11.4	11.4	94.8
	Una o più volte al mese	21	5.2	5.2	100.0
	Total	404	100.0	100.0	

Table 3: Online shopping habits

Che grado di conoscenza hai della Realtà Aumentata nel settore della cosmetica?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nulla	95	23.5	23.5	23.5
	Scarso	139	34.4	34.4	57.9
	Sufficiente	84	20.8	20.8	78.7
	Buono	74	18.3	18.3	97.0
	Ottimo	12	3.0	3.0	100.0
	Total	404	100.0	100.0	

Table 4: AR degree of knowledge

Finally, 96% of the respondents confirmed having an Instagram account: it was therefore necessary to show the remaining 4% (corresponding to 16 participants) the scenario of the absence of mobile Augmented Reality, also explaining why those who were assigned to this condition (AR="0"; 221 participants) were more than those who were assigned to the scenario of the presence of mobile Augmented Reality (AR="1"; 183 participants).

3.2.3 Reliability Analysis

The first step of this analysis is to inspect the validity of the multi-item scales of the variables measured with a 7-point Likert scale, namely Perceived Playfulness, Body Image and Willingness To Buy. As explained above, the scales used to measure these variables are scales that have already been adopted and tested in other research, and are therefore pre-validated; however, it is still important to test the reliability of the scales in this specific research topic. For this reason, reliability analyses were conducted, and Cronbach's Alpha has been interpreted. Cronbach's alpha measures the internal reliability and the overall consistency of a multi-item scale: by mathematical definition, it is an adjusted proportion of total variance of the item scores explained by the sum of covariances between item scores, and thus ranges between 0 and 1 if all covariance elements are non-negative. Given that values above 0.60 are considered acceptable and those above 0.70 are considered good, only scales

with a Cronbach's alpha value that was higher than 0.70 have been considered sufficiently trustworthy.

As can be seen from the table below, which summarises the Cronbach's Alpha values of the three variables under analysis, all scales are to be considered extremely reliable: Body Image scale has a Cronbach's Alpha of 0.899, Perceived Playfulness has 0.940 and Willingness To Buy has 0.955.

Reliability Statistics

Scale	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Body Image	.899	.903	6
Perceived Playfulness	.940	.941	9
WTB	.955	.955	3

Table 5: Cronbach's Alpha values

By also checking the table showing the reliability of the scale “if item deleted”, it was possible to notice that the elimination of any items would not have caused an increase in the value of Cronbach's Alpha, and would have been unnecessary. It would have been possible to reach the same conclusion by looking at the Inter-item Correlation Matrix of each scale, whose values are all well above 0.3, which is considered the minimum value that loadings should have.

The next step was to extract three factors from the scales (Body Image, Perceived Playfulness and Willingness To Buy): they would be the so-called “latent variables” that encapsulate the individual items that make up the scales. To this end, it was used the naïve method (also known as “scale mean” method), which consists in calculating the average of the values attributed by the respondents to every item of each scale. The main advantage of having a single latent variable comprising several items is that it makes the whole analysis process faster and more intuitive, while obtaining equally reliable results.

Subsequently, the Body Image variable was transformed into a dummy variable by considering as a threshold value to which to attribute "0" or "1" the mean of the scale previously calculated with the naïve method. Thus, the Body Image variable was assigned “0” if the value was less than or equal to

4.36, and “1” for all other cases (4.37 to 7). The reason for transforming this variable into a dummy variable is to facilitate the interpretation of the results and the acceptance or non-acceptance of the hypotheses formulated in the research model. In fact, from the third hypothesis, we want to verify whether women’s with an unfavourable body image would have a greater perception of playfulness when mobile Augmented Reality is present compared to those with a favourable body image. So, women with an unfavourable body image correspond to those whose Body Image’s score is lower than 4.36, while women with a favourable body image will have a score that is higher than this threshold.

By transforming the body image into a dummy variable it was also possible to determine the number of respondents in each of the four conditions (see Table 6):

- presence of AR + low body image (89 participants);
- absence of AR + low body image (106 participants);
- presence of AR + high body image (94 participants);
- absence of AR + high body image (115 participants).

Dummy_BodyImage	AR	N
0	0	106
	1	89
	Total	195
1	0	115
	1	94
	Total	209
Total	0	221
	1	183
	Total	404

Table 6: number of participants in each experimental condition

3.2.4 Independent t-test

From this point, the statistical analyses carried out are inferential, since they are used to draw conclusions or inferences about characteristics of populations based on data from a sample. Inferential statistics includes making inferences, hypothesis testing, and determining relationships.

Given the presence of two samples (one taking part into the AR scenario and the other one taking part into a simple website-based shopping experience) with no relation between them (people were

randomly assigned to a single group), the independent sample t-test seemed to be the most appropriate method to test the first hypothesis, which describes the main relationship between the independent variable (presence or absence of mobile AR) and dependent variable (Willingness To Buy).

In particular, this is a one-sided or directional hypothesis, as the purpose is to demonstrate that a group mean is higher than another group mean. With regard to the procedure for testing the main effect hypotheses, the ultimate aim is to verify that the mean value of willingness to buy is statistically different between the two samples. A confidence interval of $\alpha = 0.95$ was used for all analyses. Therefore, the research hypothesis can be confirmed if the p-value is lower than $\alpha = 0.95$: in this case, it is possible to reject the null hypothesis (H_0), which states that there is no significant difference in purchase intentions between women who experienced the AR scenario and those who did not experience it. Thus, the following are the hypotheses that describe the main effect of this research project:

H₀ The mean of women who experienced mobile Augmented Reality is NOT significantly different than the mean of women who did not experience mobile Augmented Reality for willingness to buy a make-up product.

H_a The mean of women who experienced mobile Augmented Reality is significantly different than the mean of women who did not experience mobile Augmented Reality for willingness to buy a make-up product.

Willingness To Buy mean in case of absence of mobile AR is equal to 3.310 (see Table 7), while in case of presence of mobile AR results to be 4.098: for this difference to be considered significant, the p-value generated by the t-test must be less than the confidence level.

Group Statistics					Std. Error Mean
	AR	N	Mean	Std. Deviation	
WTB	0	221	3.3107	1.53017	.10293
	1	183	4.0984	1.94554	.14382

Table 7: t-test output (1)

As it is possible to notice from the SPSS output below, the p-value is lower than 0.05 since 2-tailed Sig. is equal to $0.000 < 0.05$ with 402 degrees of freedom, leading us to reject the null hypothesis. It is important to underline that the chosen p-value corresponds to the case in which equal variances

between groups are not assumed: indeed, the null hypothesis of Levene's Test for Equality of Variances assumes equal variances between the two samples. However, this hypothesis has been rejected since p-value is equal to $0.000 < 0.05$.

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
WTB	Equal variances assumed	19.397	.000	-4.554	402	.000	-.78765	.17297	-1.12769	-.44761
	Equal variances not assumed			-4.454	341.973	.000	-.78765	.17686	-1.13552	-.43979

Table 8: t-test output (2)

Thus, women's willingness to buy a make-up product is evaluated as being significantly higher in case of presence of mobile AR than in case of absence of mobile AR ($M_{WTB_presence_AR} = 4.098$, $SD = 1.946$; $M_{WTB_absence_AR} = 3.310$, $SD = 1.530$, $t(342) = -4.55$, $p < 0.000$). Therefore, the manipulation of the independent variable was successful.

3.2.5 Moderated Mediation analysis with PROCESS Model 7

The last phase of the data analysis is focused on the study of the moderate mediation model through the use of PROCESS SPSS Macro (MacKinnon, D. P., Fairchild, A. J., Fritz, M. S., 2007): in particular, the PROCESS model used is model 7, which is suitable for cases of moderate mediation in which the moderator influences the relationship between the independent variable and the mediator, and is therefore in the "left-hand side" of the research model.

The moderated median model is based on regression assumptions, which are linearity of the relationship between the independent variable and the dependent variable, normal distribution of the

groups, homoscedasticity of the groups, uncorrelatedness of the groups, absence of strong multicollinearity, appropriateness of the scale and absence of extreme outliers.

Before proceeding with the analysis, it is important to clarify the difference between moderating and mediating variable: the moderator is the one that influences the form and strength of a relationship between two other variables (it specifies when certain effects will hold), while the mediator explains the relationship between two other variables (it specifies how or why such effects occur) (Bennett, J. A., 2000).

The index of moderated mediation (see Table 9) tests whether we have an indirect effect that is moderated or not by some variables: since we do not know the distribution of this index and, thus, the associated p-value, it is necessary to rely on the “Bootstrapping technique”. Therefore, to test whether this index is significantly different from zero, we can look at the bootstrap confidence interval reproduced in the SPSS output and represented by “BootLLCI” and “BootULCI” values (see Table 9): for the index to be significant, the zero should not be included in this interval. Thus, given that the two values are both negatives, it is possible to conclude that we have a significant moderated mediation model.

Index of moderated mediation (difference between conditional indirect effects):				
	Index	BootSE	BootLLCI	BootULCI
Dummy_Bo	-1.351	.249	-1.845	-.870

Table 9: Index of moderated mediation

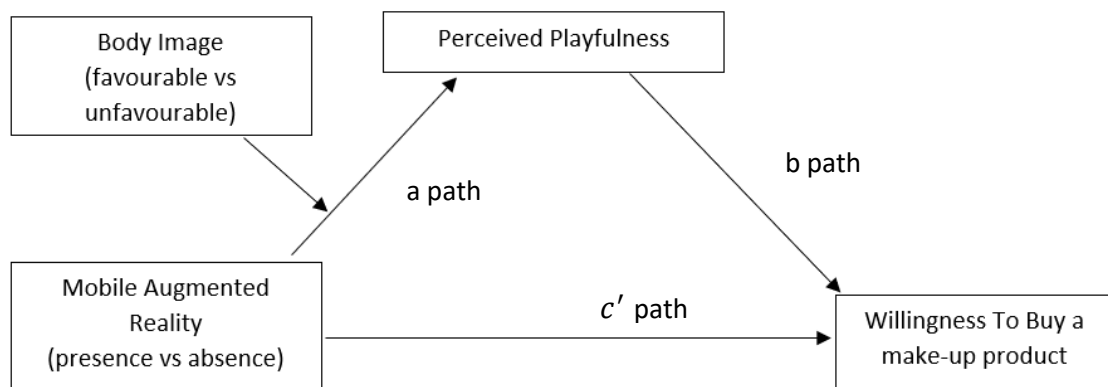
Next, we look at the indirect effect of the independent variable on the dependent variable (see Table 10): in this case, we have a significant and positive indirect effect only for the first value of the moderator, which corresponds to women with an unfavourable body image (ab=1.56, CI (1.151; 1.968)), while the effect is not significant for the second value of the moderator (ab=0,20, CI (-0.87; 0.497)).

INDIRECT EFFECT:

AR	->	PERCEIVE	->	WTB	
Dummy_Bo		Effect	BootSE	BootLLCI	BootULCI
.000		1.553	.208	1.151	1.968
1.000		.202	.147	-.087	.497

Table 10: Indirect effect of X on Y

However, the mediation model also includes a direct effect of the independent variable on the dependent one (“c’ path”, see Figure 6). If from the analysis the direct effect of the independent variable turns out to be non-significant and the indirect effect of the mediating variable (“a path” and “b path”, see Figure 6) turns out to be significant, this would mean that the mediation detected is a total or full mediation, explaining 100% of the effect on the dependent variable; otherwise, if a level of significance were also found for the independent variable, the mediation obtained would be partial.



By looking at the table below, it is possible to notice that in this specific model we have a full mediation: indeed, the direct effect of X on Y is not significant, and this can be detected by both seeing the p-value ($t = -0.486$, $p = 0.627 > 0.05$) and the confidence interval, which contains the zero (CI (-0.335; 0.202)).

Therefore, the mediator is able to totally explain the main relation: the only way that mobile AR has to influence the intention to buy a cosmetic product of women with an unfavourable body image is through the perception of playfulness.

Direct effect of X on Y

Effect	se (HC4)	t	p	LLCI	ULCI
-.066	.137	-.486	.627	-.335	.202

Table 11: Direct effect of X on Y

After that, we individually look at the two components of the model: firstly, the regression model for the moderated “a path”, and then at the regression model for the “b path” and the “c’ path”. In the first case, the outcome variable would be the mediator (Perceived Playfulness); in the second case, it would be the dependent variable (Willingness to Buy).

The most relevant information of the moderated “a path” is contained in the model outcome and is the interaction between the independent variable and the moderator (see Table 12): this interaction is significant ($t = -5.695$, $p = 0.000 < 0.05$), so we can confirm that the moderating effect is significant. Moreover, the relation between the independent variable and the mediator is positive and significant ($t = 8.353$, $p = 0.000 < 0.05$): compared to women who did not experience mobile AR, women who experienced mobile AR presents a significantly higher perception of playfulness (coeff = 0.851).

Model Summary						
	R	R-sq	MSE	F (HC4)	df1	df2
	.429	.184	1.709	26.818	3.000	400.000
Model						
	coeff	se (HC4)	t	p	LLCI	ULCI
constant	3.363	.119	28.231	.000	3.129	3.597
AR	1.756	.210	8.353	.000	1.343	2.169
Dummy_Bo	.851	.159	5.351	.000	.538	1.163
Int_1	-1.527	.268	-5.695	.000	-2.055	-1.000

Table 12: “a path” model summary

In order to understand how much variance the interaction between the independent and the moderator is able to explain, it is possible to look at the “R2-chng” value, also known as the “R-square increase due to interaction” (see Table 13): this is a part of the whole R-square value, and represents a fundamental parameter in a moderation analysis, because it gives us the effect of the moderation beyond and while controlling for the main effect. In this case, 7% of the variance of the mediator is explained by the interaction between the independent variable and the moderator.

Test(s) of highest order unconditional interaction(s):					
	R2-chng	F (HC4)	df1	df2	p
X*W	.070	32.437	1.000	400.000	.000

Table 13: R2-chng value

As the interaction is significant, we can examine the conditional effects of the focal predictor at different values of the moderator (see Table 14): consistent with what has been shown in the indirect

effect's table (see Table 10), the interaction is only significant when the dummy moderator assumes the value "0", meaning that only an unfavourable body image can moderate the relationship between the presence of mobile AR and perceived playfulness ($t = 8.353$, $p = 0.000 < 0.05$).

Conditional effects of the focal predictor at values of the moderator (s) :

Dummy_Bo	Effect	se (HC4)	t	p	LLCI	ULCI
.000	1.756	.210	8.353	.000	1.343	2.169
1.000	.229	.167	1.372	.171	-.099	.556

Table 14: Conditional effects of focal predictor at values of W

The same conclusion can also be reached by looking at the chart below, which indicates the levels of perceived playfulness in the 4 different scenarios: the highest level of the mediator is recorded in the case of the presence of mobile AR + unfavourable body image (5.12), while the lowest level corresponds to the case of absence of mobile AR + unfavourable body image (3.36).

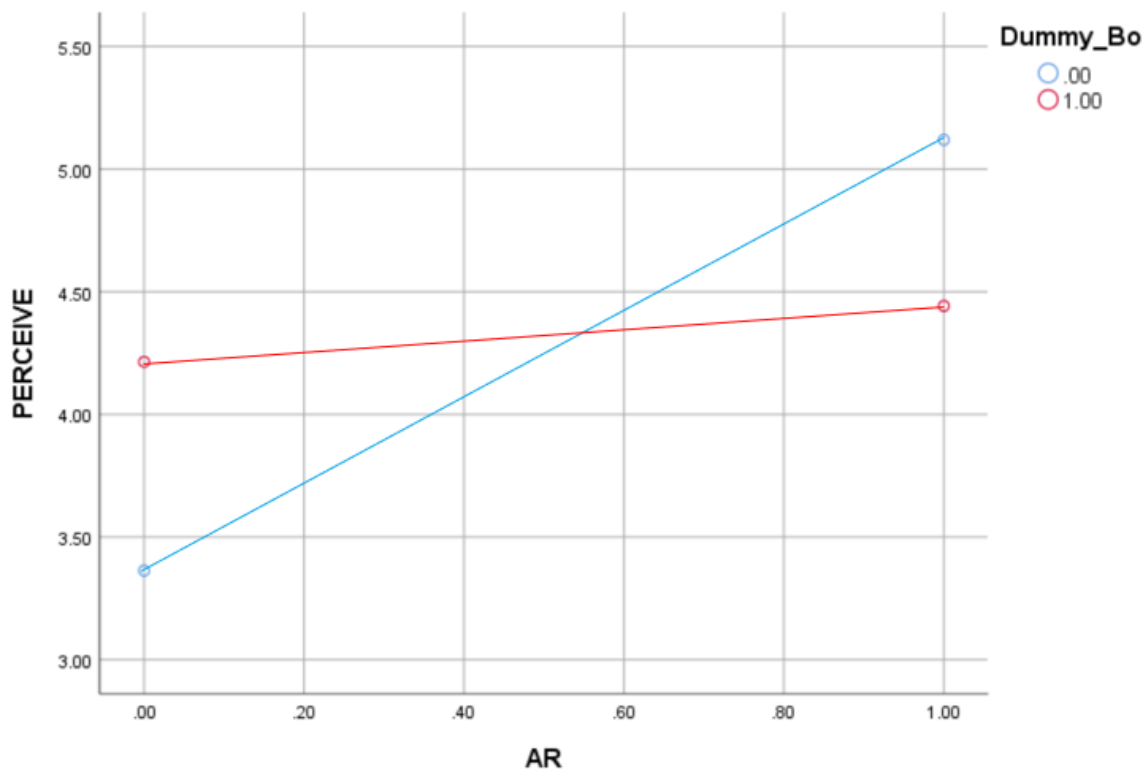


Chart 4: Level of Perceived Playfulness in the 4 scenarios

Finally, we analyse the model for the "b path" and the "c' path". The significance of the "b path" can be checked by looking at the p-value of the mediating variable Perceived Playfulness (see Table 15): as anticipated before, we have a significant indirect effect ($t = 19.402$, $p = 0.000 < 0.05$) and a direct

effect that is not significant ($t = -0.486$, $p = 0.627 > 0.05$). Specifically, by looking at the coefficient it is possible to affirm that if the perception of playfulness increases of one unit, women's willingness to buy has an increase of 0.884 points.

Model Summary						
	R	R-sq	MSE	F (HC4)	df1	df2
	.713	.509	1.551	230.851	2.000	401.000
						p
						.000
Model						
	coeff	se (HC4)	t	p	LLCI	ULCI
constant	-.055	.174	-.315	.753	-.397	.288
AR	-.066	.137	-.486	.627	-.335	.202
PERCEIVE	.884	.046	19.402	.000	.795	.974

Table 15: Model summary for the mediation effect

The last thing to look at is the end of the output, representing the Bootstrap results for the entire moderated mediation model (see Table 16): this part synthetise the previous outputs and help us making the final hypothesis discussions.

The effect of the independent variable (presence versus absence of mobile AR) on the mediator (Perceived Playfulness) is significant and positive, as Bootstrap confidence interval's values are both positives. Moreover, given that the interaction between the independent variable and the moderator (Body Image) is significant, we can conclude that there is a moderating effect on the relationship between the independent variable and the mediator: also, as it is highlighted in the table below, the values of the Bootstrap confidence interval are both negatives, meaning that the lower the level of Body Image, the greater the moderating effect would be.

Furthermore, we also have a significant and positive effect of the mediating variable on the dependent variable (Willingness To Buy), since Bootstrap confidence interval's values are both positives.

***** BOOTSTRAP RESULTS FOR REGRESSION MODEL PARAMETERS *****

OUTCOME VARIABLE:

PERCEIVE

	Coeff	BootMean	BootSE	BootLLCI	BootULCI
constant	3.363	3.362	.119	3.128	3.600
AR	1.756	1.755	.210	1.332	2.158
Dummy_Bo	.851	.852	.158	.534	1.165
Int_1	-1.527	-1.528	.265	-2.049	-1.000

OUTCOME VARIABLE:

WTB

	Coeff	BootMean	BootSE	BootLLCI	BootULCI
constant	-.055	-.058	.176	-.405	.286
AR	-.066	-.070	.136	-.337	.202
PERCEIVE	.884	.886	.046	.793	.973

Table 16: Bootstrap results

3.3 Results discussion

The analysis conducted on SPSS lead us to accept all the hypothesis formulated in the research model.

H1. The presence of mobile Augmented Reality will have a greater and more positive influence on women's willingness to buy a make-up product compared to the absence of mobile Augmented Reality.

H2. When mobile Augmented Reality is present, the perception of playfulness will increase. Moreover, the increase in the perceived playfulness will positively influence women's willingness to buy a make-up product.

H3. Women's body image will moderate the relationship between the presence of mobile Augmented Reality and the perceived playfulness. Specifically, women's with an unfavourable body image will have a greater perception of playfulness when mobile Augmented Reality is present, compared to those with a favourable body image.

After a process of data cleaning, analyses of descriptive statistics, transformation of some variables and analyses conducted to check the reliability of the scales, inferential statistics analyses were developed to test the three hypotheses of the model.

For what concern the first hypothesis, through an independent t-test it was shown that the presence of mobile AR significantly and positively influences the intention to buy the cosmetic product ($M_{WTB_presence_AR} = 4.10$), and that this effect is significantly different to that generated by the absence of mobile AR, which causes a below-average level of willingness to buy ($M_{WTB_absence_AR} = 3.310$). This implies that the inclusion of tools such as virtual-try-on is very much appreciated, and is able to bring to the make-up brands' websites a significant improvement in terms of the enjoyment

of the whole experience, making users more inclined to buy the product they have had the opportunity to virtually try out.

The significance of the second and third hypotheses was tested simultaneously and in a single analysis: that of the moderated mediation model through PROCESS Model 7. This analysis revealed that the presence of mobile AR has a significant and positive effect on the perceived playfulness of the online experience ($b = 1.756$), which in turn positively influences women's purchase intention ($b = 0.884$): the second hypothesis regarding the mediation model was therefore largely confirmed, leading us to affirm not only that the mediation model is significant, but also that it is a total mediation since the entire influence of mobile AR on the willingness to buy is explained by the presence of the mediator. This means that the reason why women are more inclined to buy a lipstick when mobile AR is present than when it is absent is solely due to the increased sense of playfulness they felt during the experience. The virtual-try-on emulated by the Instagram filter was therefore able to make the experience more pleasant, smooth, and enjoyable.

Finally, the same considerations are to be made for the moderation model: the psychological variable of Body Image, understood in this specific case as the vision that women have of the appearance of their own face, seems to have a significant interaction with the presence of mobile AR on Perceived Playfulness ($b = -1.527$). To confirm this hypothesis, there is the fact that those who have perceived more the fun side of the online experience are precisely the women with an unfavourable body image within the scenario characterized by the presence of mobile AR: therefore, the more unfavourable is the vision of their face, the greater is the ability to appreciate the playfulness generated by trying a lipstick through an Instagram filter.

These results lead us to make deeper considerations regarding the inclusion of Augmented Reality tools within the websites of cosmetic companies. Indeed, inserting a virtual-try-on brings some advantages that only consumers with certain characteristics are able to appreciate: for those who have little regard for their own appearance, the fact that they do not have to try on make-up in front of a mirror in a physical shop surrounded by many other people may be appreciated. The sense of discomfort is dampened during the online shopping journey: therefore, the presence of virtual-try-ons allows them to avoid an experience that could be a source of embarrassment and discomfort for them, such as trying on make-up in a physical store. With reference to these subjects, the results have demonstrated that the presence of AR helps them to perceive more the sense of enjoyment deriving from a virtual-try-on experience. Therefore, findings support the concept that Augmented Reality acts as a "distractor" of attention: through a defocusing mechanism, the user is led to divert attention from their face and concentrate it on the virtual make-up, making the experience delightful and more evanescent. By doing so, women with an unfavorable body image have no way of entering into a

negative mode that is normally generated by the sight of what they consider to be facial imperfections, and this make them happier about the presence of such a tool. For those with a favorable body image, this mechanism is ineffective as they are already in a positive overall mood.

Moreover, it is also supported the idea that AR help users to envision themselves in the product, making them experiencing future rewards. However, for those who are already satisfied with their external appearance, the benefits of Augmented Reality are not as obvious as in the case of women with a negative body image: their elevated self-confidence and previous product experience for self-decoration allow consumers with a favourable body image to readily envision themselves in the high body-involving products, regardless of the type of media displays (Lindström, A., Berg, H., Nordfält, J., Roggeveen, A. L., Grewal, D., 2016). Therefore it is logical that, for this group of consumers, the benefits of augmented shopping environments seem to be less critical and that no behavioral difference is anticipated between AR and the traditional website.

4. CONCLUSIONS

4.1 Theoretical and managerial implications

In this section we will analyse the results obtained from both a theoretical and an economic-managerial point of view. Three hypotheses have been formulated, all of them reaching a level of significance that can be confirmed: for this reason, some considerations will be made about all of them, in order to extrapolate insights that can be useful to marketing professionals working within the cosmetics industry.

From a theoretical perspective, the present research has contributed to the growing field of augmented make-up product presentations and has enriched the actual literature on the impacts of individuals' level of body image on their purchase intentions into an AR context. It has also provided a better understanding of the crucial role of perceived playfulness, leading marketers to leverage on making the mobile experience more engaging and enjoyable. More precisely, one of the added values of this research is to have taken into account a scenario entirely based on a mobile device: in fact, the only study among those already present in the literature to have carried out an analysis similar to that proposed by the following paper (Yi-Cheon Yim, M., Park, S.-Y., 2019) only took into account a desktop-based scenario. In addition, most studies on virtual-try-ons has only examined one type of product, namely clothing, which leads to the need of considering psychological variables such as body image in a broad sense. In the case of this paper, however, we focus on a specific nuance of the body image construct represented by facial satisfaction, which has previously been used exclusively in clinical contexts or in reference to plastic surgery: it is therefore the first time that the concept of facial satisfaction is used in an Augmented Reality context. But the most interesting finding, which fills the consistent gap represented by the scarcity of studies focused on the analysis of psychological variables in "augmented" contexts different from the virtual-try-ons of clothing, lies in the role assumed by Augmented Reality as a distractor of attention: thanks to the presence of a virtual lipstick, women participating in the online augmented experience feel less insecure about the appearance of their face, precisely because they tend to turn their attention on the make-up product itself. Such a connection between virtual beauty-try-ons and women's vision of their own face is unprecedented in current literature.

From a managerial perspective, this research project has increased the knowledge that firms have about the psychological factors that come into play during online mobile experience, which may affect the final decision. It has also enabled marketing managers to more precisely shape their

promotional strategies when using AR to boost consumer final evaluations: indeed, the study revealed that the presence of an Augmented Reality tool can really make the difference between those who decide to buy the product and those who just visit the website. The implementation of a virtual-try-on that allows users to try the cosmetic before they buy it is therefore strongly recommended: in this way, marketers would not only reduce users' uncertainties about the final result, but also involve them in an experience that will be funny and more likely to be remembered.

Nowadays, cosmetics brands need to make their mark on the minds of consumers in order to remain competitive in the marketplace: so, keeping up with technological evolution is essential. From this point of view, the implementation of a virtual-try-on is a starting point rather than an end point: it is a fundamental element to be included in the value proposition, however it must not risk becoming a tool that only entertains but does not convert. Even if data analysis has shown the practical value of such a tool in increasing users' willingness to buy, marketers need to make sure they integrate it seamlessly into all of online channels, making it an integral part of the buying experience and providing a sense of continuity.

Results further identify the importance of understanding the psychological aspects of a consumer's body image. It was predictable that women with an unfavourable body image would appreciate the Augmented Reality experience more: as they have more insecurities about the outward appearance of their face, they have a greater need for reassurance during the online shopping experience. Since the Instagram filter has the ability to "augment" the appearance of their face (without providing a distorted image of reality, in fact, the only "artificial" element was the colour to be applied to the lip area, without changing the physiognomy of the face), the whole experience was consequently evaluated more positively than those who already have good self-esteem. Moreover, AR enables users to overcome the possible shortcomings of a real purchase situation, such as exposure to others, which might raise a privacy issue, and improve upon a real purchase situation, by observing immediately augmented and enhanced self-images (Ferrer-García, M., Gutiérrez-Maldonado, J., 2012). Therefore, AR might be more appealing to individuals with a less favourable body image. Finally, we have seen how the presence of AR has a corrective effect on the mediation process for those with an unfavourable body image: as a "distractor" of attention, it makes women who feel more insecure about their facial appearance direct their attention from their face to the make-up product, which is the element that stands out most during the virtual-try-on. Thus, thanks to Augmented Reality technology, cosmetic companies will be able to target more those who feel discomfort in trying a makeup product in the physical store, meaning those who have an unfavorable body image.

Lastly, given that women who are most uncertain about the appearance of their face are also those who perceive more the fun side of the mobile AR experience, it would be advisable to create

campaigns precisely targeting this type of women, in order to share this message: to overcome their insecurities while enjoying an entertaining and innovative online experience. Accordingly, we recommend that companies conduct simple surveys that identify their target audience's self-perception of their bodies. As Dove's campaign in recent years has shown, there is still a need to appeal to a sense of acceptance of one's own appearance, helping women to feel beautiful and encouraging them to take more and more part in interactive and playful experiences.

4.2 Limitations for future research

While this current study provides many meaningful findings, it is not immune to limitations. The findings should be interpreted with caution because they are limited to the specific AR context of mobile devices.

Furthermore, our findings are limited to respondents belonging almost exclusively to the 20-25 age group, namely college students. Although they are likely to be the primary target audience for AR-based virtual try-on, they may be more sensitive (and consequently more critical) about their body image, and more innovative than average consumers, which might bias the final results. To support this theory, an earlier study found that an individual's innovativeness has a significant positive impact on their willingness to adopt new technologies (Kim, J., Forsythe, S., 2008). Thus, we recommend conducting further studies focusing on a different target group.

What's more, all the findings were tested using a high body-involving product. Hence, the findings of this study cannot be applied to other AR contexts for products with lower or moderate levels of body involvement. Therefore, future researchers are strongly encouraged to replicate the current study in different media contexts, with a greater range of products, and a broader sample. It would also be interesting to see a comparison between the results based on a lipstick virtual-try-on and the ones obtained from a filter that replicates other kind of cosmetics such as blush or eyeshadow.

Finally, a further contribution to the current literature could be given by the consideration of other variables within the research model that could influence the enjoyment of the whole experience, such as the presence of technical connection problems or the degree of knowledge respondents have about virtual-try-ons.

4.3 Conclusions

After an in-depth study of beauty virtual-try-ons and the associated psychological variables that come into play when experiencing such tools, a research model of moderate mediation was developed

which has led to interesting findings. They consist largely of two parts: firstly, women's body image has a moderating role in consumers' perception of playfulness during an AR online experience; secondly, perceived playfulness has a mediating role between AR scenario and women's willingness to buy a make-up product. More precisely, our results revealed that participants with an unfavourable body image who experienced the AR-based scenario perceived a higher level of playfulness which, in turn, translates into higher purchase intentions than participants with a favourable body image using the traditional website. However, no differences in these measures were found for those with a favourable body image: for them there does not seem to be a relevant difference between the absence and presence of Augmented Reality when it comes to purchasing.

To conclude, the presence of Augmented Reality in users' online shopping journey and the potential impact of psychological variables on the perception of enjoyment of such technological tools is still a rather unexplored field. Only recently, a few studies have been conducted to investigate such issues, but they present many aspects that still need to be adequately analysed. The topic dealt within this research project leaves valuable contributions to the current literature as well as numerous suggestions for future research.

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APPENDIX

Survey Structure

Caro/a rispondente,
grazie per prendere parte a questo progetto di ricerca. Sono una studentessa di Marketing dell'università LUISS Guido Carli, e sto attualmente portando a termine la mia Tesi di Laurea Magistrale.

Il seguente questionario è rivolto a sole donne, ed è compilabile esclusivamente tramite dispositivo mobile.

Le risposte che darai verranno usate solo per scopi accademici, e saranno completamente anonime.

Non esistono risposte giuste o sbagliate: pertanto, ti invito a rispondere nel modo più libero e sincero che puoi. Ci vorranno solamente 5 minuti per portare a termine il questionario.

Ti ringrazio per il tuo tempo e per il tuo impegno.

Instagram check

Hai un account Instagram?

☐ Sì

☐ No

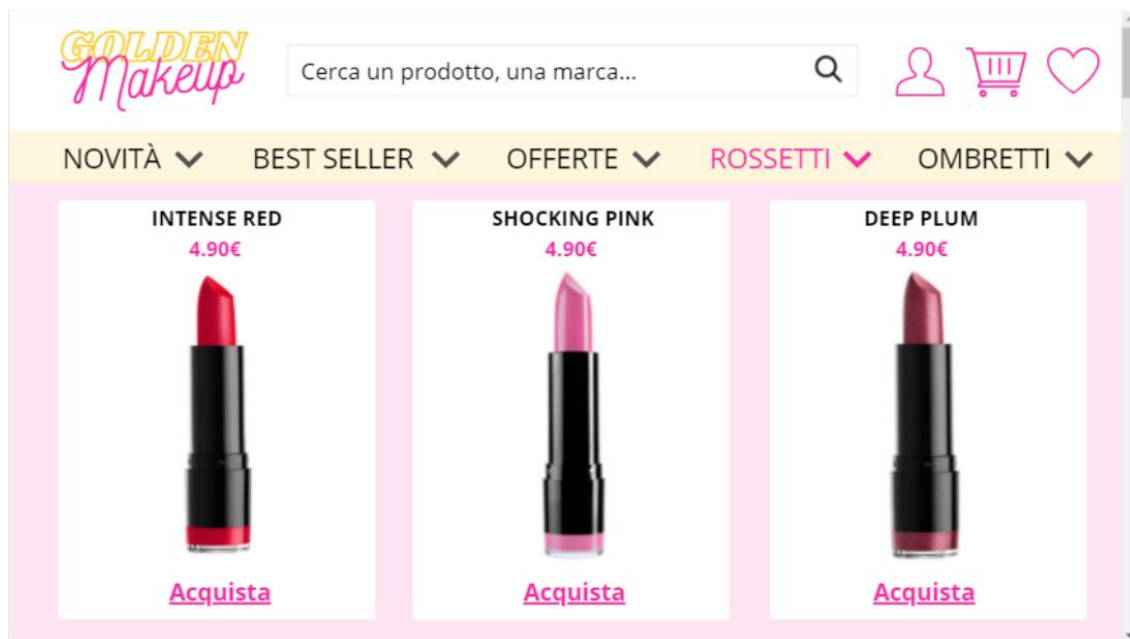
Body Image questions

Indica quanto sei soddisfatta (1 – estremamente insoddisfatta; 7 – estremamente soddisfatta) dei seguenti elementi che caratterizzano il tuo volto:

	Estremamente insoddisfatta - 1	2	3	4	5	6	Estremamente soddisfatta - 7
Il naso	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La pelle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La forma della testa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Le labbra	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L'aspetto generale del volto	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Il profilo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

First scenario – Absence of mobile AR

Immagina di stare cercando un rossetto di Golden Makeup, un brand di cosmetici. Immagina di essere nella pagina dello store online di Golden Makeup e di **valutare l'acquisto** di uno dei rossetti riportati nella pagina.



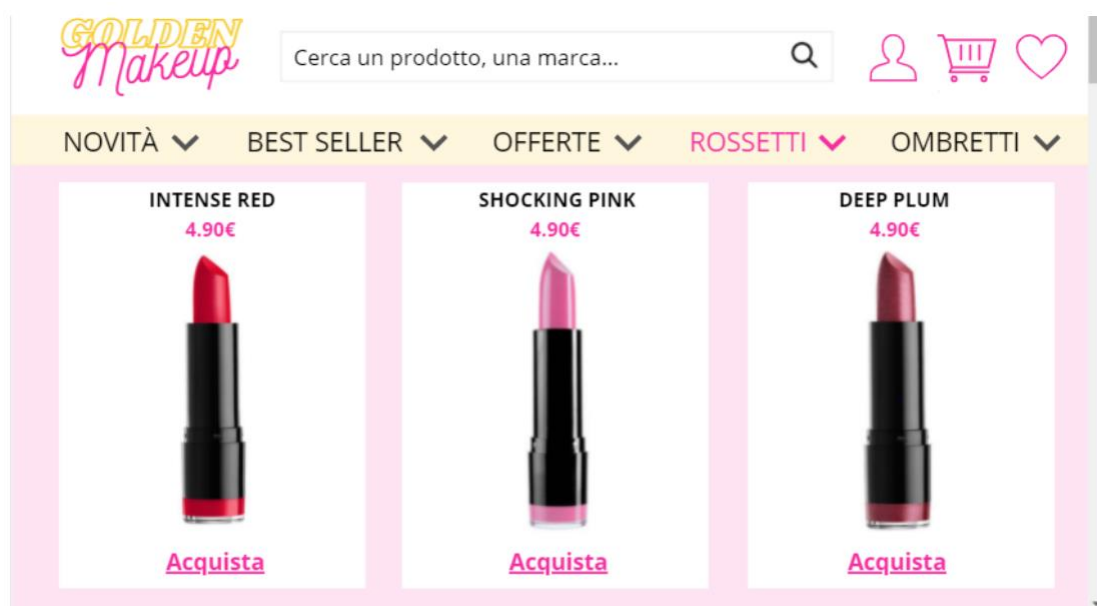
Second scenario – Presence of mobile AR

Immagina di stare cercando un rossetto di Golden Makeup, un brand di cosmetici. Immagina di essere nella pagina dello store online di Golden Makeup e di **valutare l'acquisto** di uno dei rossetti riportati nella pagina. Golden Makeup ti dà anche la possibilità di provare virtualmente i rossetti utilizzando un filtro Instagram.

Istruzioni:

- **Clicca sulla freccia** in basso a destra per visualizzare la pagina dello store online;
- Clicca su "**Clicca qui**" per provare i rossetti;
- Clicca su "**Apri su Instagram**" al centro dello schermo;
- Clicca su "**Continua**" per visualizzare l'effetto;
- Usa la **telecamera interna** del cellulare;
- Fai **tap sullo schermo** per cambiare colore al rossetto. **Prenditi tutto il tempo** che vuoi per provare i rossetti;

- Dopo aver provato il filtro, **torna indietro** usando l'apposito tasto del tuo cellulare **fino a quando non visualizzi la pagina del questionario**;
- Una volta tornato al questionario, **aspetta che appaia la freccia** in basso a destra e **cliccaci sopra** per andare avanti;
- **Se il filtro non dovesse essere subito disponibile, torna al questionario e ripeti i passaggi a partire dal secondo punto.**



[CLICCA QUI](#) PER LA PROVA VIRTUALE!

Perceived Playfulness questions

Ripensando all'esperienza appena vissuta, indica quanto sei d'accordo con le seguenti affermazioni (1 – estremamente in disaccordo; 7 – estremamente d'accordo):

	Estremamente in disaccordo - 1	2	3	4	5	6	Estremamente d'accordo - 7
Prendere parte all'esperienza online mi ha resa felice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mi sono divertita a prendere parte all'esperienza online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Durante l'esperienza online, non mi sono resa conto di nessun suono esterno	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L'esperienza online ha stimolato la mia curiosità	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L'esperienza online ha suscitato la mia immaginazione	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mi ha fatto piacere prendere parte all'esperienza online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Durante l'esperienza online, mi sono dimenticata delle cose che ho da fare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Durante l'esperienza online, non mi sono resa conto del passare del tempo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L'esperienza online ha aumentato la mia voglia di esplorare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Willingness To Buy questions

Indica quanto sei d'accordo (1 - estremamente in disaccordo; 7 - estremamente d'accordo) con le seguenti affermazioni:

	Estremamente in disaccordo - 1	2	3	4	5	6	Estremamente d'accordo - 7
Ho intenzione di comprare almeno un rossetto	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comprerò almeno un rossetto	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C'è una forte possibilità che io possa comprare almeno un rossetto	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Grand Tour questions

Quanto tempo durante la giornata dedichi mediamente all'utilizzo di Internet?

Non lo uso per niente

Meno di un'ora

Due ore al massimo

Dalle due alle quattro ore

Sono sempre connesso

Quanto spesso ti capita di acquistare prodotti di cosmetica online?

Non ho mai acquistato prodotti di cosmetica online

Da 1 a 3 volte all'anno

Da 4 a 7 volte all'anno

Da 8 a 11 volte all'anno

Una o più volte al mese

Che grado di conoscenza hai della Realtà Aumentata nel settore della cosmetica?

Nulla

Scarso

Sufficiente

Buono

Ottimo

Attention check

Seleziona il termine "buono"

Nulla

Scarso

Sufficiente

Buono

Ottimo

Demographics

Genere:

Uomo

Donna

Preferisco non specificare

Età (in numeri)

Qual è la tua attuale occupazione?

Studentessa

Dipendente

Libera Professionista

Imprenditrice/P.IVA

Disoccupata

SPSS Output

Descriptive statistics

		Hai un account Instagram?	Quanto tempo durante la giornata dedichi all'utilizzo di Internet?	Quanto spesso ti capita di acquistare prodotti di cosmetica online?	Che grado di conoscenza hai della Realtà Aumentata nel settore della cosmetica?	Genere:	Età (in numeri)	Qual è la tua attuale occupazione?
N	Valid	404	404	404	404	404	404	404
	Missing	0	0	0	0	0	0	0
Mean		1.04	4.20	2.43	2.43	2.01	24.6881	1.54
Median		1.00	4.00	2.00	2.00	2.00	23.0000	1.00
Std. Deviation		.195	.767	1.079	1.124	.099	6.37744	1.031
Minimum		1	2	1	1	2	15.00	1
Maximum		2	5	5	5	3	58.00	5

Hai un account Instagram?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sì	388	96.0	96.0	96.0
	No	16	4.0	4.0	100.0
	Total	404	100.0	100.0	

Quanto tempo durante la giornata dedichi mediamente all'utilizzo di Internet?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Meno di un'ora	8	2.0	2.0	2.0
	Due ore al massimo	62	15.3	15.3	17.3
	Dalle due alle quattro ore	174	43.1	43.1	60.4
	Sono sempre connesso	160	39.6	39.6	100.0
	Total	404	100.0	100.0	

**Quanto spesso ti
capita di acquistare prodotti di cosmetica online?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non ho mai acquistato prodotti di cosmetica online	76	18.8	18.8	18.8
	Da 1 a 3 volte all'anno	168	41.6	41.6	60.4
	Da 4 a 7 volte all'anno	93	23.0	23.0	83.4
	Da 8 a 11 volte all'anno	46	11.4	11.4	94.8
	Una o più volte al mese	21	5.2	5.2	100.0
	Total	404	100.0	100.0	

**Che grado di
conoscenza hai della Realtà Aumentata nel settore della cosmetica?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nulla	95	23.5	23.5	23.5
	Scarso	139	34.4	34.4	57.9
	Sufficiente	84	20.8	20.8	78.7
	Buono	74	18.3	18.3	97.0
	Ottimo	12	3.0	3.0	100.0
	Total	404	100.0	100.0	

Genere:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Donna	400	99.0	99.0	99.0
	Preferisco non specificare	4	1.0	1.0	100.0
	Total	404	100.0	100.0	

Età (in numeri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15.00	1	.2	.2	.2
	16.00	4	1.0	1.0	1.2
	17.00	2	.5	.5	1.7
	18.00	15	3.7	3.7	5.4
	19.00	15	3.7	3.7	9.2

20.00	36	8.9	8.9	18.1
21.00	32	7.9	7.9	26.0
22.00	65	16.1	16.1	42.1
23.00	76	18.8	18.8	60.9
24.00	33	8.2	8.2	69.1
25.00	25	6.2	6.2	75.2
26.00	13	3.2	3.2	78.5
27.00	10	2.5	2.5	80.9
28.00	6	1.5	1.5	82.4
29.00	13	3.2	3.2	85.6
30.00	7	1.7	1.7	87.4
31.00	7	1.7	1.7	89.1
32.00	3	.7	.7	89.9
33.00	6	1.5	1.5	91.3
34.00	2	.5	.5	91.8
35.00	4	1.0	1.0	92.8
36.00	5	1.2	1.2	94.1
37.00	4	1.0	1.0	95.0
38.00	4	1.0	1.0	96.0
39.00	2	.5	.5	96.5
40.00	3	.7	.7	97.3
44.00	1	.2	.2	97.5
45.00	1	.2	.2	97.8
47.00	1	.2	.2	98.0
49.00	1	.2	.2	98.3
51.00	1	.2	.2	98.5
52.00	2	.5	.5	99.0
53.00	1	.2	.2	99.3
54.00	2	.5	.5	99.8
58.00	1	.2	.2	100.0
Total	404	100.0	100.0	

Qual è la tua attuale occupazione?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Studentessa	282	69.8	69.8	69.8
	Dipendente	74	18.3	18.3	88.1
	Libera Professionista	17	4.2	4.2	92.3
	Imprenditrice/P.IVA	13	3.2	3.2	95.5
	Disoccupata	18	4.5	4.5	100.0
	Total	404	100.0	100.0	

Reliability analysis – Body Image

Case Processing Summary

		N	%
Cases	Valid	404	100.0
	Excluded ^a	0	.0
	Total	404	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.899	.903	6

Inter-Item Correlation Matrix

	Indica quanto sei soddisfatta dei seguenti elementi che caratterizza no il tuo volto: - L'aspetto generale del volto	Indica quanto sei soddisfatta dei seguenti elementi che caratterizza no il tuo volto: - Il naso	Indica quanto sei soddisfatta dei seguenti elementi che caratterizza no il tuo volto: - Le labbra	Indica quanto sei soddisfatta dei seguenti elementi che caratterizza no il tuo volto: - Il profilo	Indica quanto sei soddisfatta dei seguenti elementi che caratterizza no il tuo volto: - La forma della testa	Indica quanto sei soddisfatta dei seguenti elementi che caratterizza no il tuo volto: - La pelle
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - L'aspetto generale del volto	1.000	.679	.657	.723	.722	.712

Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - Il naso	.679	1.000	.455	.781	.502	.517
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - Le labbra	.657	.455	1.000	.529	.580	.510
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - Il profilo	.723	.781	.529	1.000	.551	.583
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - La forma della testa	.722	.502	.580	.551	1.000	.603
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - La pelle	.712	.517	.510	.583	.603	1.000

Item-Total Statistics

Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
----------------------------	--------------------------------	----------------------------------	------------------------------	----------------------------------

Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - L'aspetto generale del volto	21.54	46.283	.866	.755	.864
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - Il naso	22.17	44.345	.705	.638	.887
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - Le labbra	21.41	48.307	.643	.461	.894
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - Il profilo	22.17	44.872	.777	.688	.874
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - La forma della testa	21.52	46.886	.706	.555	.885
Indica quanto sei soddisfatta dei seguenti elementi che caratterizzano il tuo volto: - La pelle	21.93	46.392	.697	.532	.886

Reliability analysis – Perceived Playfulness

Case Processing Summary

		N	%
Cases	Valid	404	100.0
	Excluded ^a	0	.0
	Total	404	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.940	.941	9

Inter-Item Correlation Matrix

Inter Item Correlation Matrix									
	Durante l'esperienza online, non mi sono resa conto del passare del tempo	Durante l'esperienza online, non mi sono resa conto di nessun suono esterno	Durante l'esperienza online, mi sono dimenticata delle cose che ho da fare	Mi ha fatto piacere prendere parte all'esperienza online	Mi sono divertita a prendere parte all'esperienza online	Prendere parte all'esperienza online mi ha reso felice	L'esperienza online ha stimolato la mia curiosità	L'esperienza online ha aumentato la mia voglia di esplorare	L'esperienza online ha suscitato la mia immaginazione
Durante l'esperienza online, non mi sono resa conto del passare del tempo	1.000	.615	.644	.602	.642	.633	.630	.620	.630

Durante l'esperienza online, non mi sono resa conto di nessun suono esterno	.615	1.000	.621	.492	.501	.546	.511	.523	.551
Durante l'esperienza online, mi sono dimenticata delle cose che ho da fare	.644	.621	1.000	.489	.521	.597	.543	.520	.563
Mi ha fatto piacere prendere parte all'esperienza online	.602	.492	.489	1.000	.848	.737	.722	.661	.733
Mi sono divertita a prendere parte all'esperienza online	.642	.501	.521	.848	1.000	.780	.720	.685	.728
Prendere parte all'esperienza online mi ha resa felice	.633	.546	.597	.737	.780	1.000	.668	.724	.748
L'esperienza online ha stimolato la mia curiosità	.630	.511	.543	.722	.720	.668	1.000	.770	.774
L'esperienza online ha aumentato la mia voglia di esplorare	.620	.523	.520	.661	.685	.724	.770	1.000	.742

L'esperienza online ha suscitato la mia immaginazione	.630	.551	.563	.733	.728	.748	.774	.742	1.000
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Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Durante l'esperienza online, non mi sono resa conto del passare del tempo	34.15	132.464	.759	.599	.933
Durante l'esperienza online, non mi sono resa conto di nessun suono esterno	34.30	136.076	.652	.489	.940
Durante l'esperienza online, mi sono dimenticata delle cose che ho da fare	34.52	135.054	.674	.536	.938
Mi ha fatto piacere prendere parte all'esperienza online	33.41	134.446	.796	.759	.931
Mi sono divertita a prendere parte all'esperienza online	33.56	134.163	.821	.786	.930
Prendere parte all'esperienza online mi ha resa felice	34.01	133.409	.824	.725	.929
L'esperienza online ha stimolato la mia curiosità	33.73	134.325	.807	.722	.930
L'esperienza online ha aumentato la mia voglia di esplorare	34.01	133.246	.791	.689	.931
L'esperienza online ha suscitato la mia immaginazione	33.80	133.203	.830	.725	.929

Reliability analysis – Willingness To Buy

Case Processing Summary

		N	%
Cases	Valid	404	100.0
	Excluded ^a	0	.0
	Total	404	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.955	.955	3

Inter-Item Correlation Matrix

	Ho intenzione di comprare almeno un rossetto	Comprerò almeno un rossetto	C'è una forte possibilità che io possa comprare almeno un rossetto
Ho intenzione di comprare almeno un rossetto	1.000	.909	.857
Comprerò almeno un rossetto	.909	1.000	.859
C'è una forte possibilità che io possa comprare almeno un rossetto	.857	.859	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Ho intenzione di comprare almeno un rossetto	7.35	12.629	.916	.849	.924

Comprerò almeno un rossetto	7.51	12.682	.918	.850	.923
C'è una forte possibilità che io possa comprare almeno un rossetto	7.15	13.245	.878	.771	.952

Independent t-test

Group Statistics					
	AR	N	Mean	Std. Deviation	Std. Error Mean
WTB	0	221	3.3107	1.53017	.10293
	1	183	4.0984	1.94554	.14382

Independent Samples Test										
Levene's Test for Equality of Variances				t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
WT B	Equal variances assumed	19.397	.000	-4.554	402	.000	-.78765	.17297	-1.12769	-.44761
	Equal variances not assumed			-4.454	341.973	.000	-.78765	.17686	-1.13552	-.43979

PROCESS Model 7

Model : 7
Y : WTB
X : AR
M : PERCEIVE
W : Dummy_Body

Sample
Size: 404

OUTCOME VARIABLE:
PERCEIVE

Model Summary							
	R	R-sq	MSE	F(HC4)	df1	df2	p
	.429	.184	1.709	26.818	3.000	400.000	.000

Model						
	coeff	se (HC4)	t	p	LLCI	ULCI
constant	3.363	.119	28.231	.000	3.129	3.597
AR	1.756	.210	8.353	.000	1.343	2.169
Dummy_Body	.851	.159	5.351	.000	.538	1.163
Int_1	-1.527	.268	-5.695	.000	-2.055	-1.000

Product terms key:

Int_1 : AR x Dummy_Body

Test(s) of highest order unconditional interaction(s):

	R2-chng	F(HC4)	df1	df2	p
X*W	.070	32.437	1.000	400.000	.000

Focal predict: AR (X)
Mod var: Dummy_Body (W)

Conditional effects of the focal predictor at values of the moderator(s):

Dummy_Body	Effect	se (HC4)	t	p	LLCI	ULCI
.000	1.756	.210	8.353	.000	1.343	2.169
1.000	.229	.167	1.372	.171	-.099	.556

Data for visualizing the conditional effect of the focal predictor:

Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/

AR Dummy_Body PERCEIVE .

BEGIN DATA.

.000 .000 3.363

1.000 .000 5.119

.000 1.000 4.214

1.000 1.000 4.442

END DATA.

GRAPH/SCATTERPLOT=

AR WITH PERCEIVE BY Dummy_Body .

OUTCOME VARIABLE:

WTB

Model Summary

	R	R-sq	MSE	F(HC4)	df1	df2	p
	.713	.509	1.551	230.851	2.000	401.000	.000

Model

	coeff	se (HC4)	t	p	LLCI	ULCI
constant	-.055	.174	-.315	.753	-.397	.288
AR	-.066	.137	-.486	.627	-.335	.202
PERCEIVE	.884	.046	19.402	.000	.795	.974

***** DIRECT AND INDIRECT EFFECTS OF X ON Y *****

Direct effect of X on Y

Effect	se (HC4)	t	p	LLCI	ULCI
-.066	.137	-.486	.627	-.335	.202

Conditional indirect effects of X on Y:

INDIRECT EFFECT:

AR -> PERCEIVE -> WTB

Dummy_Body	Effect	BootSE	BootLLCI	BootULCI
.000	1.553	.208	1.151	1.968
1.000	.202	.147	-.087	.497

Index of moderated mediation (difference between conditional indirect effects):

	Index	BootSE	BootLLCI	BootULCI
Dummy_Body	-1.351	.249	-1.845	-.870

***** BOOTSTRAP RESULTS FOR REGRESSION MODEL PARAMETERS *****

OUTCOME VARIABLE:

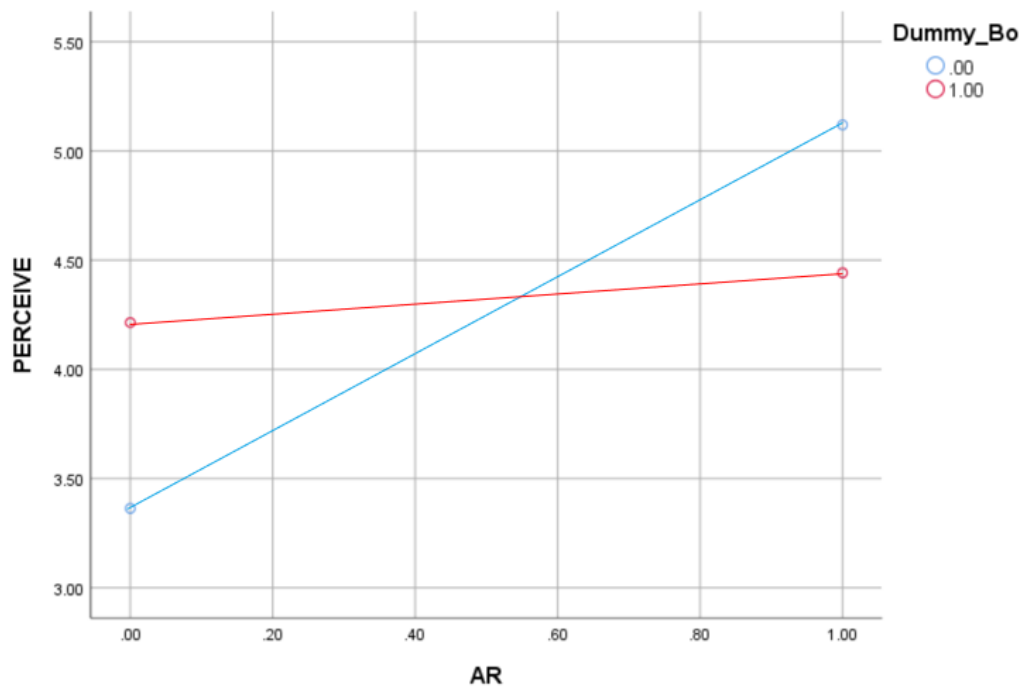
PERCEIVE

	Coeff	BootMean	BootSE	BootLLCI	BootULCI
constant	3.363	3.362	.119	3.128	3.600
AR	1.756	1.755	.210	1.332	2.158
Dummy_Body	.851	.852	.158	.534	1.165
Int_1	-1.527	-1.528	.265	-2.049	-1.000

OUTCOME VARIABLE:

WTB

	Coeff	BootMean	BootSE	BootLLCI	BootULCI
constant	-.055	-.058	.176	-.405	.286
AR	-.066	-.070	.136	-.337	.202
PERCEIVE	.884	.886	.046	.793	.973



Interviews

Interview n.1

What is your name?

Fariza Yaha.

Have you worked or do you work for companies operating in the beauty sector? If so, which ones?

Yes, in Limoni and Naima.

What is your role in these companies?

I am the owner of several franchisees for these companies, and I manage the various points of sale.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I used it about five years ago on what was called the "magic mirror" in London. Basically this app was inside the store and it sold all kinds of make-up. Everything revolved around this mirror that allowed you to see the makeup directly on your face in the middle of the shop. It was very much like a show! Then more recently I also tried the Mac Cosmetics app with Augmented Reality built in, and I have to say that the make-up rendering is much better than it was five years ago!

What do you think about Virtual Try On based on the use of Augmented Reality?

It is almost like a game, funny and entertaining, and if it is not managed optimally in terms of customer service, there is a risk that it will not lead to a sale. The risk is that it becomes just a game, but does not lead to anything concrete, and this is especially true for online channels, because it is easier to provide assistance in the shop. So you have to pay a lot of attention to the functions that you put in the Augmented Reality app, which have to guarantee a certain ease of use of the service.

In your opinion, what is the potential of this technology with regard to the beauty sector?

Theoretically very high, but in practice no shop in the last five years has been able to maintain it continuously but only for promotional purposes, so I assume it has not been a great success for what concerns physical and traditional channels. I read a lot of potential for digital channels, they are the future!

In your opinion, what is the level of usability of this service? Are there certain contexts that favour the use of such technology more than others?

There are essentially two uses. You can choose to use the app online: this is often the case when you are on your own and have the desire and time to try out lots of products without leaving home, which I personally find fantastic and very convenient! Thanks to Augmented Reality, there is much more fun in having an online experience. The second use is offline, i.e. in public in a shop, perhaps with your friends: here there is a risk that the sense of "play" is somewhat dampened by the context of the point of sale. If, for example, you are in a classic perfumery, you are unlikely to be able to let go completely and enjoy yourself.

So again, would you prefer the online shop to the physical store?

Yes, I would say that there is more money to be made from online sales because the user does not feel constrained by his surroundings and does not feel the pressure of time passing. Of course, in a physical store you do not have the possibility to try the app for as long as you want, but when you open the app from your mobile phone you have much more freedom, and the whole experience is more pleasant and, if you like, more intimate.

From your point of view, what factors could be causing consumer resistance to using this technology?

The beauty sector, as far as classical perfumery is concerned, is linked to a target of customers who belong to a fairly high age group, whereas the younger target group has difficulty in frequenting perfumery. So the most modern technology has much less appeal to baby boomers. In addition, those who are used to receiving continuous assistance, such as in a physical shop, may resist.

But beyond the age factor, on which companies have little chance to act, do you think there could be other dimensions that play a crucial role and that you can leverage?

I honestly think that the biggest obstacle is the technical functionality of the app. Kids have less and less patience and tend to judge an experience where they have to wait very negatively, so if the app does not work perfectly from the point of view of the speed with which the content loads, you risk losing the customer.

Another thing that can cause resistance is why you wear make-up: to highlight certain parts of your face that you think are beautiful, to hide a part of your face or even to reject a part of your face. In these cases we are dealing with psychological problems, and it is likely that the client will not want to have her image reflected and flaunted in front of her, and consequently may not appreciate the fun side of the experience either. In these cases either the company does nothing, and then loses the

customer who will at best buy the products in the physical shop, or it focuses on marketing and a message of self-acceptance.

Tell me more about this aspect, what could marketing do to encourage the use of Augmented Reality apps in the case of women who have difficulties in liking themselves?

For example, you can highlight a positive side: the fact that, through the app, the company is trying to communicate as transparently as possible with its customers. It is proof that the company wants to establish a more intimate relationship with them. The customer should almost feel safe while trying on the make-up from the app: the aim is that these positive feelings compensate for the negative feeling of non-acceptance of oneself. And in addition, you can promote campaigns like the one created by Dove focused on the acceptance of one's own beauty, which has also been very successful.

I believe these are all very good points to think about. I would also like to ask you what you think are the main strengths of this technology. What is fascinating for the consumers who use it?

The best thing is to play down the sale and make it like a game. And then the positive side is also the speed with which it is done! When you are in a shop and you have to try on several lipsticks, each time you have to wipe your lips with the makeup remover, and you still get to the fourth one with swollen, red lips and you cannot try on anything else! With a filter projected directly onto the face, the time taken to try the product is much faster, making the whole process more efficient and the result more effective.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience fun?

It makes the experience both fun and modern, but I have many doubts about the purchase, as I said before, since the experience and storytelling of the staff offering assistance in a shop is something that the app cannot imitate, at least not yet. Compared to a simple app, the risk with Augmented Reality is precisely that of distracting attention from the purchase of the product. But in terms of corporate reputation and engagement, it is certainly a technology to be considered.

Talking about corporate reputation, how much do you think the use of this technology contributes to making the company that uses it seem innovative to consumers?

Definitely a lot. The newer the technology, the more modern it is, the more innovative the image of the company. In the case of AR this association is even stronger, because it is a technology in which the user can really immerse himself or herself and therefore perceive it to the full.

Nowadays, how important is it for a company to appear innovative for customers?

It is crucial. The young customer of today is the customer of tomorrow in economic terms, so investing in youth and technological innovation is what you have to do if you want to be competitive in the long run. Without the right investments in R&D a company cannot hope to last long, and Augmented Reality is one of the latest emerging technologies, so I would definitely recommend incorporating it into the value proposition, especially in the beauty market, where many companies have already done so.

If it were up to you, would you invest more of your company's budget in developing this technology, enhancing online channels, or would you allocate it to traditional sales channels?

As I said earlier, investment in technology is essential, but not only in virtual try-on. The idea of trying out the product through filters can be used both in physical shops and online, although they have a different role: in the first case they serve to give an image of modernity, in the second case they simplify, in terms of speed of the trial, and make it fun. So I think it is a more useful technology in the online channel than in the traditional point of sale. And, in any cases, I would like to point out that today the two channels cannot be considered separately: you cannot develop only one channel without strengthening the other, in fact omnichannel is fundamental to give continuity to the service.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you believe it will be successful later on?

It was already successful before the pandemic, but then there are also cultural differences to consider. In Italy, where there are still traditional perfumeries, it was less successful; in France and England, on the other hand, where traditional perfumeries hardly exist anymore, it was more successful.

So the cultural factor also played an important role.

Of course, even though the reason for buying is different from one country to another. However, the pandemic has certainly favoured remote technologies such as Virtual Try On, but I believe that, even without the pandemic, these technologies would have caught on. In any case, in our sector we sell hedonic products that people do not really need, but which represent more of a 'luxury': so I am in favour of technology and virtual, but without first being able to fill that void of the customer deriving from the fact of not needing the product...you do not go anywhere!

Interview n.2

What is your name?

Luisa Saggiomo.

Have you worked or do you work for companies operating in the beauty sector? If so, which ones?

Yes, at L'Oréal Italia.

What role have you held in this company?

I am Product Management Assistant for Yves Saint Laurent beauty in the skin care, fragrance and make-up divisions.

Have you ever heard of Augmented Reality and Virtual Try On?

Yes, I have. Virtual Try On is a very current topic, I know it is used in facial recognition and that many companies have integrated it into their websites to allow users to see the make-up directly on their face.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I tried it on the Yves Saint Laurent beauté website. I uploaded my picture, but sometimes I also directly activated the camera of my PC or mobile phone and saw the effect of the various products on my face. I found it particularly useful because of the speed of use, which is impossible to have when trying make-up in a physical shop.

What do you think about Virtual Try On apps based on the use of Augmented Reality?

I think they are tools that integrate the consumer's purchasing process. I think they are very useful, especially in this particular historical period since they make up for the impossibility of going to the point of sale. It is certainly a very engaging tool for the consumer, which also has a positive impact on brand awareness and consumers' consideration of the brand in general.

In your opinion, what is the potential of this technology with regard to the beauty sector?

The big potential of this technology is limited to a specific part of the consumer's funnel, namely brand awareness and consideration. But when it comes to purchasing, I think most of the decisions regarding make-up are still made at the point of sale. Also, I think the usage is limited for some products: it may work much more for a lipstick, but it is less applicable for a mascara. So the effectiveness depends on the type of product.

Beyond the type of product, what do you think is its level of usability? Are there certain contexts that favour the use of such technology more than others?

Certainly, the historical period has favoured these new technologies. Moreover, it is much more comfortable to use the application at home than when you are out and about.

From your point of view, what factors might cause consumer resistance to the use of this technology?

Some of the resistance may be related to privacy issues, i.e. the consumer's fear that data and images may be processed in a way that does not comply with regulations. In addition, there may also be a certain mistrust on the part of consumers in trusting these technologies because they give a limited vision of the products: trivially, they may need to feel the texture of the product, its smell or otherwise have a more sensory experience before proceeding with the purchase, and in this case, it is intuitive to understand that the app has many limitations.

What do you think are the main strengths of this technology? What appeals to the consumers who use it?

Definitely the level of innovation. It is a very new technology, and this impresses the consumer, who is also more inclined to try a product that they might not try otherwise, for example in a physical store. It is a new experience, which completes the buying process and makes it certainly appealing, and it is also a good substitute when you cannot go to the shop and buy a product that you already know and have more certainty about. From this point of view, I think it is a tool that completes the customer journey.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

As I said before, I think it encourages and facilitates the purchase intention if you want to buy online a product that you already have a certain level of knowledge and information about. However, at the same time I think that most of the decisions are still made at the point of sale, so I think Augmented Reality facilitates the purchase intention more than the purchase itself, because it allows the consumer to arrive at the physical store already with an initial idea of the product that has been made possible thanks to Augmented Reality, and this enriches the information process. In addition, the fun side of Augmented Reality is certainly what strikes the consumer most of all, but this sense of fun is not always enough to make them buy a product. In fact, I think it is very likely that it will not lead to a purchase. It is the main weakness of this technology.

Do you think that the use of this technology contributes to making the company using it look innovative in the eyes of consumers?

Yes, definitely. It reflects one hundred per cent on the brand, which is perceived as more innovative, although nowadays it is difficult to surprise the consumer in terms of innovativeness. The more technology evolves, the more the consumer expects to find this innovation in the brand whose products he is buying. So it is something that cannot really be missing from a company's value proposition.

If it were up to you, would you invest more of your company's budget in developing this technology, enhancing online channels, or would you allocate it to traditional sales channels?

Honestly, I would allocate a small part of the budget to develop this new technology, and the largest part to traditional sales channels. In my opinion, point-of-sale animations are much more effective than this tool.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you think it will be successful later on?

Yes, I think that the pandemic has contributed to the explosion in the use of these technologies, and I also think that in the future it will continue to have a role as an integration tool in the purchasing process. I am very sceptical, however, about its effectiveness: I think it will fade a little bit in terms of consumer conversion when we will be able to go back to the shops without fear.

Interview n.3

What is your name?

Alessia Alibrio.

What is your current occupation?

I am a university student.

Have you ever heard of Augmented Reality and Virtual Try On?

Yes, I have a good knowledge of these technologies. I have often heard about them, especially in relation to make-up products.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I used Makeup Genius from L'Oréal. Usually I use this kind of app to modify photos that I already took, in order to compare easily different make-up. I take a photo without filters, then I open the app and modify it. It is easy and funny, and I do not need to always have my make-up on. Some other time I use this kind of app to take selfie and it is very fun because I can try on different make-up styles

What do you think about Virtual Try On apps based on the use of Augmented Reality?

I think it is very useful. I am not the kind of person that enters to a Sephora shop and asks shop assistants to try the make-up on me, or even some advice. With virtual try-on, I can see which colours fit me better, I can try many of them and compare them more easily.

What do you think is its level of usability? Are there certain contexts that favour the use of such technology more than others?

I think it is very easy to use. The only problem could be the internet connection, but if the app works also offline it is easily accessible everywhere by everyone.

From your point of view, what factors might cause consumer resistance to the use of this technology?

Maybe some consumers do not think it is reliable and think that when they actually wear that make-up they will look different. For example, the colour of a lipstick might change depending also on how much product you use, and it is not possible to make this kind of distinction through an app. Plus, some consumers might think that the good effect of that make-up is attributable to technology and not on the real features of the product.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

I think that it makes the experience really fun and that consumers would be more engaged towards the brand. Despite this, this technology is not actually reliable to me. I would rely more on a traditional photo of the make-up on a model rather than trying it in this way.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you think it will be successful later on?

I think that with the pandemic virtual try on technology has been used more frequently if related to the past, and I think that consumers will continue using it. Even with the end of the pandemic consumers will keep some of the habits of the shutdown period and virtual try on is very convenient and fast. Why should consumers drop it?

Interview n.4

What is your name?

Lavinia De Martis.

What is your current occupation?

I am a Marketing student at LUISS.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I have used these apps several times, especially during the last few months. The one that I used most was the one from MAC Cosmetics. I think it can be described as a "new" and fun experience, but most of all it can be very useful in many cases.

What do you think about Virtual Try On based on the use of Augmented Reality?

In my opinion, it is a very useful tool that allows people to try different types of products in a few seconds, moreover it is an interactive tool and therefore engages the consumer. However, they are not always able to provide an image that is exactly corresponding to the reality of the products. Improvements can be made with respect to the service quality.

In your opinion, what is the level of usability of this service? Are there certain contexts that favour the use of such technology more than others?

Certainly, the current condition that prevents in many cases to go to physical stores has led to a greater use of virtual try on. In general, I believe that these systems have a good level of usability, they can be used wherever and whenever you want to, even if I think that the most appropriate context to use them is inside our homes. However, it is also important to think about the type of product; I'm not sure representation would be effective for everyone in the same way.

From your point of view, what factors could be causing consumer resistance to using this technology?

Consumers who are used to physically trying products may show resistance to using this technology because it does not allow them to fully experience the product. For example, I think that Italian people are not so used to it as Americans are. For many women, not being able to have direct contact with the product might be a limitation, but this is a limitation in general of online shopping. In addition, another relevant factor could be the way each person sees their own image reflected in a camera. The perception of oneself could be different from the one in "reality" through a mirror, so I think this is an important factor to consider.

So do you think there might also be a psychological perspective to consider?

It is inevitable. It may well be that a woman does not like to see her face reflected when deciding which beauty product to buy. She may feel uncomfortable and prefer the traditional website where she just has to look at the pictures of the products to choose one.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you believe it will be successful later on?

There is no doubt that the pandemic has created the ideal conditions for the spread of these technologies, but I believe that if implemented in the right way they can become a widely used tool for many people.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

The aspect of fun and interactivity surely plays a fundamental role in the mind of the consumer who is about to make a purchase. As far as the make-up sector specifically is concerned, it can certainly be perceived by many as a way to at least get an idea of the effect of the product on one's face, and would therefore encourage the purchase of a greater variety of products. We cannot ignore, however, that when it comes to make-up, it is also important that everyone knows how to use the products in the right way, so consumers may not be completely satisfied with the final effect after actually using the product on themselves because they remain "anchored" to the image obtained through the virtual try on.

Interview n.5

What is your name?

Athena Zingrillo.

What is your current occupation?

I am studying Marketing at LUISS.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I tried YouCam Make-Up recently. It is actually an app in which you can access creating an account with your email and then you have the possibility to try on different kind of make-up using

AR. The app accesses your phone camera, and you can take selfies or just watch your image on the screen while wearing make-up. It is really well organised, you can select the areas you want to apply your make up on, different colours and disposal of them...and then there is the possibility to buy what best fits your style.

What do you think about Virtual Try On based on the use of Augmented Reality?

I think it is a very enjoyable and useful service, especially if we consider the period in which we find ourselves in. During this pandemic is indeed almost impossible to physically try on make-up. Virtual try on replaces the brick and mortar try on, leaving the possibility to understand which kind of make-up best suits our complexion and tastes. I also found it extremely funny and entertaining.

In your opinion, what is the level of usability of this service? Are there certain contexts that favour the use of such technology more than others?

I think that the level of usage of this service may depend on the personality of the person using it. Someone who is shyer may find it difficult to use it in public places, when she knows she is being watched, while she may be more inclined to try it in private. Conversely, a more outgoing person may find it more fun to use it with his/hers friends.

From your point of view, what factors could be causing consumer resistance to using this technology?

I think that people may be sceptical about the final rendering. These kinds of apps must be well-designed or using them just feels weird, leading to a bad user experience and the potential loss of the client. This scepticism may also be due to cultural factors: after all, in Italy the use of such technology is not yet considered “normal” when shopping online.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you believe it will be successful later on?

I believe its real success is surely linked with the pandemic. Before the pandemic we did not really pay attention to this kind of technology because we could easily try the product in store. Anyways new habits are being created and its success could persist beyond the end of the covid 19 emergency.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

I think that in this period, coupled with the growing interest of consumers in ordering products online due to the pandemic, it can also encourage the buying process. If I find myself beautiful with certain make up, why shouldn't I buy it?

Interview n.6

What is your name?

Maria Casatelli.

What is your current occupation?

I am a student.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I have used it before. It was an Instagram filter made by Sephora to help you find your ideal foundation colour. I had the option to see different undertones and change them until I found the one that came closest to my skin colour. It was a very cool experience.

What do you think about Virtual Try On based on the use of Augmented Reality?

The first adjectives that come to mind to describe the experience are "helpful" and "visionary", because it's actually a very well-made tool, capable of saving you a lot of time when choosing a product, and also quite innovative compared to what we were used to a few years ago.

In your opinion, what is the level of usability of this service? Are there certain contexts that favour the use of such technology more than others?

I think there are few limits to the level of usability of these applications. The interfaces are easy and intuitive, and the fact that you can use them from your mobile phone means that you can do your make-up test practically anywhere, at any time.

From your point of view, what factors could be causing consumer resistance to using this technology?

Those who are not sure about the quality and reliability of such services may resist. I was personally afraid that the result might not correspond to reality, and this made me reluctant to trust this technology 100%.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you believe it will be successful later on?

Yes, I think it is partly related to the dynamics of the pandemic, but I think it can be successful afterwards. By now everyone is buying products online, especially make-up, and I think these habits can only be further consolidated in the future

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

It certainly makes it a lot more fun, and I think it may also encourage people to buy the product. However, I think the fun side is a necessary but not sufficient element in terms of conversion rate: you can leverage the fun side, but you also need that to be enriched by the feeling of using a tool that is useful as well as fun.

Interview n.7

What is your name?

Emanuela Simeone.

What is your current occupation?

I am studying Communication Sciences at La Sapienza.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I used it. It was MAC's app, which allowed me to try lipsticks through different filters before I could buy them. Now that we don't have the chance to go to the shop and try them out, these apps have become indispensable to me.

What do you think about Virtual Try On based on the use of Augmented Reality?

I think the virtual try on is a useful, accessible and fun service, which I only discovered recently because of the pandemic, but I plan to continue using it afterwards. Sometimes I even enjoy just trying out different make-ups without the purpose or need to buy them. I like to try out different effects and shades, and if I really find one that strikes my fancy I sometimes even go ahead and buy it.

In your opinion, what is the level of usability of this service? Are there certain contexts that favour the use of such technology more than others?

As I just said, I think it is really easy to access such a service. You really just download the app on your mobile phone and that's it. The only contexts that I think are not conducive to using these apps are those where the user cannot access a stable Internet connection. I personally like to use these apps when I'm alone at home and not busy with other things to do, because it is fun and a great way to pass the time.

From your point of view, what factors could be causing consumer resistance to using this technology?

In my opinion, a possible resistance can be generated when you are not particularly informed about the features of these applications, and you fear either that your information (such as the photos you upload) can be used for other purposes, or that simply the 'augmented' effect does not correspond to the actual one.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you believe it will be successful later on?

I believe that it will also be successful later on. The pandemic has only accentuated the need we had for these tools, and now that we're starting to incorporate them into our routine I think it's hard to change that.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

I think the Augmented Reality experience is far more fun and interactive, and also useful for purchasing. Between a traditional website and one with Augmented Reality, I would prefer the latter for purchasing a product.

Interview n.8

What is your name?

Martina Ruscio.

What is your current occupation?

I work in a perfumery.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I had the opportunity to use YouCam Makeup and to try on eyeshadows and lipsticks. It was pretty useful and easy to use.

What do you think about Virtual Try On based on the use of Augmented Reality?

I think that it is an entertaining way to shop online. In the specific case of YouCam Makeup, I could both try different combination of colours and rely on some suggested combinations. It was funny and useful.

In your opinion, what is the level of usability of this service? Are there certain contexts that favour the use of such technology more than others?

For sure the context that can stimulate this experience more than others is represented by our homes. One of the main advantages of such technology is that you have the opportunity to try on the make-up product whenever and wherever you want, without temporal or spatial limitations. If I want to buy an eyeshadow and I need to see how it would look on my face but I do not have the time to go in a physical shop, I can decide to open this app and try it at any time, even at midnight.

From your point of view, what factors could be causing consumer resistance to using this technology?

I believe that a possible issue concerning this technology is that we are still a little bit sceptical about the quality of such services. The first time you decide to buy a make-up after having virtually tried it on you have to take into account that there is the risk that the result showed in the virtual-try-on may not correspond to the reality. This is not my case, but I think that many other people might think twice about it before proceeding with the purchase.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you believe it will be successful later on?

I discovered this tool during the pandemic, but I also believe that I would probably keep using it in the future. It has so many advantages compared to the traditional in-store shopping or to online-shopping without the virtual-try-on experience. Once you start using it, it is difficult to change this habit.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

I think the most characteristic feature of such an experience is the fun side of it, but I'm not sure it really makes a difference at the purchase level. However, compared to an experience without Augmented Reality, I think it has an added value.

Interview n.9

What is your name?

Elisa Fiore.

What is your current occupation?

I am a student at LUISS.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

Yes, I tried GLAMlab several times using my mobile phone camera. Among many make-up sections, I have always only tried eyeshadows, and I also bought a product once.

What do you think about Virtual Try On based on the use of Augmented Reality?

I think that it something that every firm should include in its range of services because I found it extremely effective and funny to use. It is a way to keep the consumer in contact with the products even when there is no possibility to go to the physical store, and it makes the whole shopping experience more entertaining and delightful.

In your opinion, what is the level of usability of this service? Are there certain contexts that favour the use of such technology more than others?

I think that virtual-try-ons have the characteristic of being experienced anywhere, but I certainly think that the most suitable context is one's own home. As far as I'm concerned, since it's an experience I really like to do, I prefer to enjoy it when I'm alone.

From your point of view, what factors could be causing consumer resistance to using this technology?

Consumers might resist more for a cultural factor: as I have relatives abroad, I travel a lot and therefore notice certain differences between the way Italians shop and other nationalities. Italians are always reluctant to adopt a new technology or one with which they are not yet familiar, and find it hard to change their habits. So those who are used to trying a product in the physical shop are unlikely to trust such tools.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you believe it will be successful later on?

Personally, I will continue to use these tools even after the pandemic, but I believe that most of their success is anyway due to this historical period when people were forced to stay at home for a long time. I don't think that in the future these tools will remain unused, but neither will they have the popularity they enjoy now.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

As I said before, one of the characteristic traits of virtual-try-ons is the sense of fun one has during such an experience, but I don't see why this should be an obstacle for a possible purchase. It happened to me to buy an eyeshadow after trying it on GLAMlab, as I think it happened to many other girls. Fun is an added value, I think the desire to buy should increase if you have lived an experience that you enjoyed.

Interview n.10

What is your name?

Miriana Paolozzi.

What is your current occupation?

I am a secretary in a cosmetics company.

Have you ever used a make-up app integrated with Augmented Reality? If yes, can you briefly describe the experience?

I once happened to use the Sephora app where I had the option of activating the camera on my mobile phone to view the make-up in 3D directly on my face. It was funny, and I think it was mainly due to the fact that the quality of the virtual product far exceeded my expectations.

What do you think about Virtual Try On based on the use of Augmented Reality?

I just think it is a very nice tool and it is also useful to entertain and keep consumers longer on your website. I found it particularly easy to use, and the final output was really good.

In your opinion, what is the level of usability of this service? Are there certain contexts that favour the use of such technology more than others?

this kind of service is really fast to use, it takes even 5 minutes to try dozens of different products, so the level of usability I think is pretty high. As far as the contexts of use are concerned, I think the ideal is to try out the make-up with some friends, also to recreate the idea of the classic shopping experience.

From your point of view, what factors could be causing consumer resistance to using this technology?

In general, consumer scepticism might keep them from using these tools; then another factor to consider is the age of the consumers. I don't think that virtual-try-ons are very able to target those who are more than 35/40 years old.

Do you think the success of this technology is linked to the dynamics of the pandemic, or do you believe it will be successful later on?

Certainly, their success is linked to the pandemic, but I think they are such convenient and easy-to-use tools that they will be exploited later on and continue to make online shopping more enjoyable.

In your opinion, does the use of this technology encourage the intention to buy a make-up product with respect to apps not integrated with AR? Or does it just make the whole experience "fun"?

I think that, compared to an app without such a feature, apps with a virtual-try-on also make a difference in terms of purchase: it is likely that, if I particularly enjoyed the experience before the purchase phase, I am more inclined to buy. Yes, I think they can also be useful in terms of purchase.

Interview n.11

What is your name?

Mattia De Magistris.

What is your profession?

I am a psychology student at La Sapienza University, specialized in social neuropsychology.

Have you ever heard of Augmented Reality and Virtual Try On? How much knowledge do you have about these concepts?

Yes, I have heard of them because sometimes Augmented Reality is used in clinical settings to help patients overcome certain social behaviour disorders. However, I have not had much to do with the use of this technology in make-up or clothing.

Do not worry, we will focus on the psychological aspects of using Augmented Reality. With reference to its use for the purpose of projecting make-up directly onto the user's face, what do you think about the impact of such a technology on the user's self-esteem?

It is never easy to give an unequivocal answer because the truth is that it depends on the target audience and its level of self-esteem before using the application. Generally speaking, people with low self-esteem have a tendency to be rather insecure when performing actions and trying out new experiences. They often feel uncomfortable when they are not familiar with the tool in front of them. Therefore, if it is the first time they use the app, this may not have a positive effect on their self-

esteem. Individuals with high self-esteem are more confident in their actions, and tend to have a more positive outlook on their surroundings and experiences.

In your opinion, could the use of AR contribute to shift the customer's attention from the make-up worn to their face?

There is not an absolute answer. There may be different reasons for this, but the result is the same: more narcissistic individuals may tend to focus their attention on what they think looks best, their own face, overshadowing the projected make-up or pair of glasses or whatever they are trying on at the time. For what concerns the ones that are more insecure about their own appearance, these individuals would not look at their face because of low level of self-satisfaction, and thus their attention may be more easily captured by some other features or objects, such as cosmetic products in case of virtual-try-ons.

What are the possible 'side effects' of these filters on people's perception of their own face?

One has to assume that the vision people have of themselves does not correspond to the vision others have of them. Everyone looks at the world from a different perspective, and distorts reality by amplifying either the merits or the defects of what they see. It is a natural attitude that we all have. Again, there is no one-size-fits-all answer, in some cases filters can highlight a good thing, in others a bad thing. However, if we talk about side effects, I would say that the risk is that individuals see their imperfections enhanced by the use of Augmented Reality, and this happens more frequently in subjects with low self-esteem.

In addition to this "distorting effect", do you think that unfamiliarity with technology in general can also increase an individual's insecurities and consequently lower their body-esteem?

This is related to what I said earlier: individuals with low self or body-esteem are more insecure about their actions and, as a result, might attribute an application malfunction to a mistake on their part. For example, instead of thinking that it is a connection problem, they might think that they are the 'incompetent' ones who do not know how to use the app. In any case, the conditional is a must, because you can never have a universal rule that applies to all subjects, so it is advisable to first identify a reference sample and carry out the necessary analyses to verify the truthfulness of this behaviour. Generally speaking, I can tell you that individuals with low self-esteem tend to amplify any technical or network malfunctions.

So do you think that an individual with low self or body-esteem tends to perceive even less the "fun" side of an Augmented Reality experience?

Sure, they will be much more caught up in their own physical defects or some technical problem to really enjoy the experience, which in the end is also the aim I guess you want to achieve with these apps, to make the user have fun.

Absolutely. Do you also think that Augmented Reality can amplify the insecurities of an individual with low self-esteem?

This statement is correct, but the reverse is also true. Well, I think that the two variables influence each other, creating a sort of vicious circle. Augmented Reality, for the reasons I explained before, could help to amplify the flaws that individuals see in their bodies; vice versa, individuals with low self-esteem, and who therefore have difficulty accepting certain parts of their bodies, may not appreciate the experience with Augmented Reality, and frustrate the fun effect that it wants to create. By not perceiving this effect, individuals will focus even more on their flaws and start all over again.

In your opinion, what is the main psychological benefit that users can gain from this technology?

Augmented Reality, as already mentioned, is also used in clinical settings, for example to help individuals with social behaviour disorders to have a contact that resembles a human one, and then have them interface directly with real people.

What about Virtual Beauty Try On with a specific regard to beauty usage?

I think the main benefit is to help individuals enter the phase of accepting their own aesthetic imperfections. If used in the right way, it could help individuals to start appreciating themselves with all their flaws.

What do you think about companies' awareness of the possible psychological effects of using these technologies? Do you think that these issues are in general not much addressed or discussed?

I believe that all big companies are interested in these issues. I also believe that every company should have a figure similar to a "social psychologist" who studies the behaviour of individuals in society, perhaps with the aim of influencing them. It is a bit like what marketing experts do, indeed the two disciplines are closely linked. I believe it is unlikely to think of a large company and not imagine that it does in-depth research into the psychological effects that their actions have on the minds of consumers. Perhaps, however, with specific reference to these new technologies, it is possible that the psychological side has not yet been properly analysed, and that we need time to get a complete picture of the situation.

What do you think about the sensitivity of today's beauty companies with regard to issues such as acceptance of one's appearance?

Exactly, I think they are aware of it and try to make their own customers aware of these issues. But I do not think it is very appropriate to talk about the sensitivity of companies, because I doubt that they do it just to "feel closer" to their customers. There is always an economic return, as it should be. So I would talk more about "fake sensitivity", or better still "forced sensitivity".

How do you think these technologies can be used to improve people's perception of themselves? Could marketing play a crucial role?

I am not a marketing expert, but I think it could certainly play a crucial role in determining how individuals perceive these Augmented Reality apps. If the right strategies can be implemented, I do not exclude that these new technologies can also contribute to improve people's perception of their bodies, but it is up to you to figure out what these strategies are! Finding the right message to get across is definitely the most important thing to start with.

SUMMARY

INTRODUCTION

The following paper will take into account a specific sector of the retail industry, the cosmetics one, and on how companies in this sector have started to focus their value proposition on Augmented Reality tools, such as virtual-try-ons, to innovate and adapt to the increasing competition. Psychological variables such as body image and facial satisfaction will also be considered, and evidence will be given on how the possibility to virtually try on a make-up product through an Instagram filter - one of the most modern Augmented Reality technology applications - allows those with an unfavourable body image to appreciate and perceive more the "fun side" of the online experience based on the presence of Augmented Reality, having a positive and significant impact on the purchase intention of the make-up product.

RELEVANCE

Nowadays, guaranteeing a seamless and smooth customer experience is no longer considered a distinctive feature to offer in order to stand out from competitors, but a common basis from which to start developing a unique value proposition. Indeed, the convergence of physical and digital consumer experience (omnichannel) turned out to be the top priority for almost all the industrial sectors (Hagberg, Sundström & Nicklas, 2016). This omnichannel tendency is even more clear in the retail industry, where we assist to an early adoption of Augmented Reality (Scholz & Duff, 2018) and where these new technologies and tools are seen as the future of the retailing itself (Grewal, Roggeveen & Nordfalt, 2017), especially when the purchasing experience revolves around hedonic products: a previous study showed that AR is easier to use (vs. app), and users find AR more responsive when buying a hedonic (vs. utilitarian) product (Anubhav, Anuja, Nripendra & Yogesh, 2020). As multisensory interfaces like AR-based ones offer an environment of playfulness, interactivity and entertainment, this resonates with the characteristics of hedonic products and enhances users' overall experience (Voss, Spangenberg & Grohmann, 2003). A typical example of hedonic products are the ones related to the beauty and make-up market, whose revenue is expected to reach US\$511,401m in 2021 and to grow annually by 4.8% (CAGR 2021-2025) (Statista). According to these data, the beauty sector is one of those with the fastest growing rate in the retail industry, highlighting the relevance of the product category chosen. Understanding the increasing importance of online presence over physical one, several leading beauty and personal care brands have decided to shift part of their investments in physical shops to online stores: this is the case of

the German retailer Douglas, which closed 500 of its 2,400 stores around Europe in response to more consumers spend shifting online, a trend that has been accentuated by the spread of the pandemic.

Given this omnichannel tendency, it is important to consider the key role of Augmented Reality (AR) as an enabler of omnichannel experiences across the customer journey (Hilken *et Al*, 2018). AR can be considered as a persuasive set of ‘smart’ technologies whose purpose is to seamlessly merge online and offline customer experiences by using an intuitive, context-sensitive, and socially connected interface (Hilken, De Ruyter, Chylinski, Mahr, & Keeling, 2017). To facilitate online decision making, many firms such as L’Oréal, IKEA, Sephora, Ray-Ban, American Apparel, Adidas and Dior have decided to adopt a strategy based on service augmentation, aimed at simulating some aspects of the service that are normally experienced inside the physical store. Because this AR-based technology, also known as virtual-try-on, offers a ‘try before you buy’ experience, marketers and retailers saw a great potential into AR in terms of online conversion rates’ improvement and return rates’ reduction (Dacko, 2016). “We now consider virtual make-up try on to be the base of any experience. At the end of the day the only barrier to buying [a product] is wondering what it will look like”, said Lubomira Rochet, Chief Digital Offer at L’Oréal: indeed, in the beauty sector in particular, Augmented Reality was able to bridge a gap that was a major concern for consumers who had to imagine the make-up on their faces without actually seeing it.

Launched in 2019, L’Oréal’s AR makeup experiences have proved the success of the technological revolution: website engagement time doubled and the conversion rate almost tripled (Cook, Ohri, Kusumoto, Reynolds & Schwertzel, 2020). Other noteworthy results have been achieved by Sephora: between 2016 and 2018, more than 200 million shades of make-up were tested through their Virtual Artist app as a result of more than 8.5 million visits to the new AR feature (Rayome, 2018). This technology is definitely revolutionising the way people come into contact with make-up products, reshaping the entire customer journey: the basic idea was to turn smartphones into a real mirrors, in which users can see their own face reflected and try out a huge range of make-up in a short space of time. AR-based apps are thus capable of tracking movements and capturing over a hundred facial expressions, and are even able to detect the texture of the skin to offer a fully realistic 3D modelling. Nevertheless, investors were initially sceptical about the real impact of such a technology on the company's sales: the risk was that this tool would become a way for users to have fun while trying out beauty products, without leading to any real gains for the company. However, a research conducted in 2017 on 25.000 Japanese female subjects showed that users of YouCam Makeup - the award-winning Augmented Reality-based beauty app - are 1.6 times more likely to purchase beauty products, as compared to those who do not use the app, and that they spend 2.7 times more money on beauty products, compared to those who are not experiencing virtual try-on (Perfect Corp, 2017).

Future perspectives confirm an always positive and increasing trend in the adoption of AR technology: the worldwide spending on Augmented Reality and Virtual Reality (AR/VR) is expected to accelerate out of the pandemic, growing from just over \$12.0 billion this year to \$72.8 billion in 2024 (International Data Corporation, 2020). A study conducted on 3,938 Internet users in the US and UK provided further insights on AR potentials: it appeared that more than 30% of respondents said that AR has the strongest potential in enhancing shopping activities. They also found that AR solutions simplify their choices by helping them to virtually test out products from the comfort of their home (GlobalWebIndex, 2018). As a consequence, in 2020, 46 percent of retailers has planned to deploy Augmented or Virtual reality in their businesses (Cook, Ohri, Kusumoto, Reynolds & Schwertzel, 2020).

Fariza Yaha, owner of several Limoni franchisees and member of the Board of Directors at Lubi, was interviewed in order to enrich this thesis project by offering her personal opinion about the potential evolution of virtual try-ons. In her perspective, they are the future of the beauty industry: “I assume they have not been a great success for what concerns physical and traditional channels. I read a lot of potential for digital channels, they are the future. [...] Augmented Reality is one of the latest emerging technologies, so I would definitely recommend incorporating it into the value proposition, especially in the make-up industry, where many companies have already done so.”

Another aspect to look at is the type of device involved: in today’s environment, more and more people are online, precisely the 58.8% of the world’s population (Internet World Stats), and a significant percentage of this population prefers to surf on the Internet via mobile rather than desktop. In Italy, the percentage of mobile users is equal to 47% and it is expected to grow to the point of exceeding that of desktop users (StatCounter). Thus, it seems to be crucial for firms to focus their efforts on the adoption of a specific kind of Augmented Reality technology: the mobile AR, an increasingly recognised approach having potential for enabling smart retail. Furniture retailers have since launched MAR apps which help to “bring products home” prior to actually making the real purchase (Tabusca, 2014). In 2020, around 1.73 billion of people used Mobile Augmented Reality through their smartphones and by 2023 there will be an estimated 2.4 billion Mobile Augmented Reality users worldwide (Statista). In 2019, more than 1 billion smartphones and tablet devices were capable of delivering augmented experiences, and within 2020 almost 100 million consumers were expected to shop using AR-based apps either online or in-store. The consumer interest and appetite are in continuous growth: since 2018, the number of mobile AR users has nearly doubled with respect to 2019, with usage and popularity driven largely through social media (Cook, Ohri, Kusumoto, Reynolds, & Schwertzel, 2020).

Above the currently existing social networks, Instagram is largely considered to be one of the most popular. The number of monthly active Instagram users reached 1 billion within June 2018, and it was expected to reach 1.16 billion by the end of 2020 (Statista, 2018); among active users, half of them uses Instagram Stories daily. Stories are a feature of the app allowing users post photo and video sequences that disappear 24 hours after being posted. One of the reasons why they are so popular is that Instagram started adding on them some special features such as Instagram filters, that can bring Augmented Reality to enable users to see digital content in the real world in three dimensions (Carmigniani et al., 2011). AR Instagram filters have rapidly spread among users because they look interesting and fun to play (Karundeng, F., 2020). Specifically, through the Spark AR application, which was launched in August 2019, anyone can create AR filters for free and share them with all Instagram users: therefore, Instagram filters can be considered in all respects one of the most popular mobile Augmented Reality applications.

In such a frenetic context, based on rapid changes and individual's ability to adapt to them, there are factors that remain beyond this technological evolution: the way in which people see their body may have implications on their intentions to purchase products that involve a direct consideration of the body itself, with a special focus on contexts characterized by the presence of Augmented Reality. Unfortunately, many firms that have already adopted AR programs to promote their products or services still not recognize the importance of this "psychological perspective" (Yi-Cheon Yim & Park, 2019). A particular kind of stakeholder involved in this issue are companies operating in the cosmetic sector, which more than many others have a predominantly female clientele: indeed, it has been demonstrated that women generally hold more negative body attitudes than men due to socially and culturally driven body ideals (Feingold & Mazzella, 1998), meaning that the psychological side of the technological evolution could rationally have a greater impact on females rather than males. A study conducted on 1,053 Swiss women revealed that 71% were dissatisfied with their body and wanted to be thinner, although 73% of them were at normal weight (Allaz, Bernstein, Rouget, Archinard & Morabia, 1998). Moreover, the way women see their bodies also includes the way they see their faces and, usually, if the body is associated to an unfavourable perception, the same applies to face (Felisberti & Musholt, 2014). Several studies have identified body image as a variable that influences the decision to purchase a high body-involving product, such as make-up, underlying the relevance of this construct throughout the customer journey (Rosa, Garbarino & Malter, 2006).

Based on what stated so far to describe the proposed area of study and underline the relevance of the thesis project's topic, the research objective is to deeply analyse the impact of mobile Augmented Reality on women's willingness to buy a make-up product into an online shopping context,

considering both the mediating role of perceived playfulness and the moderating effect of body image, with the final aim of providing further insights about a such discussed phenomenon.

THEORETICAL BACKGROUND

As previously said, online retailers are increasingly using AR technologies to solve mental and physical intangibility issues in a product evaluation. Moreover, these technologies are easily available and accessible to consumers via their smartphones: this has made them a much-discussed topic on which numerous studies and experiments have been conducted.

The current literature reveals contrasting views on the long-term benefits of AR, ranging from it being perceived as being exclusively a promotional tool (Woods, 2009), to boosting positive consumer-brand relationships, favourable attitude toward the brand (Owyang, 2010) and consumer satisfaction by generating an experiential value effect (Chou, 2009). It was also demonstrated that the presence of AR tools can impact different stages of the customer journey: a study conducted by Romano, Sands and Pallant (2020) revealed that, prior to purchase, AR can broaden consumers' product consideration set, while narrowing the choice set. Moreover, they found that AR can lessen brand value, thereby giving emerging brands the opportunity to connect with consumers. At the point of purchase, AR can help with product curation and drive hedonic value through playfulness.

Another quality of AR is that it makes consumers feel more confident about their choices at the time of purchase: researchers describe AR make-up applications as effective tools to convey detailed product information in a short period of time (Smink *et al.*, 2019; Yaoyuneyong *et al.*, 2016) and reduce perceived purchase risk (Alimamy, Deans & Gnoth, 2017). Given that customer's willingness to purchase products is a rational process, where customers choose products that have the highest value (Zeithaml, 1988) and the lowest perceived risk (Bauer, 1960), using tools that help consumers perceive a lower risk throughout the shopping experience can positively and significantly influence their willingness to buy the product. In this respect, effects of AR on strengthening purchase intention has been deeply analysed (Beck & Cri , 2018; Hilken, De Ruyter, Chylinski, Mahr & Keeling, 2017; Poushneh & Vasquez-Parraga, 2017): in 2017, 21.467 US smartphone users took part in a survey and were asked to talk about the shopping benefits they believe they will receive from using a MAR shopping app and the consequences of such benefits on the quality of their shopping overall experience. Results highlighted a greater purchase satisfaction which has to be considered a prominent consequence of using MAR shopping apps (Dacko, 2017). Furthermore, a research study developed by Watson *et al.* (2018) has deeply analysed the relationship between the defining characteristic of AR (i.e. augmentation) and consumers' purchase intentions within the cosmetic industry. Specifically, findings demonstrate that augmentation creates a more positive emotional

response than interactions without augmentation, and this enhanced emotional feedback creates in turn greater purchase intention for those experiencing augmentation.

Another study conducted on 159 management graduate Indian students revealed that participants were more likely to provide WOM recommendations when they used AR interface (vs. simple mobile app) to buy hedonic products, resulting from a more positive overall experience. Several studies confirmed that WOM has a positive impact on consumers' purchase intentions (Khan, Ramzan, Shoaib & Mohyuddin, 2015); thus, it is reasonable to suppose that, since the presence of an AR-based environment translates into greater WOM recommendations and to a general positive experience, it also leads to a greater willingness to buy the product in question.

Given the above-mentioned literature, we expect that the presence of mobile Augmented Reality will have a positive and significant impact on women's willingness to buy the product, with respect to the simple view of the cosmetics product image on a website.

H1. The presence of mobile Augmented Reality will have a greater and more positive influence on women's willingness to buy a make-up product compared to the absence of mobile Augmented Reality.

In order to develop the second hypothesis, it is necessary to examine the current literature concerning the construct of perceived playfulness, which plays a crucial role in an Augmented Reality context. The choice of focusing on such a construct is not accidental: 10 women with a previous experience in using AR-based make-up applications were interviewed, with the aim of providing a solid and qualitative basis for the research model proposed in the following paragraphs. When they were asked to briefly describe the experience, 8 women out of 10 used adjectives such as "funny" and "enjoyable" as first words, highlighting how much the playful side of such virtual try ons is top of mind for consumers using them. The concept of Augmented Reality and playfulness are therefore perceived as being closely linked, also justifying the importance given to the latter construct in the course of this research.

Ahn et al. (2007) defined playfulness as a short-term system-specific trait or state. Specifically, playfulness of a website represents how it entertains its customers or users (Qi, Ip, Leung & Law, 2010). Moon and Kim (2001) described perceived playfulness as "the extent to which the individual perceives that his or her attention is focused on the interaction with the World-Wide-Web; is curious during the interaction; and finds the interaction intrinsically enjoyable or interesting". Thanks to the presence of AR technology, consumers perceive a high level of enjoyment: as they participate in a playful and interactive experience, they are consequently more prone to purchase the product (Park & Yoo, 2020). The perception of playfulness is likely to be evoked during the selection and

purchasing process of hedonic products such as make-up, since emotions like fun and playfulness are closely related to hedonic value (Scarpi, Pizzi & Visentin, 2014; Jarvenpaa & Todd, 1996): indeed, hedonistic shopping is described as the festive and ludic way of shopping, and is related to fun and playfulness rather than to task completion, reflecting the experiential side of shopping, comprising pleasure, curiosity, fantasy, escapism, and fun (Hirschman & Holbrook, 1982). This feeling of fun is therefore enhanced by the presence of technologies such as Augmented Reality: data obtained from a survey distributed to 102 European people after having experienced a “Magic Mirror”- a kind of AR technology which seeks to make the virtual make-up appear as part of the real by using a front-facing camera - showed that perceived augmentation, evoked by the presence of AR technology, was as a strong predictor of the playful experience that shoppers have with the application (Javornik, Rogers, Moutinho & Freeman, 2016).

However, living a pleasant AR-based experience is not an end in itself: perceived playfulness has also the power to positively affect users' purchase intention (Albayrak, Karasakal, Kocabulut & Dursun, 2020). A study conducted by Hsu et al. (2012) on 558 Taiwanese respondents has proven that the perception of playfulness during an online retailing experience can significantly and positively impact purchase intentions. Wang et al. (2021) also conducted a survey on 238 young women from South Korea, which were asked to answer some questions after having experienced YouCam Makeup for 5 minutes: the hypothesis were supported, confirming that mobile AR services add enjoyment and playfulness to the simulated shopping experience and further improve online consumers' purchase intentions. All these findings led us to develop the following hypothesis:

H2. When mobile Augmented Reality is present, the perception of playfulness will increase. Moreover, the increase in the perceived playfulness will positively influence women's willingness to buy a make-up product.

The last part of the research model will be focused on the body image construct, which is commonly defined as an individual's subjectively perceived physical self, embedded in a mental construct (Myers & Biocca, 1992). Body image is different from body esteem, which entails a generally favourable perception of the body: body esteem is indeed the affective part of body image (Mendelson & White, 1982). A concept directly related to body image is that of facial satisfaction, one of the key features in the determination of human physical attractiveness and symbol of the “self” more than any other part of the body (Riggio, Widaman, Tucker & Salinas, 1991).

Previous research has shown that consumers' perceptions of their bodies significantly and differently affect their responses to AR-based virtual try-on technology (Baek, Yoo & Yoon, 2018). As Fiore and Kim (2005) highlighted, personal variables (consumer characteristics) may influence the strength

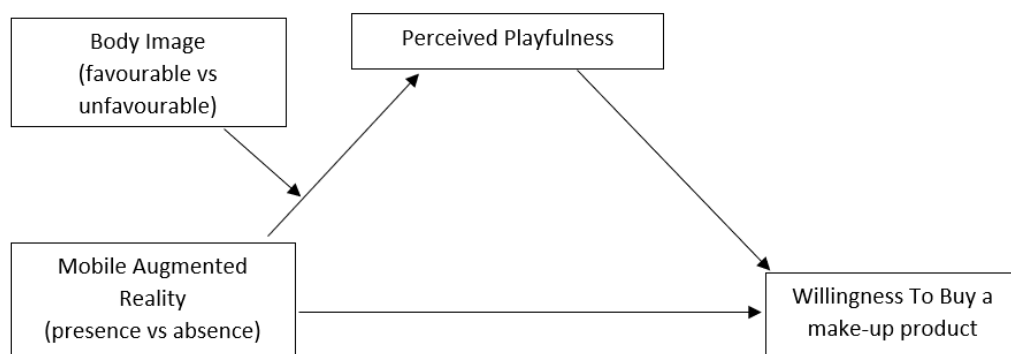
and direction of the relationship between environmental stimuli (in this case AR) and its consequences, such as the perception of playfulness and, consequently, users' willingness to purchase the product (Watson, Alexander & Salavati, 2018). Therefore, personal characteristics of users, such as body or face image, are important determinants of such try-ons' perceived value. However, results on how these psychological variables influence an individual's ability to enjoy a playful experience such as a beauty virtual-try-on are mixed, underlining the need for further research on this issue.

According to self-image/product-image congruity theory (Sirgy, 1982), when self-image belief is negative (low body image) and product-image perception is positive (product liking), the overall effect is negative, and it consequently leads to conflicting motivations. Higher level of conflict is always associated to higher level of stress: therefore, considering that stressed people have a lower perception of playfulness (Hackbarth, Grover & Mun, 2003), it is reasonable to assume that people with a unfavourable body image would enjoy less a make-up virtual try on experience. On the other hand, a more recent research (Yim & Park, 2019) arrived at diametrically opposed results: findings revealed that participants with an unfavourable body image who used AR recorded greater media usefulness and enjoyment, more favourable attitudes, and greater adoption intentions than participants using the traditional website. A possible explanation is that, when compared to the traditional website, AR would be perceived as a more useful tool for consumers with an unfavourable body image because it clearly portrays improved images about themselves. Moreover, compared to the traditional website, AR would be perceived as a more enjoyable tool because it enables them to anticipate future rewards from the purchase (Phillips, Olson & Baumgartner, 1995). This characteristic is particularly appreciated those with an unfavourable body image, that have a greater need to know how the product will look like once worn, as they are less prone to keep a constant monitoring of their body and consequently have less preconfigured information about their bodies/faces compared to those with a favourable body image (Epstein, 1980). Finally, one possible reason why AR makes people with an unfavourable body image have a greater perception of playfulness involves the concept of bottom-up attention, which is thought to operate on raw sensory input, rapidly and involuntarily shifting attention to salient visual features of potential importance (Connor, Egeth & Yantis, 2004). As it has been amply demonstrated (Aglioti, Smania, Barbieri & Corbetta, 1997), this kind of fast and uncontrolled attention is triggered by low-level features, that are related to intrinsic product properties such as colour, brightness or shape. In the case of this specific research project, the low-level feature is represented by the presence of a virtually reproduced make-up product that may initially attract users' attention during a virtual-try-on online experience: this shift of attention could therefore imply that users involved in the virtual-try-on experience do not pay attention to the appearance of their face but to the AR make-up product. In summary, AR may

function as a driver of users' attention, whose effect is much more evident when people with an unfavourable body image are involved, as it is able to shift the focus from the unappreciated elements of their face to the virtually reproduced make-up product, which is likely to represent a salient stimulus for them. Lastly, prior research has shown that virtual reality (VR) has a significant ability to generate elevated self-esteem, a sense of self-empowerment, and body satisfaction, particularly for those who are low in these self-related evaluations (Yalon-Chamovitz & Weiss, 2008). Applied to the AR context, we similarly propose that consumers with an unfavourable body image are more likely to appreciate AR tools and the sense of playfulness evoked by them. Thus, the following hypothesis has been proposed:

H3. Women's body image will moderate the relationship between the presence of mobile Augmented Reality and the perceived playfulness. Specifically, women's with an unfavourable body image will have a greater perception of playfulness when mobile Augmented Reality is present, compared to those with a favourable body image.

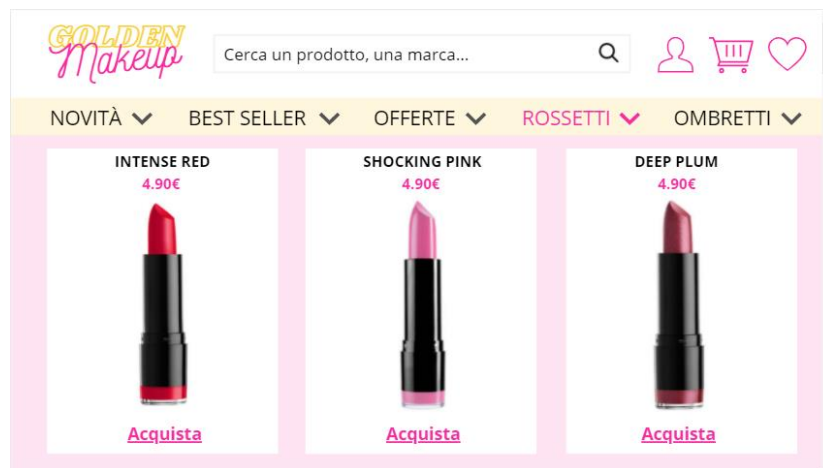
In order to verify the above-mentioned hypothesis, the following research model has been developed.



QUANTITATIVE RESEARCH

In this study, we intend to use the descriptive research as research design; the type of experimental design chosen is the between-subjects design, meaning that each participant will take part in only one of the experimental conditions; the reference sample is a non-probability sample, specifically a convenience sample, composed of the most easily accessible elements of the population; data has been collected through an online Qualtrics survey in which two scenarios (presence of mobile Augmented Reality vs absence of mobile Augmented Reality) are used. Moreover, it is appropriate to underline that the sample will be composed exclusively of women, given that the entire study is focused on the testing and possible purchase of a cosmetic product, and that the survey will be completed exclusively through mobile devices, as this is the only type of device capable of accessing the Augmented Reality scenario.

Each of the two scenarios represents a stimulus that has been specifically created and manipulated to allow participants to identify themselves in two different contexts within an online shopping experience. The first scenario (absence of mobile AR) involves a graphical stimulus (see Figure below), which consists of a simple two-dimensional image created through the use of the graphic tool Canva, and aimed at reproducing the website of an imaginary cosmetics brand, Golden Makeup. The cosmetic product chosen for the experiment is a lipstick, shown in three different shades with the corresponding prices: the latter element was kept the same for all three lipsticks in order not to create preferences on the basis of price.



The second stimulus (presence of mobile AR) translates into the opportunity to virtually try on the make-up product through an Instagram filter created exclusively for this research project. As a first step, we made the shape of the lipstick by using a face mesh tracker and uploading it to Photoshop. Once the 2D image of the lipstick was obtained, it was transferred to Spark AR Studio, a leader in social media Augmented Reality filters that allows users to create Augmented Reality masks and effects to be applied live in Instagram videos and stories: thus, this programme was fundamental in giving a three-dimensional effect to the make-up previously created in Photoshop. In order to allow those trying out the filter to see all three lipstick shades, some advanced settings were changed on Spark AR Studio: participants subjected to the “presence of mobile AR” condition only needed to tap on their smartphone screen to see the lipstick colour change.

Once the stimuli were completed, we moved on to the creation of the questionnaire (see Appendix). Participants were first asked whether they had an Instagram account or not: respondents who would have answered negatively, would have been automatically introduced to the scenario characterised by the absence of Augmented Reality. The measurement scales included in the survey to measure the constructs of Body Image, Perceived Playfulness and Willingness To Buy are already validated scales taken from previous literature: the scale for Body Image was derived from a subscale of the Body Image Satisfaction Questionnaire (Rauste-von Wright, 1989), which involves only the 6 items concerning elements of the face; Perceived Playfulness was measured through the scale adopted from

Moon and Kim (2001), which is made of 9 items concerning the perception of playfulness in a WWW context; lastly, Willingness To Buy was measured with the 3-items scale from Dodds, Monroe and Grewal (1991). In the questionnaire were also included some “Grand Tour” questions to understand respondents’ online habits, as well as their level of knowledge of technologies such as Augmented Reality applied in the beauty field.

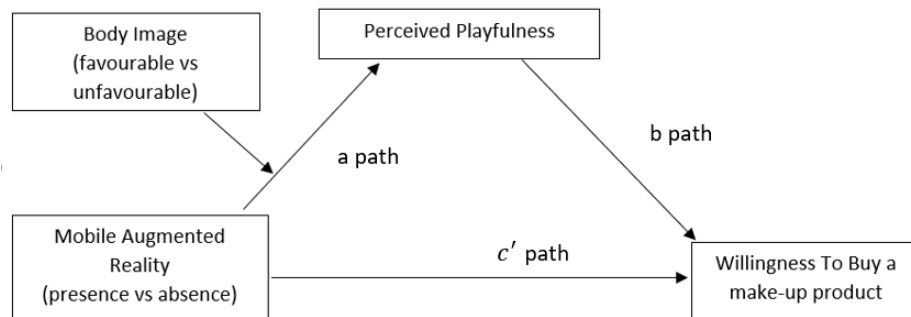
A total of 539 responses have been collected within a period of 10 days: they were then transferred to SPSS to be analysed and, after a cleaning process, the final number of answers to be submitted for analysis became 404. As a first step, we created the independent and dichotomous variable called "AR", determined on the basis of the scenario to which respondents have been assigned in the survey: this dummy variable was associated with the value “0” in the case of a scenario characterised by the absence of mobile Augmented Reality, and “1” in the case of the presence of mobile Augmented Reality.

The first analysis carried out on the reference sample concerns descriptive statistics: as expected, 99% of the sample is made of female subjects, while the remaining 1% prefer not to specify the gender. With regard to current employment, the vast majority of them (69.8%) is made of students, 18.3% are employees, 4.5% are unemployed, 4.2% are freelancers and only 3.2% are businesswomen. Participants were also asked to indicate their exact age in the questionnaire: the data showed that the highest percentages were recorded at 23 (18.8%), 22 (16.1%) and 20 (8.9%) years of age. For what concerns the “Grand Tour” questions, respondents were asked questions about their Internet use, their online shopping habits and their level of knowledge about Augmented Reality in the cosmetics sector: 43.1% stated that they use the Internet two to four hours a day, 41.6% declared that they buy cosmetic products online from 1 to 3 times a year, and 34.4% stated that they have scarce knowledge of AR. After that, reliability analyses have conducted. All the scales resulted to be extremely reliable: Body Image scale has a Cronbach’s Alpha of 0.899, Perceived Playfulness has 0.940 and Willingness To Buy has 0.955. In order to extract three factors (latent variables) from the scales, the “scale mean” method was adopted, which consists in calculating the average of the values attributed by the respondents to every item of each scale. Subsequently, the Body Image variable was transformed into a dummy variable by considering as a threshold value to which to attribute "0" (unfavourable Body Image) or "1" (favourable Body Image) the mean of the scale previously calculated with the naïve method (mean=4.36).

From this point, the statistical analyses carried out are inferential, since they are used to draw conclusions or inferences about characteristics of populations based on data from a sample. Given the presence of two samples (one taking part into the AR scenario and the other one taking part into

a simple website-based shopping experience) with no relation between them (people were randomly assigned to a single group), the independent sample t-test seemed to be the most appropriate method to test the first hypothesis, which describes the main relationship between the independent variable (presence or absence of mobile AR) and dependent variable (Willingness To Buy): the purpose is to demonstrate that a group mean is higher than another group mean. A confidence interval of $\alpha = 0.95$ was used for all analyses. Willingness To Buy mean in case of absence of mobile AR is equal to 3.310, while in case of presence of mobile AR results to be 4.098: this difference is significant since the p-value associated with the “t” statistic is lower than 0.05. Thus, women’s willingness to buy a make-up product is evaluated as being significantly higher in case of presence of mobile AR than in case of absence of mobile AR ($M_{WTB_presence_AR} = 4.098$, $SD = 1.946$; $M_{WTB_absence_AR} = 3.310$, $SD = 1.530$, $t(342) = -4.55$, $p < 0.000$). Therefore, the manipulation of the independent variable was successful.

The last phase of the data analysis is focused on the study of the moderate mediation model through the use of PROCESS SPSS Macro (MacKinnon, Fairchild & Fritz, 2007): in particular, the PROCESS model used is model 7, which is suitable for cases of moderate mediation in which the moderator influences the relationship between the independent variable and the mediator. In this way, it is possible to analyse all the “paths” of the model (see figure below).



The first statistic to look at is the index of moderated mediation, that tests whether we have an indirect effect that is moderated or not by some variables: since we do not know the distribution of this index and, thus, the associated p-value, it is necessary to rely on the “Bootstrapping technique” and to look at the bootstrap confidence interval. In this case, the interval do not include the zero, so it is possible to conclude that we have a significant moderated mediation model. To go more in depth with the analysis, we look at the indirect effect of the independent variable on the dependent variable: in this case, we have a significant and positive indirect effect only for the first value of the moderator, which corresponds to women with an unfavourable body image ($ab=1.56$, $CI(1.151; 1.968)$), while the effect is not significant for the second value of the moderator ($ab=0.20$, $CI(-0.87; 0.497)$). However, the mediation model also includes a direct effect of the independent variable on the dependent one (“c’ path”). Given that direct effect of the independent variable on the dependent one turned out to be

non-significant ($t = -0.486$, $p = 0.627 > 0.05$) and the indirect effect of the mediating variable (“a path” and “b path”) turns out to be significant for women with an unfavourable body image, this would mean that the mediation detected is a total or full mediation, explaining 100% of the effect on the dependent variable. Therefore, the mediator is able to totally explain the main relation: the only way that mobile AR has to influence the intention to buy a cosmetic product of women with an unfavourable body image is through the perception of playfulness.

After that, we individually look at the two components of the model: firstly, the regression model for the moderated “a path”, and then at the regression model for the “b path” and the “c’ path”. In the first case, the outcome variable would be the mediator (Perceived Playfulness); in the second case, it would be the dependent variable (Willingness to Buy). The most relevant information of the moderated “a path” is contained in the model outcome and is the interaction between the independent variable and the moderator: this interaction is significant ($t = -5.695$, $p = 0.000 < 0.05$), so we can confirm that the moderating effect is significant. Furthermore, by examining the conditional effects of the focal predictor at different values of the moderator, it stands out that the interaction is only significant when the dummy moderator assumes the value “0”, meaning that only an unfavourable body image can moderate the relationship between the presence of mobile AR and perceived playfulness ($t = 8.353$, $p = 0.000 < 0.05$): this finding supports our third hypothesis. For what concerns the second hypothesis, from the “a path” results that the relation between the independent variable and the mediator is positive and significant ($t = 8.353$, $p = 0.000 < 0.05$): thus, compared to women who did not experience mobile AR, women who experienced mobile AR presents a significantly higher perception of playfulness (coeff = 0.851). Moreover, by looking at the significance of the “b path”, represented by the p-value of the mediating variable, it can be noticed that we have a significant indirect effect ($t = 19.402$, $p = 0.000 < 0.05$): specifically, by checking the coefficient, it is possible to affirm that if the perception of playfulness increases of one unit, women’s willingness to buy has an increase of 0.884 points. This lead us to confirm also the second hypothesis.

Therefore, all the proposed hypotheses have been supported: this implies that the inclusion of tools such as virtual-try-on is very much appreciated, and is able to bring to the make-up brands' websites a significant improvement in terms of the enjoyment of the whole experience, making users more inclined to buy the product they have had the opportunity to virtually try out. It was also confirmed that the reason why women are more inclined to buy a lipstick when mobile AR is present than when it is absent is due to the increased sense of playfulness they felt during the experience: the virtual-try-on emulated by the Instagram filter was therefore able to make the experience more pleasant, smooth, and enjoyable. Finally, an interesting finding is that those who have perceived more the fun side of

the online experience are precisely the women with an unfavourable body image within the scenario characterized by the presence of mobile AR. This allows us to make specific considerations: the presence of virtual-try-ons allows women with an unfavourable body image to avoid an experience that could be a source of embarrassment and discomfort for them, such as trying on a make-up product in a physical store, surrounded by many other people, leading them to particularly appreciate the presence of AR tools. Moreover, findings support the idea that Augmented Reality can act as a "distractor" of attention: through a defocusing mechanism, the user is led to divert attention from their face and concentrate it on the virtual make-up, making the experience delightful and more evanescent: by doing so, women with an unfavorable body image have no way of entering into a negative mode that is normally generated by the sight of what they consider to be facial imperfections, and this makes them happier about the presence of such a tool. In other words, the presence of AR has a corrective effect on the mediation process for those with an unfavourable body image. For those with a favorable body image, this mechanism is ineffective as they are already in a positive overall mood. Lastly, it is also supported the idea that AR helps users to envision themselves in the product, making them experiencing future rewards. However, for those who are already satisfied with their external appearance, the benefits of AR are not so obvious, since their elevated self-confidence and previous product experience for self-decoration allow them to readily envision themselves in the high body-involving products, regardless of the type of media displays (Lindström, Berg, Nordfält, Roggeveen & Grewal, 2016).

CONCLUSIONS

From a theoretical perspective, the present research has contributed to the growing field of augmented make-up product presentations and has enriched the actual literature on the impacts of individuals' level of body image on their purchase intentions into an AR context. More precisely, one of the added values of this research is to have taken into account a scenario entirely based on a mobile device: in fact, the only study among those already present in the literature to have carried out an analysis similar to that proposed by the following paper (Yim & Park, 2019) only took into account a desktop-based scenario. In addition, most studies on virtual-try-ons have only examined one type of product, namely clothing, which leads to the need of considering psychological variables such as body image in a broad sense. In the case of this paper, however, we focus on a specific nuance of the body image construct represented by facial satisfaction, which has previously been used exclusively in clinical contexts or in reference to plastic surgery: it is therefore the first time that the concept of facial satisfaction is used in an Augmented Reality context. But the most interesting finding, which fills the consistent gap represented by the scarcity of studies focused on the analysis of psychological

variables in "augmented" contexts different from the virtual-try-ons of clothing, lies in the role assumed by Augmented Reality as a distractor of attention: such a connection between virtual beauty-try-ons and women's vision of their own face is unprecedented in current literature.

From a managerial perspective, this research project has increased the knowledge that firms have about the psychological factors that come into play during online mobile experience, which may affect the final decision. It has also enabled marketing managers to more precisely shape their promotional strategies when using AR to boost consumer final evaluations: indeed, the study revealed that the presence of an Augmented Reality tool can really make the difference between those who decide to buy the product and those who just visit the website. Findings also revealed that AR might be more appealing to individuals with a less favourable body image: thus, thanks to Augmented Reality technology, cosmetic companies will be able to target more those who feel discomfort in trying a makeup product in the physical store, meaning those who have an unfavorable body image. Finally, given that women who are most uncertain about the appearance of their face are also those who perceive more the fun side of the mobile AR experience, it would be advisable to create campaigns precisely targeting this type of women, in order to share this message: to overcome their insecurities while enjoying an entertaining and innovative online experience. Accordingly, we recommend that companies conduct simple surveys that identify their target audience's self-perception of their bodies. As Dove's campaign in recent years has shown, there is still a need to appeal to a sense of acceptance of one's own appearance, helping women to feel beautiful and encouraging them to take more and more part in interactive and playful experiences.

However, this study is not immune to limitations. The findings should be interpreted with caution because they are limited to the specific AR context of mobile devices. Our findings are also limited to respondents belonging almost exclusively to the 20-25 age group: although they are likely to be the primary target audience for AR-based virtual try-on, they may be more sensitive (and consequently more critical) about their body image, which might bias the final results. Thus, we recommend conducting further studies focusing on a different target group. What's more, all the findings were tested using a cosmetic product: future researchers are strongly encouraged to replicate the current study in different media contexts, with a greater range of products, and a broader sample. It would also be interesting to see a comparison between the results based on a lipstick virtual-try-on and the ones obtained from a filter that replicates other kind of cosmetics such as blush or eyeshadow. One last contribution to the current literature could be given by the consideration of other variables within the research model that could influence the enjoyment of the whole experience, such as the presence of technical connection problems or the degree of knowledge respondents have about virtual-try-ons.