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Virtual Reality in Tourism:

What implications will Virtual Reality Technology have for business models in the tourism industry?

Master Thesis - Strategy & Management, Business Analysis & Performance Management

Marius Kavlie-Jørgensen Økland
&
Yves-Michel Thomas Anthony Lefébure

NORWEGIAN SCHOOL OF ECONOMICS

Supervisor: Eirik Sjåholm Knudsen

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1 Executive Summary

This thesis investigates how business models in the tourism industry will be affected by the rapid emergence of virtual reality technology. The research is based on data gathered from two experiments, one in a lab- and one in a field environment, conducted in the fall of 2016. The implications are considered from a combination of statistical analysis and existing literature. We have examined how effects from advertisement media differ when it is displayed to participants as pictures on a smartphone, compared to those 360-degree images displayed in a virtual reality head mount. The existing literature suggests that the immersive nature of virtual reality should have a positive effect on customers' willingness to buy, as the risk linked with not being able to properly evaluate the quality of the experience goods should be reduced. Our data has not found support for this claim directly. The only significant finding we have in this regard, is that exposure to virtual reality leads to changes in other dependent variables that are associated with the actual purchase. This finding is only significant when looking through several mediating variables, suggesting that the actual effect is very limited. Our findings do, however, suggest that there might be other implications for business models in the tourism industry. Namely, we found that the use of virtual reality increases the perceived access to information about the quality of the product for the customers. This would theoretically suggest that the risk associated with purchasing the trip is reduced, but we have not been able to confirm this claim statistically. We also found that the perceived quality of the images is better when viewed in 2D than in the virtual reality head mount, but that the participants enjoyed viewing the images more when they looked at them in virtual reality. According to the existing literature, the implications of these findings are that the effects of virtual reality should be higher as the technology improves, and that virtual reality might have value to players in the tourism industry as an integrated part of their value proposition. In conclusion, this research provides critical insights on the limited potential of virtual reality as means to increase customer acquisition, using the confines of our experiments, and contributes to a better foundation for predicting its uses and future implications in the tourism industry.

2 Acknowledgements

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4 Introduction

Technological innovations and advancements are happening at a fast pace around the world, and is increasingly impacting the way companies are setting up and changing their business models. The internet has for example revolutionized how many companies sell their goods and services, and we can now easily download apps to our smartphones allowing us to pay our bills or store our pictures in cloud storage.

One of the fastest emerging technologies in the latest years is virtual reality technology, more commonly known as "VR". This is not a new concept, though; since Morton Heilig introduced "The Sensorama", a cinematography machine with immersive multimodal technology, in 1956 (Axworthy, 2016), there have been many attempts to develop technology that could shut out the physical world around us, and immerse us into a virtual environment (Virtual Reality Guide, 2016). However, in the most recent five or so years, this technology has been seriously considered by leading technology companies for its commercial potential. At the time of this research, the first generation of "Head Mounted VR" from companies like HTC, Samsung, Facebook, Sony and Google has just entered the mass market. The year 2016 is, according to Deloitte Global's (2016) estimation, the year in which VR will reach one billion US dollars in sales, and according to Digi-Capital (2016) the projected market size is $30 billion in 2020. Still, very limited research has been conducted to assess how this will impact the way different industries do business, but one of the industries expected to be particularly affected by the influx of VR is the tourism industry. Virtual reality technology is considered especially effective in conveying experiences, and due to this sector mainly trading in experiences, the tourism companies are expected to be able to benefit grossly from it.

Our research aims to unveil the likely ways, if any, players in the tourism industry can take advantage of this emerging technology through making changes in their business models. The thesis focuses on the strategic implications, and our findings should not be considered as a prediction or forecast. Rather, our conclusions are meant to build a foundation to understand how the discovered effects of virtual reality stimuli, compared to 2D image stimuli, can be utilized through business model innovation. The research question for our thesis is therefore:

"What implications will virtual reality technology have for business models in the tourism industry?"

To answer this, we will examine how exposure to images through virtual reality technology is experienced compared to the same images being viewed in 2D. Our research aims to gain an in-depth understanding of these effects, and we will consider data from two self-conducted experiments in our analysis. For us to be able to interpret this data correctly, and be able to answer our research question in a meaningful way, we will need to examine and understand the established theory about search- and experience goods, business models and business model innovation, tourism, and the virtual reality technology itself.

The main findings in this thesis are that virtual reality technology does have a significant positive effect on some purchasing related constructs, like the perceived access to information about the quality of the product, but we were not able to identify any direct effect on actual purchases from the different kinds of media exposure. We did, however, find that when controlling for the perceived lower quality of the images viewed in virtual reality, more positive effects revealed themselves, implying that the effects are expected to rise as the technology improves. We also find that telepresence, a virtual reality related concept, has a positive effect on the ability to mentally imagine an experience. Additionally, we find that compared to traditional commercial-exposure, virtual reality technology bears a positive effect on enjoyment. Based on the existing literature, we argue that the business model implications of these findings include new channels to reach their target segment, an increase in interest from the younger generation in tourism experience goods, or in other words – a changed customer segment, and an expansion of the value propositions offered by travel providers, now expected to be including virtual experiences.

In this paper we will first assess the relevant theory necessary to have an insightful discourse. Based on this theory, we will provide a set of hypothesis that are relevant to answer our research question while also being possible to examine through our experiments. These hypotheses will later be tested, and the results will be viewed in light of the business model theory in the discussion. Before our analysis we will disclose the methodologies used for our experiments, both relating to the research design, some practical approaches, and including a presentation of the reliability and validity of our research. The empirical methods used in our analysis will be presented in conjunction with the respective analysis.

5 Theory and Hypotheses

Historically, changes in technology has changed the way firms in the tourism industry do business. E.g. internet, transportation technology, guide-books, etc. Now, VR is predicted to be yet another new technology that will create many new opportunities for how firms in this industry design their business models in order to create value for their customers.

The tourism industry is different from many other industries in terms of both the characteristics of the services offered, and how their business models are designed. Much of the services offered in tourism is what we call experience goods, where it is difficult for consumers to evaluate the quality of the good or service a priori. This classification has direct implications for firms' business model design, in terms of both how firms acquire customers and how they produce and deliver their services.

In order to explain the potential impact of Virtual Reality Technology for business models in the tourism industry, we will first present a general theoretical background, before we look more specifically at the tourism industry and VR to develop our hypotheses. More concretely, we will first describe the distinction between *search-* and *experience goods,* before we portray how the choice of *business model* depends on the nature of the good. Then we will look at how new technology makes it possible for firms to engage in *business model innovation* by delivering value in new and different ways. Finally, we will look at current business models in the tourism industry, and develop hypotheses about how *virtual reality technology* affect business models by looking at its impact on consumer's attitudes, willingness to buy and actual experience.

5.1 Search vs. experience goods

Classical theories on competition often classify products or services in terms of their price and quality. Another way of classifying goods and services is to look at how "easy" it is for consumers to evaluate such product attributes before, during and after consumption. Nelson (1970) originally used this insight to make the distinction between search and experience goods, where the attributes of the former can be evaluated before consumption, while the latter only could be evaluated during or after consumption. Later, (Darby & Karni, 1973) added a third category, credence goods, for which quality is difficult to evaluate for customers even after consumption. However, we will in this thesis mainly focus on the distinction between the former two, and the implications for the firms that sell these goods.

5.1.1 Theory of search and experience goods

Search goods are products or services with features, like quality or price, that are easily evaluated before purchase (Nelson, 1970). Additionally, there are two criteria that must be fulfilled for a good or service to be classified as a search good. First, the consumer in question must be able to inspect the option, and second, the inspection must occur prior to purchasing the good. Information about a search good can be expensive for a consumer to acquire, even if the information is easily available. In the urge of making a purchasing decision, consumers can be confronted with many types of search goods, making the finale decision a difficult task.

Experience goods are products or services with features that consumers have a difficult time vetting for objective features before purchase. Up front, the quality of an experience good is mostly derived from the consumer's perception of the quality and value of the product. This means that consumers often need to trust others evaluation of the good to get pre-purchase information about the good's quality. Thus, gathering information about the quality tend to be a costly endeavor for consumers, and might in some cases exceed the price of the good in question (Nelson, 1970)

The third type of goods, credence goods, are goods for which quality perception is difficult to evaluate even after consumption (Darby & Karni, 1973). Classic examples include education, medical treatments, legal services or home maintenance services.

We have so far referred the term "*good"* from an economic understanding, that is, any product or service available to a consumer. The mentioned distinction between search and experience rely on how easily the good's attributes can be pre-evaluated by the consumer. Good's attributes can be divided into revealed and hidden attributes (Jun & Jolibert, 2016). When evaluating attributes of a good, the consumer will use observable criteria, such as color or price. These are examples of revealed attributes. Hidden attributes are attributes that cannot be evaluated by sensorial observation, for instance, efficiency or reliability. In addition to attributes, a good can also be characterized by whether it is a product or a service (Zeithalm & Bitner, 2012).

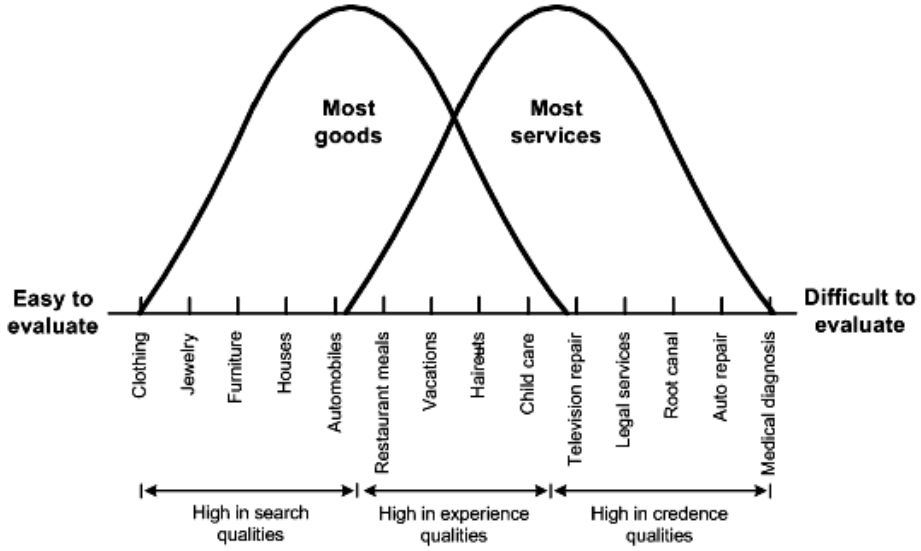


Figure 6.1: Product and service attributes

Most products with attributes that are easy to evaluate (revealed attributes) tends to be recognized as search goods. As figure 6.1 shows, services tend to be higher in experience qualities than products. Goods with hidden attributes and that are high in experience qualities are typically services. Goods with revealed attributes and that are high in search qualities are typically products. This is consistent with Nelson's statement that "*durable goods are associated with search products* while *non-durable goods are generally assimilated to experience products"* (Nelson, 1974).

Nelson builds his theory on a number of assumptions. One assumption is that the consumer assumes that there is a positive relationship between the price and the quality of the good. This assumption provides guideline in understanding the customer's perception of a search good and is relevant when considering how businesses adapt their goods both in terms of price and quality towards their customers. A second assumption that a consumer experiencing different variant of a homogenous good is able to determine the most preferred variant among all the variants (Nelson, 1974). In contrast to credence goods, experiencing these types of goods give enough information for a consumer to evaluate and decide which variant of a good he or she prefers. Credence goods are therefore not taken into account in Nelson's theory of search and experience goods. A third assumption is that experience goods can be acquired only by purchasing and "experiencing" the good. Ford et al. (1988) research on experience goods also emphasizes on the characteristic that experience goods must be purchased and used for a period of time before the consumer can claim to have an opinion on its perceived quality (Ford, Smith, & Swasy, 1988).

5.1.2 Implications for elasticity of price and demand, and marketing

Central to Nelson's (1970) distinction between search and experience goods is the cost of search. The theory states that a consumer will maximize the expected utility of good or service by searching information until the marginal expected cost of search becomes greater than its marginal expected return (Nelson, 1970).

Generally, for any types of good, the consumer can choose between either searching for, or experiencing the quality of the good. While we previously mentioned the cost of searching for information concerning the quality of a good, it is the cost of experiencing a good that limits the cost of search a consumer is willing to take (Nelson, 1970). Additionally, in Nelson's theory, the marginal utility for search and experience goods is the same for each consumer, meaning that to reach the equilibrium, a consumer would need a higher sample of search goods than experience goods to make a rational purchasing decision.

The relationship between the elasticity of demand and competition is important in order to understand the implications of Nelson's theory in the market of consumer goods. If the consumer does not have enough information on the quality of an experience good to make a rational choice between one good or another variant of it, the elasticity of demand for that experience good is assumed to be near zero. This is because the choice is considered to be near random. Conversely, the elasticity of demand for a search good depend on the amount of information and number of variants available in the market for that search good. As search goods does not require purchasing, the elasticity of demand for search goods is higher than zero.

Search goods are often subject to substitution or price competition, as consumers have better access to information and can compare features easily. In other words, the price elasticity is usually high for this category of goods. Experience goods, on the other hand, have typically lower price elasticity than search goods because consumers may interpret lower prices as an indicator of unobservable problems or quality variations. This is consistent with Nelson's first assumption. Those differences in price elasticity impact the competition level in the consumer goods market. The distinction between search and experience goods implies different levels of competition based on what type of goods that are dominating the market.

Finally, we can look at the implications of the above for how firms' price and market products and services that fall in one of the two categories. If a firm is a price leader of a search good, it should focus its branding on price attributes. Conversely, if a firm is not positioned as a price

leader, it should focus its marketing on other characteristics such as the longevity or availability of the good to the consumer. When it comes to branding experience goods, these are usually exposed to reputation and word-of-mouth effects created by consumers (Nelson, 1970). In general, brand reputation has a higher effect on advertisement for businesses offering experience goods, than businesses offering search goods.

5.2 Business models

So far, we have looked at characteristics of the products or services firms sell, and broad implications of this for pricing and marketing. Now, we will take these insights on search and experience goods, and couple it with theory on how firms design their business models to show the practical implications of the different characteristics.

A business model is the rational logic, or the blueprint of a business (Osterwalder & Pigneur, 2010). More specifically, a business model covers the four distinctive elements target segment, value proposition, value delivery and value capture (Drucker, 1993). *Target segment* describes which customers the firm is targeting. This includes its target market (mass, niche, segmented or multi-sided platforms market) and the relationship with its customers (personal assistance, automated or self-service, communities or co-creation relationship). The *value proposition* describes what value is offered to the customers, and can be based on classical features such as price and quality, or features such as newness, performance, design, cost or risk reduction, availability and user friendliness. *Value delivery* describes the way a business delivers its product or service to its customers. Delivering consists of making the value proposition physically or psychologically available to the customers. The product itself provide value to the customers, but only because the business made the product available to its customer (Kaufman, 2012). *Value capture* describes how the firm should capture a share of the total value created by the business, and is essential for the latter to be economically sustainable (Kaufman, 2012).

Several different normative frameworks exist that translate these four elements into specific components that a business model has to cover. One of the most popular such frameworks is the so-called Business Model Canvas (BMC) (Osterwalder & Pigneur, 2010). The BMC consists of "*nine basic building blocks that shows the logic of how a company intends to make money*", where each block can be classified into one of the four main business areas: offer, customers, infrastructure and financial viability, as figure 6.3 illustrates.

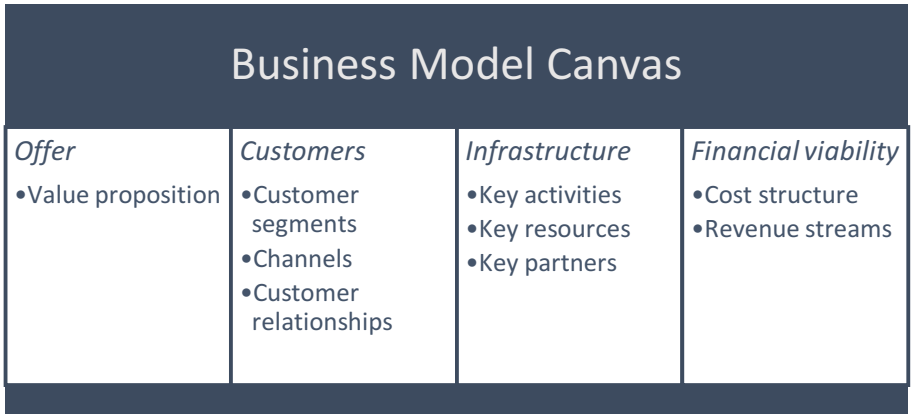


Figure 6.3: Business Model Canvas

In the following, we will go briefly through each of the four main business areas, and link its content to the earlier discussion on search- vs. experience goods to show the practical implications of this distinction.

Peter Drucker's definition of value proposition is basically the same as Alexander Osterwalter's. As described by Nelson (1970), the market of search goods may be affected by price competition. Whether a business *offers* search- or experience goods is therefore a deciding factor when considering strategic positioning towards competition.

The *customer business area* defines who the different groups of people the business considers as customers. There are different types of customer segments: mass or niche market, segmented or diversified market. The business chooses its customer segment both based on the product characteristics and on the customer's profile and needs. When it comes to search and experience goods, consumers that are high risk-takers, as opposed to low risk-takers, may be less reluctant to buy an experience good. Based on Nelson's theory, a low risk-taker might not buy an experience good because the associated risk makes their expected marginal utility negative. How the value is delivered to the customer, and how the business reaches and communicates with its clients is facilitated with channels. The business can own its channel or can use partner channels. The business' choice of channel considers the segment market and customer's reaching preferences. When it comes to search goods, information concerning a good's attributes can be collected by the consumer either directly from the product itself, from the producer (e.g. on the company website) or from other attributes (e.g. comparative market research) (Nelson, 1974). However, communicating information related to experience goods is different because the consumer must rely on non-observable product attributes, reputation or reviews from other consumers. A good example of such a communication channel is the word-

of-mouth concept also mentioned by Nelson (1970) in the theory of search and experience goods. As we will see in the next part, the apparition of disruptive innovation, such as the internet, has shaped new communication channels and customer relationships. The relationship between the business and its customers can have a great impact on the overall customer experience. When it comes to experience goods, businesses are often relying on consumer's feedbacks because it can be difficult for them to understand the consumer's experience and identify which product attributes are most valued by the consumers. Zeithaml and Bitner's (2003) theoretical view on product- and service attributes contributes to this aspect: services are characterized by unobservable attributes, and consequentially typically requires a closer provider-consumer relationship. Therefore, the relationship between a business providing services and its consumer often plays a critical part for a successful experience good-based business model.

The *infrastructure* business area describes the most important resources, activities and partnerships required to make a business mode work. Key resources are the main assets that the business need to create and deliver value to its customers. There are four types of key resources: physical, financial, intellectual and human. Key activities are the key things the business must do to make sure the elements of the business model are realized. The key activities present all the activities the business needs in order to secure its value proposition, distribution channels, customer relationship and revenue streams. They can be categorized as production, problem solving or platform/network activities. As we described with experience good services, some businesses will focus more on the channel element, others on the customer relationship element. Business models often requires alliances to success in their market. This element emphasize on the underlying motivations behind the partnership between the business, its supplier and its partners. It helps understanding who the key partners and suppliers are, and what key resources the business acquire from them. There are four types of partnerships: strategic alliances, cooperation, joint ventures and buyer-supplier relationships (Osterwalder & Pigneur, 2010). The experience goods market typically uses different forms of partnerships than the search goods market. Generally, partnerships play an important role in the service market because businesses providing services often require more complex content than search goods to both create and deliver the service.

As one of the main block constituting the *financial viability* of a business model, revenue streams are the generated incomes of the company and can be categorized in two distinctive types of revenue streams: transaction and recurring revenues (Osterwalder & Pigneur, 2010).

Any pricing decisions and analysis take into account the elements of the revenue stream building block. There are many ways to generate revenues, such as asset sale, usage or subscription fees, licensing or advertising. Generating revenues often implies generating costs, which is what constitutes the cost structure of the business model. Cost structure include all the cost generated by the business' activities. Understanding the cost structure can help the business understand which key resources and activities are most expensive and help identifying the fixed and variable costs. Depending on all the previous building blocks, a business model can have a cost structure that is either cost- or value-driven. As opposed to cost-based businesses, a value-based business will typically focus on the value each element generates for the customers rather than the costs. For instance, a value-based pricing business will determinate factors that contributes in generating value to the customers. These factors can be customer's satisfaction or happiness, but can be difficult to identify for the business. Therefore, moving from a cost-based structure to a value-based structure requires a good understanding of the good-attributes and the customer's experience from consuming the good.

5.3 Business Model Innovation and new technology

Although the business model framework can be applied to almost any business, it is not necessarily a rigged static state for any one business. As there are constant changes in the surroundings of the firms, they often have to adapt their business models in order to stay competitive. New technology is an example of such a change that often forces, or opens up opportunities for, companies to innovate their business model. Thus, business model innovation is not the same as technological or product innovation, but can be enabled or driven by other innovations (Markides, 2006).

According to Markides (2006), to qualify as an innovation, the new business model must enlarge the existing economic pie, either by attracting new customers into the market or by encouraging existing customers to consume more. Amit & Zott (2012) list three ways business model innovation can create value, namely by adding novel activities, by linking activities in novel ways or by changing one or more parties that perform any of the activities.

There are a number of potential drivers for business model innovation (Amit & Zott, 2001). One driver, the availability of new complementary technologies, is of particular interest for our thesis, as this is the essence of the scope of what we intend to investigate the implications of.

From technological innovation, one of the most impactful innovations in recent years has been the world wide web. The internet arguably presented new possibilities and new challenges for almost every business. For providers of experience goods in particular, the use of internet has played a major role with regard to the amount of information customers can acquire pre-sale. Access to audio-visual media and large databases of reviews for the experience, gives customers the ability to gather information from third parties. Thus, many experience goods have moved closer to the category of search goods (Huang, Backman, & Chang, 2016). Moreover, the internet has developed into an arena for several other uses. Online marketing has become a big part of everyday life for most consumers. Further, social media has changed the customer relationship for many, as they now have the opportunity to influence people every day with their content, and have accessible customer support from almost anywhere. The internet has also become one of the major arenas for purchasing.

5.4 Goods and business models in tourism

With the theoretical building blocks in place, we now continue by looking more closely at the tourism industry. The tourism industry is of particular suitability for our research, as it is one of the most distinguishable industries for experience goods. Though the tourism industry is complex, and contains a large amount of differentiated products and services, we consider travel experiences to be the most fitting commodity to investigate how virtual reality technology will impact experience goods. This, due to its inherent uniqueness, and how it is likely to be evaluated through experience.

In the past decade, the tourism industry has been challenged by untraditional competitors along its value chain, both in terms of products and services. Initiated by new technologies, behaviors and economic dynamics, these challenges are changing the boundaries of the tourism industry and have implications on the way businesses create, capture and deliver value to their consumers.

5.4.1 Definition of tourism

The World Tourism Organization defines tourism as "*the activity of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes"* (World Tourism Organization , 2014). In general, the tourism industry includes a vast variety of sectors and other industries, mostly consisting of businesses and organization providing tourism and travel services to visitors. Some of them

include hospitality, shopping and entertainment, banking and insurance and transportation industry (World Tourism Organization, 2016).

We will put our focus on cruise tourism, which is a form of tourism where the travel itself and the cruise ship is a part of the experience. The cruise ship has other purposes than transporting the passenger, it also provides with restaurant services restauration, activities and different stops along the trip.

5.4.2 Business models in tourism

There is a weak distinction between products and services in tourism because the process of producing and consuming a tourism service is often one of the same thing (Andersson, 2007). Andersson (2007) describes this relation as "*the moment when value is created and resources are consumed and thus the decisive moment for the economics of tourism experiences*. As Andersson puts it, tourism services are typically characterized as experience goods because the consumer cannot conceptualize the tourism experience or its quality without experiencing the service itself. In addition, the value created when the tourist consumes the service depends on both the business value proposition and on the *tourist's state of mind at that particular moment*, as described by Andersson.

When it comes to value proposition, we mentioned some of the values that can be offered to the customer, including risk reduction or availability. In the tourism service market, and especially in the case of cruise tourism, an important aspect of the value proposition is to offer the customers a successful travel experience. Therefore, reducing the customer's perceived risk associated to tourism services should be closely considered in the value proposition of a tourism business model. What defines key success factors of such business models rely on the understanding of the customer's needs and how the key activities and key resources of the business are adapted to fulfill these needs.

Reducing customer's perceived risk can also be facilitated through good communication channels. However, the information available to the consumer depends on the way the business communicates with its targeted segment. In tourism marketing for instance, businesses often use strategies that create emotions for the customer. Wan et al. (2007) discussed the effect of marketing in the tourism industry. They concluded that to optimize the advertising effect, the business should consider each characteristics of the travel destination very carefully and choose the media type that best appeal to the target market (Wan & Chiou, 2007). However, translating

travel characteristics into human emotions through marketing measures can be challenging, especially if the business does not have a specific target segment.

The partnership building block described in the Canvas business model is also a critical aspect for businesses in the tourism industry. A tourism service provider will typically have partnerships with other providers and organization within the industry, but also with companies in other industries. These partnerships are essential for tourism services because they constitute the essential processes that makes the travel possible. Such partnerships can include agreements with local or regional administrations, transport services or booking services.

Some research argues that businesses in the tourism industry do not engage in innovation, but rather promote it by implementing innovative specifications to their products or services (Sundbo & Gallouj, 2000). Clause and Madsen (2014) also confirmed the link that exists between innovation and the customer's interaction with the firm within experience-based tourism. Additionally, Prebensen (2014) studied the role of customers as knowledge sources for innovation. Her research concluded that knowledge about what is valued in the process of booking and remembering a tourism experience, can contribute to the further development of experience products (Prebensen, 2014). Clause and Madsen (2014) examined the sources of knowledge that experience-based tourism firms use in their product innovation processes. Their research concluded that customers are an important source of knowledge for innovation activities. The way this knowledge is collected by businesses within the tourism industry is diversified, and include practices such as satisfaction surveys, questionaries or written and oral feedbacks (Clause & Madsen, 2014).

5.5 Virtual Reality Technology and Tourism

Even though the concept of virtual reality was first introduced in the 1960's, it's only in the most recent five years that the big efforts to make it a mainstream commodity has taken place. From being an obscure technology that only a few people had access to, virtual reality is now becoming a high-impact technology in several markets (Deloitte, 2016). In this part, we introduce virtual reality technology and explain how this technology can be implemented in the tourism industry.

5.5.1 What is Virtual Reality technology?

Guttentag (2009) defines virtual reality as *the use of a computer-generated 3D environment – called a virtual environment, that one can navigate and possibly interact with, resulting in a*

real-time simulation of one or more of the user's five senses (Guttentag, 2009). Guttentag definition refers to *navigation* as the possibility for the user to move around without restriction in the virtual environment and refers to *interaction* as the ability to interact with what is present in the virtual environment. The *user's five senses* refer to the five human senses: Sight, hearing, touch, smell and taste. Sight and hearing are senses that are usually stimulated in most virtual reality experiences, while the sense of touch, also known as haptic, is less common (Guttentag, 2009). Another definition of virtual reality from Sherman and Craig (2003) contributes to our understanding by defining a virtual reality experience based on different levels. The four elements that a virtual reality experience should have are: the presence of a virtual world, the presence of immersion, a response to user input and a form of interactivity (Sherman & Craig, 2003). Immersion represents the physical configuration of the virtual reality system and can be classified in three levels: fully, semi and non-immersive systems (Gutierrez, 2008). Each system determines the level of immersion and requires different types of virtual reality technologies. The non-immersive system is usually a desktop or mobile-based system that can be used in the video game industry or to watch 360 degrees' videos or images. The concept of immersion was later developed by Kim (2005) when describing the spatial presence in a virtual reality context (Kim, 2005). On that note, spatial presence must be distinguished from non-spatial presence since the latest refers to the user's psychological effect of the virtual reality experience only.

Major technology companies such as Oculus with HMD headsets, HTC with Vive, Sony with PSVR (PlayStation Virtual Reality) systems, Google with Google Cardboard and Daydream View, and Samsung with Gear VR, are leading the virtual reality race today. There are, however, different types of virtual reality technologies with different grade of complexity and functions. We make the distinction between *Mobile VR* and *Tethered VR*, where the former is operating through the use of a mobile and the latter is operating through the use of a computer and requires cables between the headset and the workstation. There are also more complex virtual reality technologies, such as body sensor suits, eye-tracking or motion controllers that increases the user's immersion, non-spatial presence and interactivity possibilities with the virtual environment.

5.5.2 Virtual Reality as a driver for business model innovation

Since the 1970's, the development of virtual reality technology in the entertainment industry has led to the development of new virtual functionalities suited for other product and services in entertainment such as music, sport or travel (Jacobius, 2016). This technological

development has also led to adaptation to other industries in the education, military, medical or heath care industry (Guttentag, 2009).

According to Markide's (2005) definition of business model innovation, to be qualified as an innovation, the use of virtual reality technology must either attract new customers or increase existing consumer consumption in the market in question. In order to understand how virtual reality has already been a change driver in some industries, and therefore can be considered a real potential disruption in the tourism industry, we will now look at some examples of virtual reality innovations in other industries.

In the music industry, multiple virtual reality products are currently available for customers to experience virtual musical performances, concerts or music festivals. Such virtual experiences are available for free on social media but they can also be sold and create a profit. The Norwegian pop star band, A-ha, together with Hydro, a Norwegian global aluminum company, organized in 2016 a concert using Virtual reality technology. Available online, it can be played whenever the customer wants for an affordable price (A-HA, 2016). In sports, the same concept was used by Samsung during the Winter Olympic Games in 2016 to offer customers a virtual Olympic experience (Rio2016, 2016). In car manufacture, Audi takes the lead in the United Kingdom by offering customers a virtual reality driving test and have a real-life-like experience with the car. Audi's virtual driving test offers a safer and cheaper alternative for car-testing. The virtual experience may also give the customer the possibility to virtually test the car in various environments that they would not previously have been able to.

These examples show how virtual reality technology can simplify pre-sales processes and remove the boundaries between a consumer and a product by removing the physical barriers that separates them. When it comes to travel, virtual reality technology intervenes as a simulator of a real travel experiences, so that travelers can evaluate potential vacation spots or place to stay.

5.5.3 Virtual reality technology and the tourism industry

Williams and Hobson (1995) research on virtual reality revealed that the technology would have important impact on tourist's behavior and consequently impact the whole tourism industry. Virtual reality technology can also have a great impact on marketing and the way tourism related businesses promote their travel destinations (Williams & Hobson, 1995). The European Travel Commission (ETC) mentioned how marketing messages in customer's travel

decisions can have more impact than traditional marketing channels when the messages are based on experiences and human feelings. The World Tourism Organization also consider VR as a driver of development in the tourism industry (Jacobius, 2016). As we have described in the theory of search and experienced goods, experience services are susceptible to be exposed to word-of-mouth, consumer's beliefs and media covers. The use of virtual reality technology in marketing strategies could influence the customer's choice of destination and purchasing decision (Williams & Hobson, 1995). There are today cruise lines that proposes virtual tours of their destinations by offering 360-degree images on their websites. Some cruise lines also offer 360-degree videos of their ships. Hurtigruten is one of the cruise lines that have decided to further investigate the potential virtual reality technology can offer to the tourism industry.

5.5.4 Hypothesis one – Customer acquisition

As we have seen, one of the key elements of any business model is the customers. For experience goods, understanding how to provide customers with sufficient information to persuade them into purchasing can be a determining factor for success. With the use of virtual reality technology, it is expected that the user will gain a higher immersion in the information they are gathering. As the vividness of a virtual experience closely relates to the expectations of the actual experience, we have set up five hypotheses of how we believe exposure to virtual reality images will influence the way customers get acquired by the suppliers of these goods.

5.5.4.1 Hypothesis 1A

"*Exposure to virtual reality will increase purchasing for the experience good*."

5.5.4.2 Hypothesis 1B

"Exposure to virtual reality will increase the intention to purchase the experience good."

5.5.4.3 Hypothesis 1C

"Exposure to virtual reality will give customers a more positive attitude to purchasing the experience good."

5.5.4.4 Hypothesis 1D

"Exposure to virtual reality will increase perceived access to information about the quality of the experience good."

5.5.4.5 Hypothesis 1E

"Exposure to virtual reality will decrease the perceived risk for purchasing the experience good."

5.5.5 Hypothesis two – Future implications

To ensure some relevance for our findings, and make them applicable to more than just reporting on the current state of virtual reality, we need to include some understanding of how virtual reality might be considered in the upcoming time. Firstly, we must be aware that virtual reality technology, like any technology, improves with continuous development. Thus, we must take perceived quality of the images into account. This way, we can also do analysis controlling for the perceived quality, to check for any latent effects that might become real as the quality of the technology improves. Further we find it useful to understand that virtual reality is not only an information-gathering system, but should also be considered for the value of the exposure experience itself. We know that the technology was initially intended for entertainment purposes, and we would say that ignoring this aspect of the technology would be unwise. Our two main hypothesis regarding future implications of the technology is therefore as follows.

5.5.5.1 Hypothesis 2A

"The perceived quality of virtual reality images is higher in 2D than in virtual reality"

5.5.5.2 Hypothesis 2B

"Customers enjoy watching virtual reality more than they enjoy watching the same images in 2D".

5.5.6 Hypothesis three – Altered customer experiences

Due to the fact that there is limited research on the effects of virtual reality used for business purposes, and even less so relating to tourism, we believe that a more explorative approach to understanding how expectations and memories of the real experience is influenced by having previously seen the destinations in virtual reality would increase our ability to discuss the likely future uses and implications for the technology in businesses. As virtual reality headsets can be used in more settings than to encourage purchases, we have decided on exploring the following two hypotheses to give a more holistic view on the way virtual reality might impact the business models in the tourism industry in the future.

5.5.6.1 Hypothesis 3A

"Exposure to virtual reality will increase the expectations for the real experience."

5.5.6.2 Hypothesis 3B

"Exposure to virtual reality will influence customers' memories/ evaluations of the real experience".

6 Methodology

Based on our hypotheses, we will now consider our methodological choices for testing them. This includes our research design, as well as how we have prepared and executed our data gathering, and potential threats to validity and reliability of our data. The statistical methods used in our analyses are presented prior to each analysis.

The data material for testing our first set of hypotheses will be limited to the first experiment, as the participants of the second experiment had already bought the tickets to a travel experience. The list and explanation of the grouped variables we are using is available in section 6.1.3.1.3 of this research paper. These hypotheses will be tested by looking at different grouped variables, and check for significant differences between the virtual reality- and control group, either directly or with moderating and/or mediating variables.

Our second set of hypothesis addresses elements that are relevant to be able to discuss the current and foreseeable implications of this technology based on how the users experienced and reacted to the exposure of virtual reality compared to the 2D images.

The third hypothesis will be tested exclusively from the data gathered in the second experiment due to the sequential set-up for the questionnaire. Understanding how the customer experience is influenced by exposure to virtual reality gives better grounds for decision-making with regard to where the firm might want to provide this. We will look at two underlying reasons for altered customer experiences.

6.1 Research design

As our research aims to discover the likely effects of a new technology for a given industry, it is important that we are able to get the right type of data, and that the data has a high degree of validity. There is very little research done in the field of Virtual Reality technology for the tourism and travel industry, and we will accordingly rely solely on the data we will be gathering through our experiments. This is referred to as primary data (Saunders, Lewis, & Thornhill, 2009).

The research is conducted in a conjoined effort from both a marketing- and a strategy focused research group, where the findings are shared openly between the two during the analysis of the gathered data. Thus we will be looking to gather a rich set of data, as this allows for different approaches to analyzing it. This collaborative design benefits both groups, as the marketing centered paper will be able to concentrate their efforts on the isolated effects of the virtual

reality exposure, while we can complement their research by putting their findings into a business context. In this paper, we will therefore ignore some of the mediating and moderating variables that explains the relationship between variables, and rather focus on the implications of the discovered total effects. Our macro level analysis is better suited for the purpose of this paper, which is to understand how the effects of virtual reality will impact the business models of providers of experience goods in the tourism industry.

As the data analysis of the two groups are independent and simultaneous, it is a considered primary analysis (Glass, 1976).

6.1.1 Research purpose

Saunders et al. (2009) argues that the purpose of a research study can be either exploratory, descriptive, descripto-explanatory or explanatory. According to Robson & McCartan (2002) description of an exploratory purpose – to find out what is happening; to seek new insights; to ask questions and to assess phenomena in a new light – we would argue that this suits our research well due to the very thin research coverage of VR technology's expected influence for the tourism industry. Our research profile is best described by the fourth purpose type, which refers to a model in which you aim to establish a causal relationship between variables. In our research, we are firstly aiming to establish the relative effects of virtual reality exposure compared to traditional picture exposure in the context of travel experiences. Out findings are in turn analyzed in the theoretical framework established above, and it is in this regard that our research takes an exploratory turn. This is conducted in what Saunders et al. (2009) calls *a search of the literature*.

6.1.2 Research approach

Saunders et al. (2009) argues that there are two overarching approaches to research: deductive and inductive. It is also noted that there are many cases in which a combination is preferred. Our study is initially designed to follow Robson's (2002) five sequential steps of deductive research:

1. *Deducing a hypothesis from the theory:* Based on the presented literature about goods, business models and business model innovation, we have made a list of testable propositions about the relationship between VR-exposure and different dependable variables. We have divided these hypotheses to fit into either a business related context, or a customer oriented view.

2. *Expressing the hypothesis in operational terms:* We are measuring the different concepts through a set of either two or three questions (or variables) relating to the same concept. Thereafter, in analyzing the data, we are combining the related variables to get a better representation of the real effect of the variable. We are running the tests of variables using both moderating control variables and with mediating dependent variables.
3. *Testing this operational hypothesis:* Using suitable statistical tests in SPSS, we will test the relationships between the different causal relationships we have predicted in our hypotheses.
4. *Examining the specific outcome of the inquiry:* We hope to be able to find either confirmations or dismissals of our hypotheses from the tests. From these findings, we will also understand if any of the theoretical framework used to construct our hypotheses needs to be modified. If none of this is found, we hope to be able to provide modifications to our study that would enable such outcomes.
5. *If necessary, modifying the theory in light of the findings:* Our hypotheses are derived from general theory about different interlinked concepts. Thus, we would not expect for our tests to modify any of these theories, but rather compliment them by providing a deeper understanding of how the concepts relate in a specific industry with a specific technology.

The second part of our research, where we use our findings to make predictions about the implications of virtual reality technology for business models based on existing theory, also follows a deductive approach. Still, we do not follow the five steps mentioned in doing this, as the hypotheses we construct in effect is the end goal of this exercise, and will not be tested.

6.1.3 Data gathering

In order to answer our research question, we depend on a large number of respondents, as this will give better grounds for catching significant deviations between our two groups in both the lab- and field experiment. This form of gathering data requires careful planning and consideration as there are several possible sources of error that needs to be eliminated or minimalized (MacDonald & Headlam, 2009). Though our two experiments mainly measured the same variables, the planning and execution of the two differed vastly.

6.1.3.1 Experiment one: Lab experiment

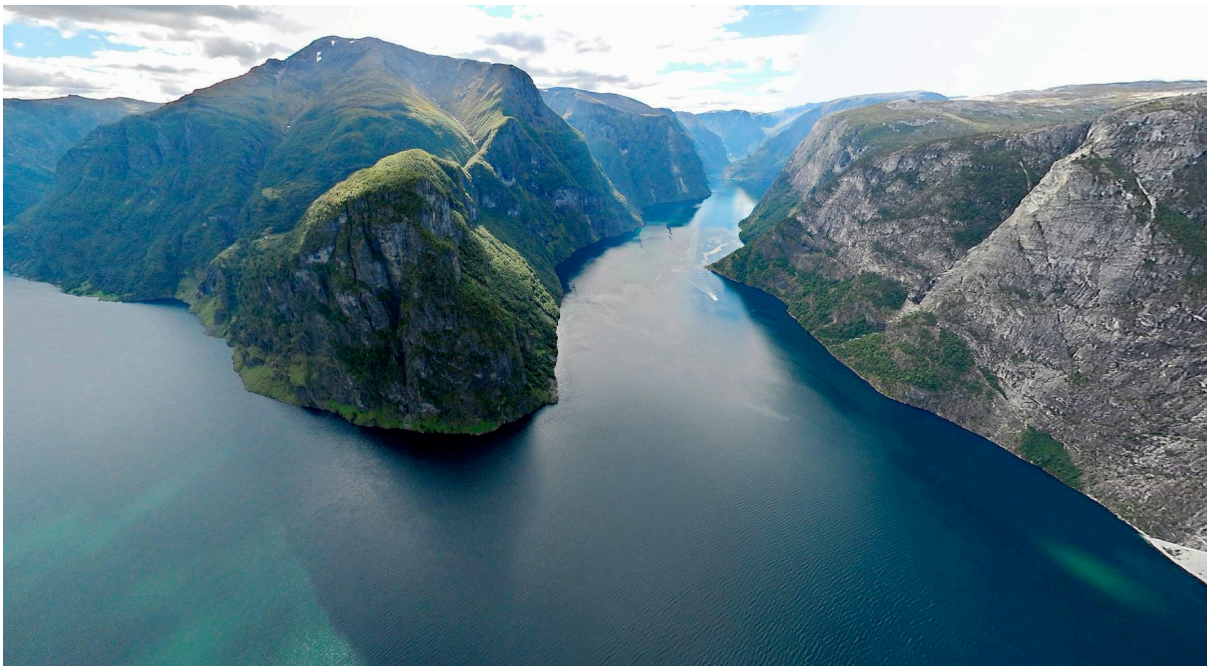
Our first experiment would take place at the Norwegian School of Economics.

6.1.3.1.1 Media

For our first experiment, the images shown were from three different locations. The virtual reality exposure consisted of three 360 degree images, as shown in the links below, while the 2D-exposure consisted of three images from each of the locations. The decision to use three images from each location in this experiment was decided in collaboration with our supervisors based on what was considered to be appropriate in order to capture all the "main angles" and motives from the 360-degree image, without the pictures seeming overlapping or displaying non-scenic cuts, such as only sky or only water.

The three locations depicted is shown below, and the other images used in the experiment can be found in the appendix 11.2.1.

Aurlandsfjord – Nærøyfjord:



360-degrees: http://360.visitnorway.com/fjellandfjord/#/fjellogfjord39

The Nærøyfjord:

360-degrees: http://360.visitnorway.com/fjellandfjord/#/fjellogfjord44

Flåm Railway:

360-degrees: http://360.visitnorway.com/fjellandfjord/#/fjellogfjord26

6.1.3.1.2 Sampling frame

By recruiting Norwegian students at the Norwegian School of Economics for our study, we would limit the difference in our participation pool, while also being able to get enough participants to achieve statistical power. Though the homogeneity of this group increases the validity of our findings though less differences in independent variables, we also realized the weakness of limiting our experiment to only include this one type of potential consumers. We had decided that we would need a minimum of 60 participants for the experiment to have the chance of gathering enough data to be able to provide statistical significant causal effects. However, we aimed to get above 100 student participants, as this would increase the likelihood for the effects to present themselves substantially. Only if we wanted more participants would we start recruiting participants from the Master program. The theoretical formula for determining the sample sizes required in each comparison group can be expressed as follow,

$$n_i = 2(\frac{\mathrm{Z}\sigma}{\mathrm{ES}})^2$$

where n_i is the sample size required in each group, Z is the standard normal distribution reflecting the confidence level, σ is the standard deviation and E is the margin of error. In our analysis, we use a 95% confidence level ($\mathrm{Z} = 1.96$) and a margin of error of 5. We consider an average standard deviation of 1.5 since the majority of our constructs both experiment datasets lies between 1 and 3. By applying the formula we compute the values and get a required sample size of $n = 69.15$, that is, 69 observations required in each group. Using a standard deviation of 1, the required size falls to 62 participants, which is consistent with the minimum number of participants we agreed upon.

Recognizing that virtual reality technology is widely considered interesting in the student body, we avoided mentioning it in the invitation to participate. This way, we avoided inflated differences between our experimental- and control group that was due to influence from the effect of participant expectations. Still, we needed a relatively large share of the students to participate. We concluded that the most effective way of recruiting without using this as leverage, was through an extensive presentation in class, held by our supervisor, combined with a high probability of winning a gift card worth NOK 3 000,- drawn between all participants. In advance of the recruitment, we also contacted the students which already knew what the experiment was about to tell them not to sign up. This was done to make sure that every participant had as equal prerequisites as possible when taking part in the experiment.

6.1.3.1.3 Variables

After deciding the sampling frame, we decided on the manipulated independent variable; the control group would be exposed to a 2D pictures displayed on a high-end smartphone, while the experimental group would be exposed to 360 degree pictures using a "mid-end" Virtual Technology headset. The pictures displayed on the smartphone would be screen sections of the same motives as the ones displayed in 360 degrees in the VR headsets. This way, the exposure would give approximately the same visual information, and the main difference would be the medium in which the information was communicated to the participants.

Further, the overarching criteria in selecting the dependable variables were that they should have a reasonable likelihood of being altered depending on exposure, based on what we already knew from a theoretical point of view. The variables should also have relevance in either (or both) a marketing- or/ and strategy perspective. The following concepts were decided on:

Concept	**Description**
Telepresence	This concept is defined as the degree to which one feel a sensation of being somewhere else.
Imagination	The degree to which one can imagine how it would be to actually experience the good in question.
Connectedness to nature	The degree in which one feels as part of the nature surrounding oneself.
Risk profile/personal traits	The extent of one's perception of risk and surprise as a positive attribute in experiences.
Attitude	The attitude towards purchasing the presented good before a real offer to purchase has been made.
Senses	The extent in which one expects their senses to be stimulated by the actual experience.
Emotion	The expected level of emotional reaction one expects the experience to give for oneself.
Cognition	The expected level of cognitive stimuli the experience would provide.
Accessibility	How accessible one feels the presented experience good is to the viewer.

Enjoyment	The degree of which the viewer enjoys looking at the presented material through the given media.
Impression	How the general impression of the trip is to the participant after looking at the images.

For the lab experiment, we would measure each non-modified dependable concept through three similar questions, all with strong link to the concept. The full list of questions is found in the appendix 11.1. We also agreed on what the possible independent variables that could influence the outcome were. This way, we were able to define which variables we would have to be able to control for in our data analysis. To decrease the likelihood of biased of influenced answers in the questionnaire, one of the measures taken were that we would ensure our participants of data anonymization, and would therefore avoid having any questions revealing personal or identifying information about the participants. However, we would be able to control for impersonal information, such as: gender, age, study program (Bachelor or Master), hometown they grew up in, eyesight limitations and previous knowledge or experience.

6.1.3.1.4 Pre-test

As we wanted to test for real behavioral differences, we decided that we would offer a travel product to the destinations the participants had seen pictures from, after they had completed the survey. To avoid ceiling- and floor effects, it was crucial to price the offer at a level where some participants would accept it, while not attractive enough for most or all participants to accept. We agreed that the best way to ensure this was through setting the price right. For us to understand what the price should be, we decided to conduct a pre-test among our fellow students, only testing their hypothetical willingness to pay for a product described similar to what the participants would be exposed to later.

Our initial tested price point turned out to give a higher rate of purchase intention that what we would want. Thus, we ran the test again at a higher price point, which got close to the wanted rate of purchase. The relative change between intention rate and price difference allowed us to understand the approximate price elasticity of the product. Thus, we calculated the best estimated price point to give a likely purchasing rate that would provide measurable significant differences in the experiment, if they existed. This would also allow us to predict the actual purchases from the experiment, which meant that budgeting was likely to be more accurate.

6.1.3.1.5 Data type

Using an experimental design, based on real purchasing decision, our methodology depend on quantitative data. To avoid sources of error in coding answers, we made sure that the primary data gathered got coded directly through the questionnaire. This meant that we for almost every question would use an eleven-point (0 – 10) response-scale. This format was chosen due to having a natural mid-point at 5, as well as being both understandable for the participants and providing a high enough level of nuance or accuracy that it would be possible to discover any possible differences between groups during analysis. To make sure we would not make any human errors in transferring the participant answers to a digital format for data analysis, we decided to make the questionnaire electronically available in all the labs where the experiments were being conducted. This way, the data would already be digital, and accordingly, easily transferrable to statistical analysis software.

6.1.3.1.6 Participation rate

Having the participants complete the survey while in the room with a researcher also had the benefit of ensuring a high response rate. The main challenge in participation rate was, as predicted, getting every registered participant to meet up at a suitable time. To resolve this, we decided on an electronical registration where we would allow the participants to set up the time according to their own schedule, as long as we had enough capacity to take them in. In addition, we gathered their contact info as part of the registration process. We and sent out reminder SMS one day in advance to all the registered participants, and encouraged the participants who did not show up to register again at a later hour.

6.1.3.1.7 Question formulation

To get as correct measures as possible, we spent several rounds of revising our questions after their first draft. This ensured that the questions were all clear, precise and concise (relatively short); any leading, ambiguous or compound questions would seriously compromise the validity of the data. For all questions we also evaluated to what extent it was loaded. As a rule, this should be avoided, but though loading some questions deliberately, we were able to force the expected average towards points on the scale where differences would appear. Hence, if the expected average response to a question were close to either end of the scale (0 or 10), we could make the question more extreme, and thus push the expected average closer to the center of the scale, where differences are possible to pick up.

6.1.3.1.8 Observations

During the experiments, we decided that the researcher would take note of a few observable variables; Some of the variables, like exposure time to the media or if the participants used glasses or lenses, would be used as a controlling variable in later analysis, while others, like excitement or talkativeness, were measured as possible interesting mediators to explain our findings. To link the observations of each participant to their answers, without compromising the anonymity, the observations would be filled out in the same survey as the on the participant filled out, without the possibility to go back and edit or review the participants provided answers.

6.1.3.1.9 Training

Ensuring minimal differences in participants' experiences in the experiment increases the validity of the gathered data. This is essential, as the purpose of an experimental design is to isolate the effects of the manipulated independent variable; the only systematical difference in the two groups should be the different medium used to view the images, and all other sources of random variation should therefore be limited as much as possible. For this reason, we took several measures to standardize the experiment process to the highest detail possible. This included firstly writing a comprehensive script for the researchers, also listing any and all actions to be taken. Secondly, we made a set of behavioral rules, including: tone of voice, how to reply to questions, level of mood/energy, dress-code, physical placement in each of the experiment rooms, how to strap on the VR-headset, and how to greet participants upon arrival. Thirdly, we took turns on handling the technical gear to make sure we were completely comfortable taking care of any technical issues if they were to arise.

One important factor we considered especially carefully was how to behave in relation to making the actual travel offer at the end of the survey. As this was considered the most interesting variable, we identified an obvious potential for researcher bias, where the sales pitch would differ depending on the media the participants were exposed to. We would also have to make sure this awareness did not have an opposite effect. To make sure this was as equal as possible, we practiced in front of each other several times, both before and during the experiments, with a strictly scripted pitch.

Another vital part of the training included running a "beta test" of the experiment, using professors. This way, we could observe how the other researchers lead their experiment, and agree on a "norm" which would be as equal as possible. Getting feedback from professors with

long research experience also provided a valuable critical review of our process, and allowed us to make sure everything we planned to say was easily understood by the participants. This trial run also exposed potential sources of issues that could occur, and allowed us to design the experiment to reduce the risk of them occurring. During the trial, every researcher also took observational notes, which were compared after the experiment. This way, we could agree on a norm for evaluating the different observable variables, and would thus avoid having substantial systematic differences depending on the researchers' subjective opinions.

6.1.3.1.10 Randomization

Considering that the rooms used for the experiments were different in both size and interior, we wanted to take all possible measures to limit the effects this would have. We removed every excessive and removable furniture and accessories from each room, and refurnished them to look and "feel" as equal as possible. Although several measures were taken to minimize consistent differences depending on the researcher, we saw room for limiting it further; by setting up a system that made sure each researcher would use all rooms approximately equally, as well as equalizing how many participants each researcher would expose to the different technologies in each room, the systematic differences that might arise from certain researchers using a certain technology in a certain room differently than others, would almost be annulled. We had four rooms, four experiment leaders, two virtual reality headsets and two Samsung Galaxy S7 Edge smartphones. Our solution to avoid systematic differences was to rotate rooms each day, except for the two last days because the registered number of participants in these two days combined was close to the average of the other days of the experiment. In addition to this, we also rotated what medium (VR or 2D) we would use in our respective rooms each day, and kept score on how many participants we had ran our experiment on with what medium and in what room. This way, we were able to adjust for any imbalances occurring as the experiment went on. Through this kind of randomizing the aim was to avoid any systematic differences than the intentional experimental conditions created. This, due to sources of error or differences being likely to spread evenly between the conditions and individuals in the experiment.

The last source of error we tried to omit through randomization, was the researcher-participant relationship. As some researchers might act differently depending on the age, gender or other properties within the participant, every participant was assigned a researcher at random upon arrival. However, if the participant in question was a friend or otherwise known to any of the researchers, the researcher(s) in question would be removed from the draw, as this was considered to have a probable effect on the way the participant experienced the experiment,

and thus would put the participant through a different experience than the rest, with a likely influence on how they answered the questionnaire, as well as on how they considered the offer made in the end. The feeling of anonymity might also suffer.

6.1.3.2 Experiment two: Field experiment

The second experiment would take place onboard Hurtigruten during the sailing/ it's route between Bergen and Trondheim. The information gathered in this experiment was largely towards the same parameters as the ones in the lab experiment. The three main differences between the two was the reduced amount of control, the sampling frame and the post-experience measurement in the field experiment.

6.1.3.2.1 Media

In this experiment, the media we were going to use was from the destinations we were going to visit the following day. Due to the 360-degree picture set from these destinations containing richer details, we decided to use four images per location for the 2D exposure to ensure that they would see everything that the virtual reality users would. This was also somewhat as a learning experience from the first experiment, as the exposure-time for the 2D exposed participants were vastly shorter than that of the virtual reality group, and we thought that the prerequisites would be more equal if they got a smaller gap in the media exposure time, which was likely if there were more pictures to watch in 2D.

This experiment also had images from three destinations, as you can see below.

Leknes – The Hjørundfjord:

360-degrees: http://kunder.makingview.no/2012/fjordnorge/#/fjordnorge7

Slogen – Øye:

360-degrees: http://360.visitnorway.com/geiranger/#/slogen

Skagenflå – Geiranger:

360-degrees: http://360.visitnorway.com/geiranger/#/skagefla

6.1.3.2.2 Sampling frame

As the survey would take place onboard the ship, and crewmembers would not be eligible for participation due to their very different prerequisites, the sampling frame would be limited to people who would had already purchased tickets to the trip. We expect this to play a significant role in how the participants experience the media exposure. These participants should be prone to have a higher interest in these kind of trips. They would be expected to have certain expectations to the trip, and due to the relatively high price of such a trip, combined with information about approximate average age of travelers from Hurtigruten personnel, we can expect that most participants are of a much higher age than those in the lab experiment.

With regard to recruitment, we will also be dealing with a much lower pool of potential participants. This means that in order for us to have a chance of finding statistically significant differences in the data, a much higher rate of the pool will have to be recruited as participants. We would also expect a difference in motivation to participate, as money was an unlikely main driver towards participating, given the already high price paid to be a passenger. Taking all these factors into consideration, we decided to set the participant goal to 60, as this should be able to pick up potential differences.

6.1.3.2.3 Variables

The survey on Hurtigruten was held with a similar purpose as the lab survey. Hence, the questionnaire had very similar questions. However, as the participants were anticipated to be more pressed for time, while we would also ask them to come back for a new questionnaire the day after the media exposure, we decided to limit the measurement of each variable concept to two questions each. This way, the first survey would not take too long, and the participants would be more likely to report to us the next day. The second day questionnaire is also the part that deviated the most from our first experiment; We measured the post-experience, or how the participants actually experienced seeing the places they had only seen in VR/ 2D the day before. This was to put us in a position where we could see how memories might be influenced by pre-exposure to VR.

6.1.3.2.4 Data type

Taking into consideration that the survey was to be conducted while the ship was sailing, that we would have limited space, and that the participants were expected to be of a high age, we decided to have an analog (on paper) questionnaire prepared for them. We would then translate this data into a digital format ourselves. This left a slight chance of us typing wrong on one or

two questions in the transfer, but this was considered to be minimal. We also created a "fail safe" for ourselves to avoid skipping or overlooking any of the questions when plotting them by digitally forcing a response on all questions. Thus, the only way we would be able to make mistakes was by checking of the wrong option, which in most cases would not corrupt the statistical value of the dataset.

6.1.3.2.5 Changes in survey

Due to the limitations in variables, the questionnaire in the second experiment was shorter. However, as we did measurements on both expectations and post-experience, the total amount of data gathered per participant exceeded that from the first experiment. Due to the participants being expected to be mainly non-Norwegian speakers, we made translations of the information letter, the instructions and both questionnaires to English, German and French, in addition to the Norwegian version, to ensure that the participants fully understood what they were being asked. The Norwegian version for the VR-exposed participants can be examined in the appendix 11.1. The translations were made by a translation company and read through by speakers of each language to ensure that the content was communicated clearly.

It is also important to note the contextual differences in the second experiment. Firstly, the participants were not scheduled, but instead registered for and participated on a "drop-by-basis", which meant some participants had to wait in line while others were exposed to the media. The non-scheduling also meant that we took time out of the participants' time from other activities on-board, leaving them more pressed for time. Secondly, the field nature of this experiment brought a set of external interference; the participants were often joined by friends or family and would oftentimes talk about their experience both before the first questionnaire, and between the first and the second questionnaire.

6.1.3.2.6 Training

Lack of access to the venue (the ships) in advance to the experiment meant that we were not able to run a pilot experiment and standardize our procedure to the same degree as in experiment one. However, as this experiment was conducted subsequent to the other, we decided to use the guidelines agreed on there to the extent that was possible. As this experiment was conducted in two rounds, we also took the time between to evaluate the bottlenecks and learnings from the first trip to ensure we could optimize the second trip. As a result, we changed our recruitment tactics by involving the crew to a much higher degree and by being more visible to the passengers during the experiments. We also had a more "aggressive" approach to the

passengers, meaning that we would take initiative to talking to the passengers as they passed by our stand, and ask them if they had time for the survey when it seemed appropriate.

6.1.3.2.7 Randomization

Overcoming language barrier for the passengers with limited Norwegian and English proficiency outweighed possible researcher-participant influences. Having one researcher speaking fluent German and one speaking fluent French, we would direct German- and French speaking passengers respectively to be handled by these two researchers. This was also due to the more dynamic nature of our experiment, where conversations with the participants prior to the experiment was a natural part of recruitment. We also concluded that because we would only have a maximum of two participants exposed to the media at any given time, the effects of having mainly two experiment leaders instead reduced the variation in how the participants experienced the survey.

6.2 Data Validity and Reliability

We have discussed some of the limitations related to data gathering and justified what we believe are the necessary measures to deal with those concerns. We will now discuss the validity and reliability of our experiments and analysis. Validity testing refers to how accurate a test measures what is supposed to be measured, while reliability refers to the degree to which the tools gives reliable and consistent results. Both concerns must be discussed in the analysis.

6.2.1 Construct Validity

Construct validity is the experimental demonstration that a test measures the construct it is supposed to measure. A construct is the physiological term to define an attribute or skill that is proper to the human brain. Since our master thesis explores the effect of virtual reality on participants through the use of psychological constructs of human behaviors, we must make sure that our construct validity is done correctly. The way we have conclude which items belongs to which common constructs for each experiment is presented in the factor analysis.

6.2.2 Internal and External Validity

Internal validity is used to make sure that the relationship between two variables is causal and not simply due to correlation. External validity is used to make sure the results of the study can be applied to other situations. Whenever two variables are correlated indicated whenever a change in one variable is met with similar changes in the other variable. A positive covariance indicates that when one variable deviates from the mean, the other variable deviates in the same

direction. A negative covariance indicates the opposite (Hill, Griffiths, & Lim, 2012). When analyzing the correlation between variables, we will always consider the validity of our observations and discuss wherever a causal relationship is defendable Considered in our analysis, Pearson product-moment correlation coefficient should lie between -1 and +1, where -1 indicates a perfect negative correlation and +1 indicates a perfect positive correlation.

6.2.3 Reliability

As defined above, reliability tests if the results will provide the same outcomes if the analysis was repeated many times. Put in other words, reliability indicates the presence (or not) of random error in the analysis. In this part, we will focus our attention on internal consistency and test the degree to which the items (individual variables) of each constructs (grouping variables) are measuring the same underlying attribute. We will use Cronbach's coefficient alpha statistic test in SPSS for that. The Cronbach's coefficient indicates the average correlation among every items that constitutes each construct. The coefficient value is set between 0 and 1 where the higher the value is, the greater the reliability is. The accepted minimum coefficient value for each construct depends on the types of analysis but it is normally recommended to lie at least above 0.7. The results of the Cronbach alpha tests for both experiments are presented below.

Constructs	**Experiment one** Cronbach Alpha test	**Experiment two** Cronbach Alpha test
Snitt_Attitude	0.849	0.856
Snitt_Attitude2	N/A	0.888
Snitt_Sense	0.898	0.829
Snitt_Emosjon	0.839	0.841
Snitt_Emosjon2	N/A	0.954
Snitt_Kognisjon	0.804	0.846
Snitt_Kognisjon2	N/A	0.965
Snitt_Accessibility	0.70	0.844
Snitt_Imagination	0.804	0.835
Snitt_Telepresens	0.845	0.847
Snitt_Enjoy	0.903	0.839
Snitt_Self	0.764	0.829
Snitt_Natur	0.822	0.841

Snitt_Intensjon	0.786	N/A
Snitt_Positive_Impression	0.867	0.934
Snitt_Positive_Impression2	N/A	0.841
Snitt_Personal_Traits	0.632	N/A
Snitt_Sikt2	N/A	0.514
Snitt_Satisfaction2	N/A	0.469

All our constructs have a coefficient value equal or above to 0.7 except for constructs *Snitt_Personal_Traits, Snitt_Sikt2* and *Snitt_Satisfation2*. We take these results under consideration in the difference between mean analyses when using *Snitt_Personal_Traits* as moderator. However, both *Snitt_Sikt2* and *Snitt_Satisfaction2* are considered as so, since they relate to our third set of hypotheses, which purposes is considered as exploratory-based and can allows such inconsistencies.

7 Analysis

Our analysis is divided into three main parts. The first part consists of a preliminary analysis of both the experiment datasets. The second part is a difference between means analysis, consisting of testing the hypotheses we have articulated. The third part of the analysis is the moderator and mediator part, which comprises further exploring of our hypotheses through considering moderating and mediating variables for our hypotheses.

7.1 Preliminary analyses

Experiment one consists of an independent design, meaning that we have exposed different people to different experimental manipulations. Participants in both groups were treated exactly the same way except for the instructions and survey they received. Since our sample was randomized, we expect any difference between our two conditions to be to be attributed to the treatments themselves. Yet, assigning our participants randomly does not ensure neutralization of all differences between the two conditions. Studies involving human participants often requires collecting background- and meta information, such as the number of people, the proportion of female and men or the mean of age. In our study it is essential that the 2D- and VR-group are comparable, and by gathering this data, we are able to control for unwanted differences in the two groups in our statistical analysis.

The preliminary analyses are divided between experiment one and two. For each experiment, we will first give a description of the variables forming the dataset and check their distribution normality using a Kolmogorov-Smirnov statistic test. For categorical variables, a Chi-Square Goodness-of-fit test is appropriate. Note that we have made sure that the following three assumptions required to make a chi-square test are fullfiled for each categorical variable tested: the observations are independent, the groups of the categorical variable are mutually exclusive (one or the other) and there are at least five expected frequencies in each group of the categorical variable. Following the descriptive statistics, we will also present the factor analysis defending the way the variables are constructed together.

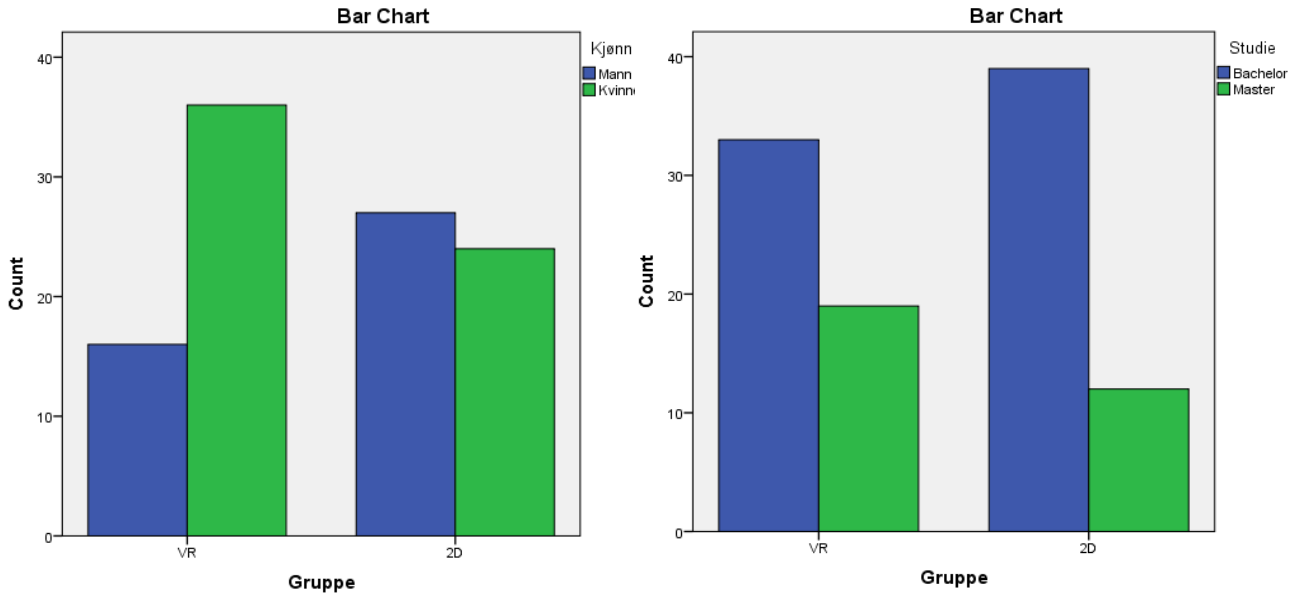
7.1.1 Experiment one

7.1.1.1 Descriptive statistics

Experiment one dataset consists of 103 participants divided between the two groups with 52 participants in the VR-group and 53 participants in the 2D-group. The scores distribution of the variables and constructs forming our dataset are presented with histograms and available

in the appendix 11.3.1. We start the descriptive statistics by analyzing the following continuous and categorical variables constituting demographic characteristics of our participants.

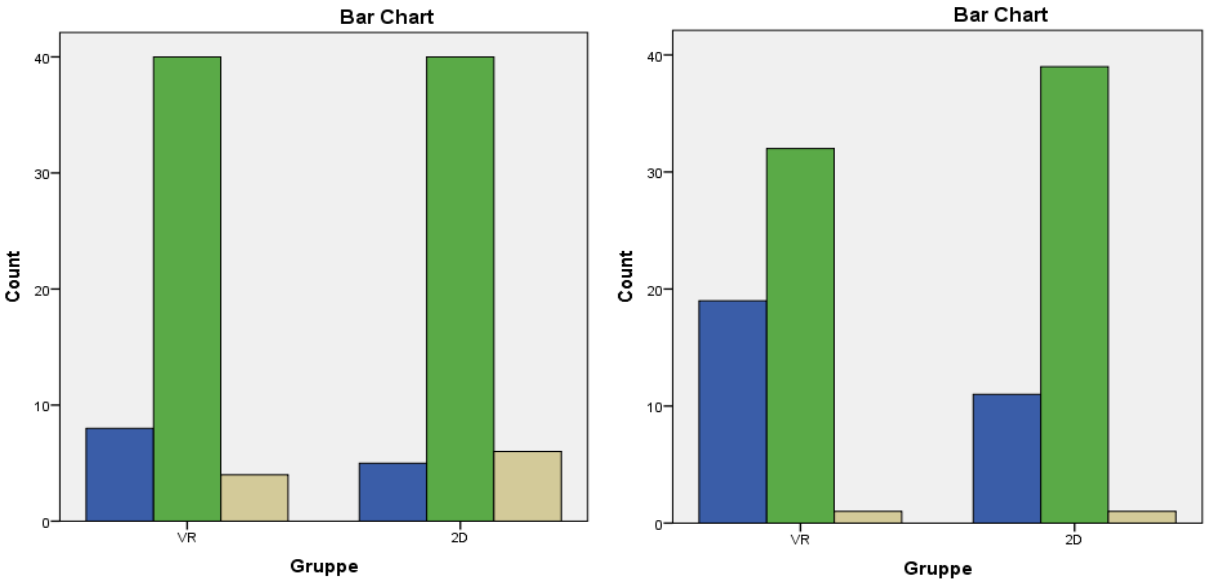
Since the dataset is limited to master and bachelor students only, we suspect ***Age*** to be homogeneous. The age average is 22.62 in the VR-group (minimum of 18 and maximum of 38) and 21.9 in the 2D-group (minimum of 18 and a maximum of 30). The Kolmogorov-Smirnov normality test result indicate that *Age* is statistically different to a normal distribution (F-value of 0.17, p=0.00 in both groups). ***Gender*** has an unbalanced proportion of men and women in each groups. In our sample there are 60 women (36 in the VR-group and 24 in the 2D-group) and 43 men (16 in the VR-group and 27 in the 2D-group). The chi-square test result indicates that the categories of women and men are statistically equal in the 2D-group (chi-square value of 7.70, p=0.01) but not in the VR-group (chi-square value is 0.18, p=0.67) The histogram below on the left illustrate that the proportion between women (in green) and men (in blue) is more balanced in the 2D-group than in the VR-group. ***Study*** indicates if the participant is a master or bachelor student. There are in total 72 bachelor students (33 in the VR-group and 29 in the 2D-group) and 31 master students (19 in the VR-group and 12 in the 2D-group) in our dataset. The histogram below on the right illustrate that the proportion of bachelor (in blue) and master students (in green) is quiet similar in each groups.



Pos_usik indicates the participant's risk-profile. The mean is 8.67 in the VR-group (standard deviation of 1.91, median of 9.00) with a minimum value of 3 and maximum value of 9.00. In the 2D-group, the mean is 8.22 (standard deviation of 2.00 and median of 9.00) with a

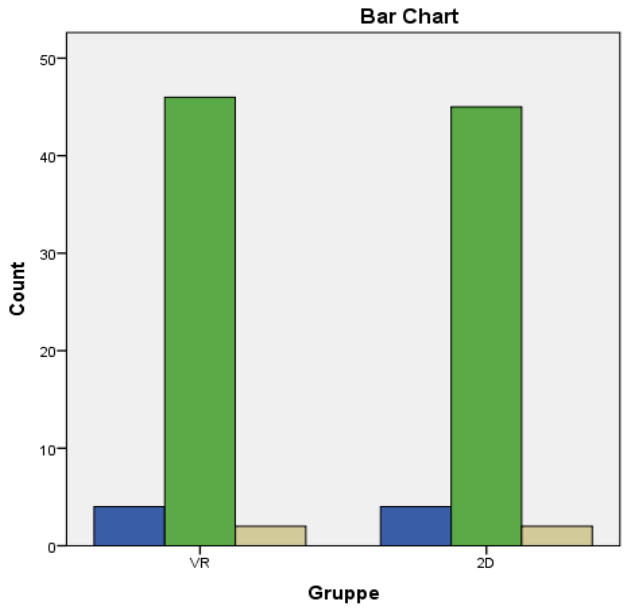
minimum value of 3 and maximum value of 11. The normality test results indicates that both group have a distribution statistically different to a normal distribution (F-values of 0.18 and 0.20, p=0.00 in both groups). ***Snitt_Personal_Trait*** describes the participant's attitude towards taking risk and experiencing new situations and ideas. The mean is 7.44 in the VR-group (median of 7.6) and 7.33 in the 2D-group (median of 7.6). The normality test results indicates a normal distribution in the VR-group (F-value of 0.08, p=0.20) but not in the 2D-group (F-value 0f 0.12, p=0.05). When using ***Snitt_Natur*** in our analyses, we are concerned that participants in each group have a comparable interest in travelling to nature destinations. The mean is 6.56 in the VR-group (median of 6.75 and variance of 4.60) and 6.16 in the 2D-group (median of 6.00 and variance of 3.41). The normality test results indicates a normal distribution in the VR-group (F-value of 0.01, p=0.20) but not in the 2D-group (F-value of 0.14, p=0.02).

Nærøy and ***Flom*** are categorical variables identifying if the participant visited Nærøyfjorden and Flåmsbanen before taking part in the experiment. The histogram below on the left indicate that 13 participants have visited Nærøyfjorden before (in blue), 80 haven't (in green) and 10 don't know (in beige). The histogram below on the right indicates that 30 participants have visited Flåmsbanen before (in blue), 71 have never visited it before (in green) and 2 don't know (in beige).

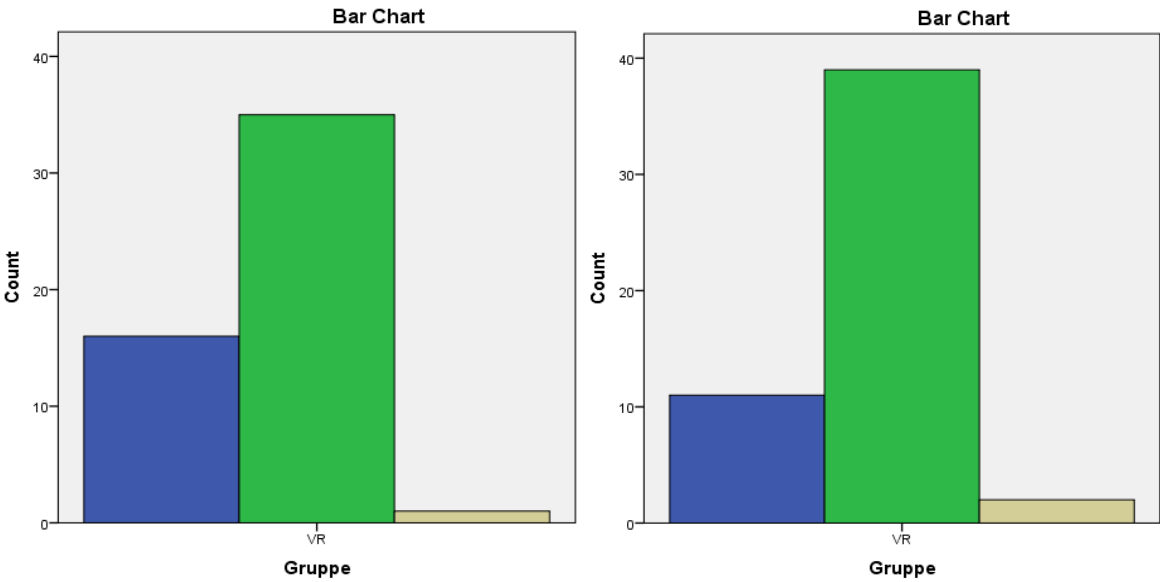


Planner indicates if the participant planned to travel to the destination before taking part in the experiment. The histogram below indicates that 8 participants answered yes (in blue), 71 answered no (in green) and 2 answered don't know (in beige). The score distribution of these variables seems to be reasonably balanced in both groups. ***Kunnskap*** indicates the participant's

pre-knowledge of the trip "Norway in a Nutshell". The mean is 2.79 in the VR-group (median of 1.00) and 2.25 in the 2D-group (median of 1.00). The normality test results indicates a distribution different to a normal distribution in both groups (F-value higher than sig. value in both groups).



Note that for the following three variables (*VR_erf, VR_rekl* and *VR_kunn*), the control group (2D-group) were not asked about virtual reality technology. ***VR_erf*** identify how much knowledge the participant has on virtual reality technology before taking part in the experiment, while ***VR_rekl*** identify if the participant has seen commercial in VR-format before taking part in the experiment.



The histogram above on the left illustrate the distribution of *VR_erf*, and indicate that 16 participants tried virtual reality headset before (in blue), 35 never tried (in green) and 1 do not know (in beige). The histogram on the right illustrate the distribution of *VR_rekl* and indicate that 11 participants that have seen a VR-format commercial before (in blue), 39 have never seen (in green) and 2 do not know (in beige) if they have seen a commercial in virtual reality-format before.

VR_kunn indicates the participant's pre-knowledge on virtual reality technology. The mean is 4.17 (median of 3.00 and variance of 7.79). The normality test results indicate that the distribution of *VR_kunn* is not statistically equal to a normal distribution (F-value of 0.21, p=0.00).

With variable ***Kvalitet***, we are finally interested in the participant perceived quality of the images in the two groups. The mean is 6.46 in the VR-group (median of 7 and variance of 3.86) and 9.63 int eh 2D-group (median of 10 and variance of 2.72). The normality test results does not indicates a normal distribution in both groups (F-values higher than the critical sig. values in each group).

For the remaining constructs, we have summarized the normality test results in the following table. The test results are available in the appendix 11.3.1.

Constructs	**Group**	**F-value**	**Sig.**
Snitt_Attitude	VR	0.150	0.005
	2D	0.071	0.200*
Snitt_Sense	VR	1.69	0.001
	2D	0.105	0.200*
Snitt_Emosjon	VR	0.095	0.200*
	2D	0.084	0.200*
Snitt_Kognisjon	VR	0.101	0.200*
	2D	0.078	0.200*
Snitt_Accessibility	VR	0.151	0.005
	2D	0.191	0.000
Snitt_Imagination	VR	0.120	0.061
	2D	0.115	0.089
Snitt_Telepresens	VR	0.063	0.200*

	2D	0.107	0.200*
Snitt_Enjoy	VR	0.132	0.024
	2D	0.097	0.200*
Snitt_Self	VR	0.064	0.200*
	2D	0.123	0.051
Snitt_Intensjon	VR	0.145	0.008
	2D	0.119	0.070
Snitt_Positive_Impression	VR	0.105	0.200*
	2D	0.076	0.200*

At a 95% confidence level, half of the constructs have a distribution statistically equal to a normal distribution. The main reason for this is due to the limited size of our sample. However, we consider the number of observations in each group to be satisfying (52 in the VR-group and 53 in the 2D-group) and do not consider normality as a requirement in our analyses.

7.1.1.2 Factor analysis

Factor analysis is often used when working with psychological traits to define human behavior, and is therefore necessary to complete our analysis. Like generating constructs from different items, factor analysis looks for ways the data can be reduced by using a set of factors rather than having each item individually (Tabachick & Fidell, 2007). There are three steps involved in a factor analysis. The first step is to consider both the sample size and the strength of relationship between the items. The strengths of relationship between the items recommend a correlation matrix for evidence of coefficient greater than 0.3 (Tabachick & Fidell, 2007). The second step is factor extraction. In this step we put in practice the factor analysis technique, which consists of determining the number of factors believed to best describe the underlying relationship among the variables. The third and last step is factor rotation and interpretation, which is to interpret and rotate the factors considered in the second step.

Our factor analysis is based on pre-defined concepts articulated in Vekony and Korneliussen's (2016) complementary study "*Immersive Virtual Reality in Destination Marketing*". Therefore, we do not discuss whenever the constructs we agreed upon are valid in a theoretical point-of-view but rather focus on the statistical method that lead to the same conclusions as Vekony and Korneliussen (2016). Selected factor analysis outputs are available in the appendix 11.4.1.

Based on the methodology previously presented, the first step consists of verifying if our data are suited for a factor analysis. Using Kaiser-Meyer Olkin (KMO) test, we are making sure that the KMO value is greater than 0.6. In our case, the KMO value is 0.79 and Bartlett's test is significant with a p-value of 0.00. The correlation matrix indicate that the majority of coefficients are above 0.3, which in turn indicates that a factor analysis is appropriate for our data. The next step is factor extraction. In our analysis we have only considered factor loading values above .50. The communalities table provided with the analysis shows how much of the variance in each item is explained. Based on this table, no items have a communality value lower than 0.5. Next, we must look at the total variance explained. In our case, only the first twelve components have an eigenvalue above 1 and the next two components have an eigenvalue between 0.8 and 0.9, which is acceptable. These twelve components explain a total of 74.90% of the variance, while the next two components cumulate the explanation up to 79%. The last part of the extraction step is to analyse the patters and see if the items are suited to form a construct together. The pattern matrix indicates that there are four items loading under the first component, three items loading under the second component and four under the third component. Following the same logic for the remaining component, each component seems to have three to five items with high loading value (from 0.6 and above). These results are consistent with the expected constructs and their associated items. The factor extraction step also include rotating with the number of component and see the effects generated. By generating a new factor analysis with thirteen components, we get the follow results: the total variance explained has a cumulating value of 76.94 %, the component matrix shows a better spread of items with thirteen components and the pattern matrix seems to have consistent results (similar loading values for each groups of items in each component). The results of the factor analysis and are summarized below. These constructs are the same constructs presented in the methodology part.

Constructs	**Items**
Snitt_Attitude	= (Glad + Beundr + Mening + Inntrykk + Fornøyd) ÷5
Snitt_Sense	= (Sans1 + Sans2 + Sans3) ÷3
Snitt_Emosjon	= (Emosjon1 + Emosjon2 + Emosjon3) ÷3
Snitt_Kognisjon	= (Kogn1 + Kogn2 + Kogn3) ÷3
Snitt_Accessibility	= (Tilgj1 + Tilgj2_r) ÷2
Snitt_Imagination	= (Image1 + Image2 + Image3) ÷3
Snitt_Telepresens	= (Tele1 + Tele2 + Tele3) ÷3

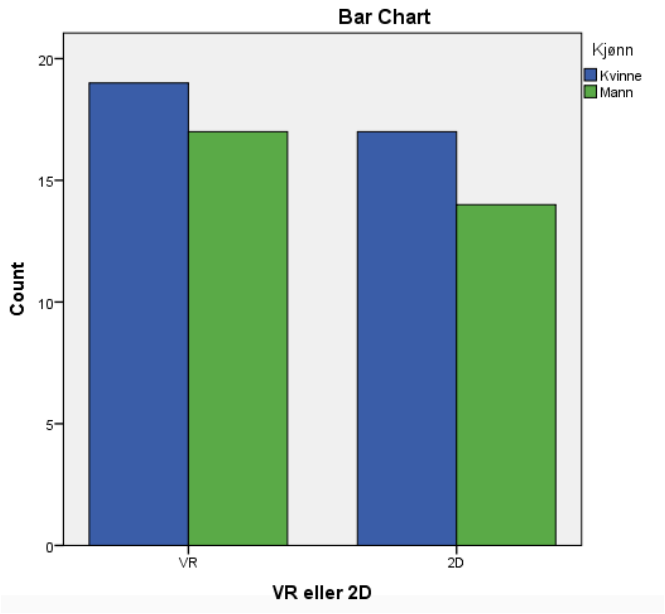
Snitt_Enjoy	= (Enjoy1 + Enjoy2 + Enjoy3) ÷3
Snitt_Self	= (Self1 + Self2 + Self3) ÷3
Snitt_Natur	= (Natur1 + Nature2 + Nature3 + Nature4) ÷4
Snitt_Intensjon	= (Int1 + Int2 + Int3) ÷3
Snitt_Positive_Impression	= (Bra + Appell + Behag + Attrakt + Interes) ÷5
Snitt_Personal_Trait	= (Trait1 + Trait2 + Trait3_r + Trait4_r + Trait5) ÷5

7.1.2 Experiment two

7.1.2.1 Descriptive statistics

The dataset from the second experiment consists of 67 participants divided between the two groups. The VR-group has 36 participants and the 2D-group has 31 participants. The distribution scores of the variables and constructs forming our dataset are presented with histograms and available in the appendix 11.3.2. We start our descriptive analysis by describing the following demographic variables of our participants: *Alder*, *Kjønn* and *Nasjonalitet*.

In this dataset, we expect to have a higher age average compared to experiment one dataset. ***Age*** has a mean of 49.42 in the 2D-group (median of 52) and 56.03 in the VR-group (median of 58). The normality test results indicates a normal distribution in the VR-group (F-value of 0.12, p=0.17), but not in the 2D-group (F-value of 0.14, p=0.09). *Age* has also three isolated cases (participants aged 10, 12 and 14), which have been removed from the dataset for the purpose of our analysis.



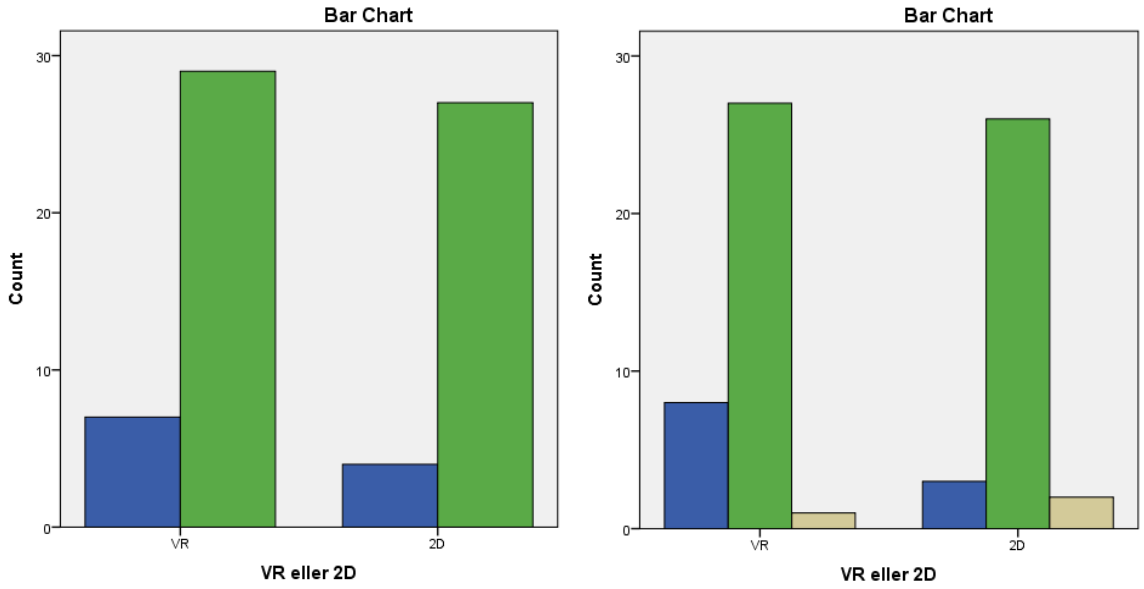
Gender seems to be unproportioned in the two groups: there are 36 women (19 in the VR-group and 17 in the 2D-group) and 31 men (17 in the VR-group and 14 in the 2D-group). However, the chi-square test result indicate that the categories of women and men are statistically equal in each group.

Nasjonalitet is a categorical variable indicating the nationality of our participants. The nationalities accounted are described in the table below together with the frequencies and distribution in each group. The nationalities distributions seems to be satisfying with some exceptions. German nationality has the most important difference between the two groups (3 participants in the 2D-group and 12 in the VR-group).

Nationality	**2D-group**	**VR-group**	**Total**
Australian	7	3	10
Brazilian	1	1	2
Chilean	0	1	1
Greek	0	1	1
Indian	0	1	2
Italian	3	1	4
Canadian	0	1	1
Norwegian	2	3	7
Spanish	1	1	2
Switzerland	4	4	8
Swedish	2	0	2
German	3	12	16
English	2	2	4
American	6	5	11
Total	31	36	67

Snitt_Natur is suspected to have higher means in this dataset compared to experiment one since the participants are actually customers of Hurtigruten and, in a sense, already have proved an interest in nature. The means are 9,20 in the 2D-group (median of 9.25) and 8.87 in the VR-group (median 9.13), compared to 4.60 and 6.56 in experiment one respectively. The normality test results indicate a normal distribution in the 2D-group (F-value of 0.13, p=0.14), but not in the VR-group (F-value of 0.13, p=0.10).

ReistFør indicates if the participant has travelled with Hurtigruten before and ***VærtFør*** indicates if the participant has been to the places showed in the images before. The histogram below on the left indicates that 11 participants have traveled with Hurtigruten before (in blue), 56 have not (in green) and none don't know (in beige). The histogram on the right indicates that 11 participants have been to the placed showed in the images before (in blue), 53 have not (in green) and 3 don't know (in beige). In seems that there is a consistency in the results for participants that have travelled with Hurtigruten before and participants that have been to the places showed in the images before. The distribution in the two groups seems to be comparable.



VR_Før and ***VR_kunn*** measures the same as *VR_Før* and *VR_kunn* in experiment one dataset. Out of 36 participants in the VR-group, 10 have tried VR-headset before and 26 have not, which represents a ratio of 38%. Recalling experiment one dataset, out of 52 participants, 16 indicated that they tried VR-headsets before, which represents a ratio of 30%. *VR_kunn* has a mean of 5.03 (median of 4.00). The normality test results does not indicate a normal distribution (F-value of 0.17, p=0.01). It is also interesting to compare the virtual reality technology pre-knowledge mean with the one from the first dataset (4.17). ***TekErfaring*** indicates the participant's general knowledge on new technology. The mean is 4.74 in the VR-group (median of 5.50) and 8.58 in the 2D-group (median of 9.00). The normality test does not indicate a normal distribution (F-values are higher that the critical value).

Kvalitet measures the same as *Kvalitet* in the dataset from experiment one. The mean here is 7.26 in the VR-group (median of 7.00) and 10.33 in the 2D-group (median of 11.00), indicating

that distribution of scores is quite different in two groups. Experiment one dataset has a perceived quality of 9.63 in the VR-group and 6.46 in the 2D-group. The normality test results does not indicate a normal distribution (F-values are higher that the critical value in both groups).

The remaining constructs are summarized in the table below together with the Kolmogorov-Smirnov test results. Each pair consist of a construct from the first part of the questionnaire and a second construct from the second part of the questionnaire. The normality test are available in the appendix 11.3.2.

Constructs	**Group**	**F-value**	**Sig.**
Snitt_Expectation	VR	0.150	0.031
	2D	0.280	0.000
Snitt_Expectation2	VR	1.66	0.010
	2D	0.280	0.000
Snitt_Emosjon	VR	0.142	0.051
	2D	0.242	0.000
Snitt_Emosjon2	VR	0.108	0.200*
	2D	0.166	0.039
Snitt_Kognisjon	VR	0.145	0.044
	2D	0.125	0.200*
Snitt_Kognisjon2	VR	0.159	0.016
	2D	0.136	0.178*
Snitt_Positive_Impression	VR	0.286	0.000
	2D	0.285	0.000
Snitt_Positive_Impression2	VR	0.222	0.000
	2D	0.257	0.000
Snitt_Sikt2	VR	0.170	0.007
	2D	0.249	0.000

At a 95% confidence level, only a few constructs have a distribution equal to a normal distribution. This is assumed to be mostly due to the limited size of our sample. We consider the number of observations in each group to be acceptable but not optimal.

7.1.2.2 Factor Analysis

This factory analysis only takes into account selected items from the dataset from experiment two. First, we consider the items from the first part of the questionnaire (before the participants travel to the places showed in the images) and second, the items from the second part of the questionnaire (after the participants had seen the places showed in the images). The factor analysis output are presented in the appendix 11.4.2.

As in experiment one, the first step consists of verifying that our data are suited for factor analysis. For the items from the first part of the questionnaire, Kaiser-Meyer Olkin (KMO) value is 0.858 and Bartlett's test is significant with a p-value of 0.00. The correlation matrix provided with the factor analysis show that the majority of coefficients are above 0.6, which indicates that a factor analysis is appropriate for this dataset. In our case, the first three components have an eigenvalue above 1 indicating that the five components we have restricted may be too high. However, the two next components have an eigenvalue of 0.926 and 0.667, which is satisfying. The component matrix shows the direction of correlation of each item, which indicate that the pre-defined constructs, *Snitt_Expectation, Snitt_Emosjon, Snitt_Kognisjon*, *Snitt_Positive_Impression* and *Snitt_Nature,* are disposed with the right items. The pattern matrix also indicate that the items are following the correct path right after each other.

For the items from the second part of the questionnaire, the KMO value is 0.809 and Bartlett's test is significant with a p-value of 0.00. The correlation matrix shows that all of the coefficients are above 0.65 and lies between 0.7 and 0.9, which signifies that a factor analysis is appropriate for this dataset. The total variance explained matrix displays that the first three components have an eigenvalue above 1 meaning that the five components we have restricted may be too high. However, the two next components have an eigenvalue of 0.954 and 0.693, which is satisfying. The component matrix shows the direction of correlation of each item, which in this case indicates that pre-defined constructs *Snitt_Expectation2, Snitt_Emosjon2, Snitt_Kognisjon2, Snitt_Positive_Impression2, Snitt_Sikt2* are disposed with the right items (albeit not perfectly). However, the pattern matrix, indicates that the items are following the correct path right after each other.

The main findings from the factor analysis presented above permits us to conclude with our ten pre-defined constructs.

Constructs	**Items**
Snitt_Expectation	= (Glad + Beundr + Inntrykk + Fornøyd) ÷4
Snitt_Expectation2	= (Glad_s2 + Beundr_s2 + Inntrykk_s2 + Fornøyd_s2) ÷4
Snitt_Emosjon	= (Emosjon1 + Emosjon2) ÷2
Snitt_Emosjon2	= (Emosjon1_s2 + Emosjon2_s2) ÷2
Snitt_Kognisjon	= (Kogn1 + Kogn2) ÷2
Snitt_Kognisjon2	= (Kogn1_s2 + Kogn2_s2) ÷2
Snitt_Positive_Impression	= (Bra + Appell + Attrakt + Anbefal) ÷4
Snitt_Positive_Impression2	= (Bra_s2 + Appell_s2 + Attrakt_s2 + Anbefal_s2) ÷4
Snitt_Sikt2	= (Utsikt_s2 + Panorama_s2 + Sikt_s2) ÷3
Snitt_Nature	= (Nature1 + Nature2 + Nature3 + Nature4) ÷4

7.2 Differences Between Means Analyses

To test the mean differences between the 2D- and VR-group in each variable and construct, we use the statistic independent t-test method. An independent t-test is a two steps process; the first step consists of posing a research question (hypothesis). These are the hypotheses we have formulated previously and include a null- (H_0) and alternative (H_A) hypothesis, which are mutually exclusive. In the context of hypothesis testing, it is important to stress that failing to reject a null hypothesis does not imply that the null hypothesis is strictly true (Hill, Griffiths, & Lim, 2012). As conceptualized below, the null hypothesis state that the mean in the VR-group is identical to the mean in the 2D-group while the alternative hypothesis state that the means are different from each other.

$$H_0: \mu_{VR} = \mu_{2D}$$

$$H_A: \mu_{VR} \neq \mu_{2D}$$

The second step is testing the null hypothesis. Testing the null hypothesis emphasizes on the three following elements: setting the confidence level, computing the calculated value (t-test) and comparing the calculated value to the critical value (Hill, Griffiths, & Lim, 2012). Usually, research accentuating on human traits and psychological attributes are satisfied with 90% confidence level. However, in our analysis, we have decided to use a 95% confidence level, meaning that our analyses only considers results with less than a 5% margin error to be of

significance. For the majority of our hypotheses, we are testing the possibility of relationships in both directions (higher or lower than the mean), and therefore we are using a two-tailed test to compare the test value with the critical value. For each independent t-test, the significant value from the Levene's test indicates if the assumption of homogeneity of variance holds, which is an important assumption in this test. For each variable, if the significant value is greater than 0.05, the assumption holds. The significant value in the t-test for equality of means shows if there is a significant difference somewhere among the mean scores on the dependent variable for the two groups (VR and 2D). If the significance value is less than or equal to 0.05, there is a significant difference somewhere among the mean scores.

After making sure that the variables and constructs from our dataset are balanced, we now continue our analysis by exploring the differences between the VR and 2D-group. This allows us to check whether we can or cannot support the hypotheses we have formulated. In this analysis, we distinguish between experiment one and experiment two. All the tests we have conducted are available in the appendix 11.5.

7.2.1 Experiment one

7.2.1.1 Hypothesis one – Customer acquisition

Our first set of hypothesis is related to customer acquisition. **Hypothesis 1A** considers if *virtual reality exposure will increase the actual purchases for the experience good*. To check the truth of this, we generate a Pearson chi-square test with variables *Group* and *Kjøpte_deltageren_billett*. The results indicate a chi-square value of 0.43 and a p-value of 0.836 indicating that the means are statistically identical. Therefore, we reject the alternative hypothesis of difference of means in the VR and 2D-group and conclude that virtual reality exposure, compared to traditional 2D-exposure, does not increase the actual purchases for travel experience goods. The chi-square test result is available in the appendix 11.5.1.

		Gruppe		
		VR	2D	Total
Kjøpte_deltageren_billett?	Nei	42	42	84
	Ja, 2 billetter	10	9	19
Total		52	51	103

The distribution of purchased tickets based on the participant's gender and study level (Bachelor or Master) is also available in the appendix and indicate that 11 pairs of tickets are brought by men and 8 by women. As mentioned, the distribution of purchased tickets between

the two groups is almost identical, but the gender distribution within each group is different: in the VR-group, 4 pairs of tickets are brought by men and 6 by women, while in the 2D-group, 7 pairs of tickets are brought by men and 2 by women.

Following our set of hypotheses, we now consider the eventual effects virtual reality can have on the participant's intention towards purchasing a ticket. **Hypothesis 1B** addresses if *exposure to virtual reality will increase the customer's intention of purchasing the experience good.* This hypothesis is tested using *Snitt_Intensjon*, which captures the participant's consideration of travelling to similar destination, its intention to recommend the trip to someone else and the probability that they will travel to this type of destination in the near future. The following table is a summary statistic of *Snitt_Intensjon*.

	Gruppe	N	Mean	Std. Deviation	Std. Error Mean
Snitt_Intensjon	VR	52	8.4167	2.05785	.28537
	2D	51	8.4248	1.91842	.26863

The mean difference is close to zero (-0.01), but we generate an independent t-test to compare its significance. Levene's Test of homogeneity of variances indicates a F-value of 0.86 and a sig. value of 0.35 meaning that we can reject the alternative hypotheses and accept the null hypotheses of equal variances between the two groups. The t-test for equality of means confirms the weak difference of means (t-value of -0.021, p=0.983). Therefore, we accept the null hypothesis of no difference in the two means. Hypothesis 1B is not supported and we conclude that on average, VR-exposure do not increase participants' intention of purchasing an experience good compared to 2D-exposure.

We then consider the effects virtual reality can have on the participant's attitude towards purchasing a ticket. This relates to **hypothesis 1C**: *exposure to virtual reality will give customers a more positive attitude to purchasing the experience good. The* construct *Snitt_Attitude* measures the positive impression participants believe they would get from participating in the travel experience, which we consider as a good indicator of attitude towards purchasing a ticket.

	Gruppe	N	Mean	Std. Deviation	Std. Error Mean
Snitt_Attitude	VR	52	8.9000	1.28062	.17759
	2D	51	8.5176	1.17927	.16513

The mean is 8.90 in the VR-group (standard deviation of 1.28) and 8.52 in the 2D-group (standard deviation of 1.18). The t-test result indicates homogeneity of variance for both groups (Levene's F-value of 1.34, p=0.250). The t-test for equality of means indicates a t-value of 1.57 and a sig. value of 0.12. Therefore, we accept the null hypothesis of no difference between the means in each group, and conclude that compared to 2D-images, VR-exposures do not have a higher effect on the participant's attitude towards purchasing a ticket.

Since the conclusion from our main hypothesis is that virtual reality exposure, compared to 2D-exposure, does not have any direct effect on purchasing choices, we have, under this set of hypotheses, formulated two additional hypotheses to explore other effects we consider relevant to our research question. **Hypothesis 1D** undertake whether *exposure to virtual reality will increase perceived access to information about the quality of the experience good.* We continue our analysis by testing the three following constructs: *Snitt_Imagination, Snitt_Telepresens* and *Snitt_Accessibility.* We focus on these three constructs because, in the context of experience goods, the concepts of telepresence and mental imagery overlaps with the notion of information as consumers consider the ability to imagine an experience good as a form of access to information. These concepts are supported in the literature provided in Vekony and Korneliussen's (2016) complementary research on virtual reality technology. *Snitt_Imagination* captures the effects virtual reality has on the participant's ability to imagine and visualize the travel destinations, called mental imagery. *Snitt_Telepresens* captures the effects virtual reality has on the participant's felling of being virtually immersed during the exposure. *Snitt_Accessibility* captures the participant's perceived access to information concerning the experience good.

	Gruppe	N	Mean	Std. Deviation	Std. Error Mean
Snitt_Accessibility	VR	52	6.7212	1.74730	.24231
	2D	51	6.0588	2.20827	.30922
Snitt_Imagination	VR	52	8.7628	1.52301	.21120
	2D	51	7.7190	1.77435	.24846
Snitt_Telepresens	VR	52	6.9744	2.27025	.31483
	2D	51	4.7320	1.88092	.26338

The t-tests results pinpoints that all three variables have equal variances in the two groups (Levene's F-value of 1.55, 0.91 and 0.65, p=0.22, 0.34 and 0.80 for *Snitt_Imagination*, *Snitt_Telepresens* and *Snitt_Accessibility* respectively). *Snitt_Accessibility* has a mean of 6.72

in the VR-group (standard deviation of 1.74) and 6.06 in the 2D-group (standard deviation of 2.21), but the means is only marginally significant (t-value of 1.69, p=0.09). *Snitt_Imagination* has a mean of 8.76 in the VR-group (standard deviation of 1.52) and 7.72 in the 2D-group (standard deviation of 1.77). The means are significant difference in the VR and 2D-group (t-value of 3.21, p=0.02). *Snitt_Telepresens* has a mean of 6.97 in the VR-group (standard deviation of 2.27) and 4.73 in the 2D-group (standard deviation of 1.88). The mean difference in the VR and 2D-group is also significant (t-value of 5.45, p=0.00). The results from the Mann-Whitney test available in the appendix 11.5.1 gives us further indication about the relationship between *Snitt_Telepresens* and *Snitt_Imagination*. We include this nonparametric test because we found out in the descriptive statistic section that most of our variables are not normally distributed most likely due to the restricted size of the dataset. The Mann-Whitney test in this case, help us confirm the conclusions of different means that we have described. The results indicates that both constructs have a higher mean rank for the VR-group. The Mann-Whitney value confirms that there is a significant difference for both constructs.

The results we have presented so far are partially in line with our hypotheses. At a 95% confidence level, *Snitt_Accessibility* is only marginally significant different in the VR and 2D-group. The t-test results for constructs *Snitt_Telepresens* and *Snitt_Imagination* permits us to confirm that virtual reality exposure increases the level of telepresence and mental imagery compared to 2D-exposure. Before we can reject or support hypothesis 1D, we will consider the presence of mediating effect between *Group* and Snitt_Accessibility using constructs *Snitt_Telepresens* and *Snitt_Imagination*. These are presented in mediator-part of the analysis.

Hypothesis 1E examines if the *exposure to virtual reality will decrease the perceived risk for purchasing the experience good.* This hypothesis requires to take into account the participant risk-profile, which is measured with variables *Pos_usik* and *Snitt_Personal_Trait*. We mentioned in the descriptive statistics that the average risk-profile of participants in each group should be comparable. By looking at the means we concluded that this requirement was satisfied. However, we have here tested their significance.

	Gruppe	N	Mean	Std. Deviation	Std. Error Mean
Pos_usik	VR	52	8.67	1.907	.264
	2D	51	8.22	2.003	.280
Snitt_Personal_Trait	VR	52	7.4423	1.18576	.16443
	2D	51	7.3294	1.37336	.19231

The t-test results indicates equal variances in both variables (Levene's F-value of 0.16 and 1.80, p=0.69 and 0.18 respectively) and equal means between the 2D and VR-group (t-value of 1.19 and 0.45, p=0.24 and p=0.66 respectively). Also, both variables are positively correlated with each other(Pearson correlation value of 0.46 significant at the 0.01 level), indicating that the constructs share a common trend. The table below summarize the averages for construct *Snitt_Personal_Trait* based on the participant's purchasing decision.

	VR-group	**2D-group**	Average
Yes	7.78	7.95	7.86
No	7.36	7.19	7.27
Average	7.32	7.44	

As expected, the risk-profile average for participants that have purchased a ticket is higher than the risk-profile average for participants that have not purchased a ticket (7.86>7.27). It is also interesting to see that the risk-profile average of participants from the VR-group that purchased a ticket is slightly lower than participants in the 2D-group that also purchased a ticket (7.78<7.95). However, the averages in *Pos_usik* does not lead to the same conclusion: the risk-profile average of participants from the VR-group that purchased a ticket is slightly higher than participants in the 2D-group that also have purchased a ticket. To formally test the significance of these relationships, we explore the presence of moderating effect, and test if virtual reality conditioning the participant's risk-profile has an effect on purchasing decisions. These tests are presented in the moderator-part of the analysis.

7.2.1.2 Hypothesis two – Future implications

Our second set of hypotheses discusses other implications of virtual reality based on the participant's reactions and experiences from being exposed to this technology. Note that hypothesis 2A and 2B are tested using a one sided (one-tailed) test: the null hypothesis (H_0) state that the mean in the 2D-group is higher than the mean in the VR-group, while the alternative hypothesis (H_A) state the opposite.

$$H_0: \mu_1 > \mu_2$$

$$H_A: \mu_1 < \mu_2$$

Hypothesis 2A discusses if *perceived quality of virtual reality images is higher in 2D than in virtual reality*. As we will explain later, this hypothesis is important when considering quality as a conditioning effect on the participant's experience during the virtual reality exposure. The following table is a summary statistic of variable *Kvalitet*.

	Gruppe	N	Mean	Std. Deviation	Std. Error Mean
Kvalitet	VR	52	6.46	1.965	.272
	2D	51	9.63	1.649	.231

The mean difference between the 2D and VR-group is 3.17, which is important. The t-test results indicate homogeneity of variances (Levene's F-value of 2.78, p=0.09) and a significant higher mean in the 2D-group (t-value of -8.85, p=0.00). At a 95% confidence interval, we reject the alternative hypothesis and accept the null hypothesis. Hypothesis 2A is thereby supported; perceived quality is on average higher in the 2D-group than in the VR-group. Note that we are here

comparing two different types of images, meaning that this comparison must be interpreted carefully. Following this conclusion, we are interested to see if perceived quality may have a conditioning effect on some of the constructs we have analysed. These moderating effects are explored in the moderator part of the analysis.

In our dataset, there are constructs measuring participants' positive attitude, not necessarily toward purchasing a ticket but towards the experience VR-exposure create itself. These are for instance enjoyment, which is what *Snitt_Enjoy* measure, and relate to **hypothesis 2B**: *customers enjoy watching virtual reality more than they enjoy watching the same images in 2D pictures*. More specifically, *Snitt_Enjoy* captures how entertaining, interesting and enjoyable the exposure was for the participant. The mean statistics for this construct is presented below.

	Gruppe	N	Mean	Std. Deviation	Std. Error Mean
Snitt_Enjoy	VR	52	9.3974	1.43568	.19909
	2D	51	7.5490	1.68104	.23539

Snitt_Enjoy has a mean of 9.40 in the VR-group and 7.55 in the 2D-group. The test results confirm the assumption of homogeneity of variance in each groups (p=0.41). When it comes to the difference of means, *Snitt_Enjoy* has a significantly higher mean in the VR-group (t-

value of 6.00, p=0.00). Therefore, we reject the alternative hypothesis, accept the null-hypothesis, and conclude that on average, participants exposed to virtual reality images experience more enjoyment than participant exposed to 2D-images. What underlying effects leading to higher enjoyment in the VR-group compared to the 2D-group are further explored in the mediator part of the analysis.

7.2.2 Experiment two

The third set of hypotheses will be tested exclusively from the data gathered in the second experiment due to the sequential set-up for the questionnaire. Note that in this part, when the assumption of equal variance is violated, SPSS makes the necessary adjustments that takes into account the violation and indicate which value should be considered to compare the means. The independent t-test results are available in the appendix 11.5.2.

7.2.2.1 Hypothesis three – Altered customer experiences

Hypothesis 3A explores if the *exposure to virtual reality will increase the expectations for the real experience.* To test this, we use *Snitt_Expectation,* which measures the participant's expectation of the travel experience and compare the means in each group.

	VR eller 2D	N	Mean	Std. Deviation	Std. Error Mean
Snitt_Expectation	VR	36	10.0000	1.01594	.16932
	2D	31	10.4839	.84886	.15246

The t-test results of the construct confirm the assumptions of equal variance in both groups (F-value of 1.26, p=0.26). The means are 10.00 in the VR-group and 10.48 in the 2D-group, and are significantly different (t-value of -2.09, p=0.04). However, the difference goes in the opposite of the anticipated direction. At a 95% confidence level, we can reject the null-hypothesis and conclude that the two means are different. However, we cannot conclude that exposure to virtual reality, compared to 2D-exposure, increase the expectations for the real experience, as it in fact reduces the expectations.

Our last hypothesis, **hypothesis 3B,** claims that *exposure to virtual reality influence customers' memories and evaluations of the real experience.* As mentioned, the survey from the second experiment is divided into two parts; one part was filled out prior to visiting the destinations, and the other after the real travel experience took place. To test if there are any differences between the two groups we explore the mean differences of the following constructs pairwise:

Snitt_Expectation with *Snitt_Expectation2*, *Snitt_Kognisjon* with *Snitt_Koginisjon2*, *Snitt_Emosjon* with *Snitt_Emosjon2* and *Snitt_Positive_Impression* with *Snitt_Positive_Impression2*. We will also explore the difference of means in *Snitt_Sikt2*. We consider the participants' travel expectations and impressions as good indicators to test our hypothesis. We also include *Snitt_Kognisjon* and *Snitt_Emosjon* because we want to explore if the expected level of emotional reaction and cognitive stimuli changes significantly in the treatment group compared to the control group. The test results are presented below.

	VR eller 2D	N	Mean	Std. Deviation	Std. Error Mean
Snitt_Expectation	VR	36	10.0000	1.01594	.16932
	2D	31	10.4839	.84886	.15246
Snitt_Expectation2	VR	36	10.1389	.91894	.15316
	2D	31	10.3250	1.03422	.18882

Recalling from hypothesis 3A, we have already analyzed construct *Snitt_Expectation*. The table below compare this construct with *Snitt_Expectation2*. As mentioned, the expectation mean in the VR-group goes from 10.00 prior to the travel experience to 10.14 after the real travel, which represents an increase of 0.14. In the 2D-group the expectation mean goes from 10.48 to 10.32, representing a decrease of 0.16. It seems that the level of expectation decreases in the 2D-group but increases in the VR-group. Interestingly though, the difference in the VR and 2D-group lose it significance after the real experience take place.

The t-test results with constructs *Snitt_Kognisjon* and *Snitt_Kognisjon2* confirm the assumptions of equal variance in *Snitt_Kognisjon* (F-value of 3.18, p=0.08), but not in *Snitt_Kognisjon2*. When it comes to the means, *Snitt_Kognisjon2* has a significantly different mean in the 2D and VR-group (t-value of -1.9, p=0.05), but not in *Snitt_Kognisjon* (t-value of -1.40, p=0.17)). As the table below indicates, in the VR-group, the participants' cognition stimuli average goes from 8.15 prior the travel, to 6.89 after the travel, which means a decrease of 1.26. In the 2D-group the cognition stimuli mean goes from 8.84 to 8.12, representing a decrease of 0.72. The level of cognition stimuli decreases in both group after the real travel takes place and the differences of means in each group goes from not significant before- to significant after the real experience takes place.

	VR eller 2D	N	Mean	Std. Deviation	Std. Error Mean
Snitt Kognisjon	VR	36	8.15	2.187	.365
	2D	31	8.84	1.763	.317
Snitt Kognisjon2	VR	36	6.89	2.760	.460
	2D	31	8.12	2.384	.435

The t-test results with constructs *Snitt_Emosjon* and *Snitt_Emosjon2* confirm the assumptions of equal variance in *Snitt_Emosjon2* (F-value of 2.53, p=0.17) but not in *Snitt_Emosjon*. When it comes to the means, neither of the constructs have significantly different means in the 2D and VR-group. As the table below indicate, the participants' emotional reaction average in the VR-group goes from 9.04 prior the real travel to 8.60 after the real travel, which represents a decrease of 0.44. In the 2D-group, the emotion reaction average goes from 9.47 to 8.60, representing a decrease of 0.87. The level of emotional reaction decreases in both group after the real experience takes place.

	VR eller 2D	N	Mean	Std. Deviation	Std. Error Mean
Snitt Emosjon	VR	36	9.04	1.729	.288
	2D	31	9.47	1.775	.319
Snitt Emosjon2	VR	36	8.60	1.727	.288
	2D	31	8.60	2.234	.408

The t-test results with constructs *Snitt_Positive_Impression* and *Snitt_Positive_Impression2* confirm the assumptions of equal variance in both constructs, and neither constructs have significant different means in the 2D and VR-group. The participants' impression towards the travel experience average in the VR-group goes from 10.34 prior the real travel to 10.19 after the real travel, which represents a decrease of 0.15. In the 2D-group the impression mean goes from 10.44 to 10.36, which represents a negligible decrease of 0.08. It seems that the level of positive impression towards the travel experience is stable in both groups.

	VR eller 2D	N	Mean	Std. Deviation	Std. Error Mean
Snitt_Positive_Impression	VR	36	10.3403	.88268	.14711
	2D	31	10.4435	.83344	.14969
Snitt_Positive_Impression2	VR	36	10.1944	1.01262	.16877
	2D	31	10.3583	.94842	.17316

The last construct we want to test is *Snitt_Sikt2*, which measures the participants' memories of the view and panorama of the real travel experience. As the table below indicates, *Snitt_Sikt2* has a mean of 10.24 in the VR-group and 10.26 in the 2D-group. The t-test result discards the assumption of equal variance in the two groups (F-value of 0.05, p=0.82), and indicates no significant different means between the 2D and VR-group (t-value of -0.27, p=0.79). At a 95% confidence level, we reject the hypothesis of difference between means in the VR and 2D-group for this construct.

	VR eller 2D	N	Mean	Std. Deviation	Std. Error Mean
Snitt_Sikt2	VR	36	10.2407	.75007	.12501
	2D	31	10.2556	.90416	.16508

We have until now tested pre- and post-effects of participant's travel expectations, cognition stimuli, emotion reaction, positive impressions towards the travel experience, and tested for group difference in *Snitt_Sikt2*. The results lead to the conclusion that VR-exposure, compared to 2D-exposure, seems to have negligible effects on the participants' real experience. The table below summarized our conclusions.

	Prior the real experience	**After the real experience**
Expectation	Expectations are significantly higher in the 2D-group.	Expectations has increased in the VR-group but no significant differences in the two groups.
Cognition	Cognitions are not significantly different in the two groups.	Cognitions decreases more in the VR-group compared to the 2D-group and the difference becomes significant.
Emotions	Emotions are not significantly different in the two groups.	Emotions decreases more in the VR-group compared to the 2D-group.
Positive impressions	Positive impressions are not significantly different in the two groups.	Positive impressions have slightly decreased in the VR-group but no significant differences in the two group.

We are aware that other factors and uncontrolled effects should also be taken into account to be able to provide robust conclusion on this analysis. A higher cognition stimuli or panorama perception cannot only be explained by the conditioning effect of virtual reality exposure. We have here only attempt to explore difference between the means of each group. Our conclusion is that we reject hypothesis 3B and conclude that VR- exposure, compared to 2D-exposure, does not have a significant influence on the customer's memory and evaluation of the real experience.

7.3 Moderator and mediator Analyses

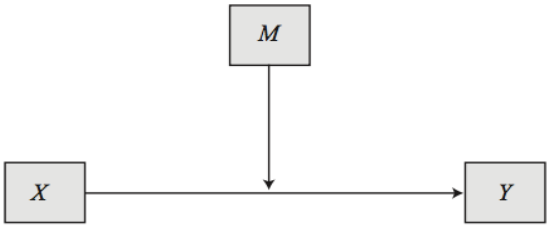
This section is split into a moderator- and a mediator part. To test the significant presence of moderators and mediators, we use a Generalized Linear Model (GLM). This statistical model is used in Conditional Process Analysis (PROCESS) to test the presence of moderating and mediating variables. A regression analysis is a statistical model that estimates the relationship between a dependent variable, Y, also called response variable, with an independent variable, X, also called explanatory variable. In the case of multiple regression models, the linear equation can be expressed with additional variables to better predict the value of the dependent variable or to control the effect of other variables (Hill, Griffiths, & Lim, 2012). There are five criteria that must be fulfilled for a regression analysis to be valid: the model is linear in its parameters (there is a linear relationship between the dependent variable and each independent variable), the dataset is made of independent observations (random sampling), there is no perfect collinearity between the independent variables (the independent variables should not be correlated with each other), the residuals are normally distributed (the error term must have an expected value of zero), and the dataset must show homoscedasticity (the error term must have uniform variance and remain the same for any values of the independent variables) (Hill, Griffiths, & Lim, 2012).

Our datasets are not time-series data, meaning that we will not consider autocorrelation as a threat. However, there are other concerns that must be taken into account, such as the presence of significant outliers in the dataset that can influence the regression equation dramatically and overestimate (or underestimate) the predicted effects of the model. This has been taken under consideration in our analysis. In the methodology part, we mentioned randomization of the data sample as an important concern, from which the preliminary analysis permitted to conclude that the distribution of scores of the variables were fairly balanced between the 2D and VR-

group. We also concluded that some of our variables and constructs are not normally distributed. However, PROCESS does not necessary require the assumption of normality to be satisfied since the confidence intervals for significance testing are executed using a bootstrap procedure. Bootstrapping can be described as an efficient way to ensure that analytic models are reliable. In the difference between means analysis, we also concluded that the majority of our constructs satisfy the assumption of homogeneity of variances. Therefore, we do not consider heteroscedasticity and the normality of scores of the constructs as a concern in our analysis.

7.3.1 Moderator variables

A moderating variable is a variable that interacts with another variable, usually with an independent variable. The relationship between independent and dependent variable is conditional upon values of the moderator. The reason why we focus on moderator rather than control variable in our analyses, is because we consider the variables in our hypotheses as part of our research study and therefore consciously evaluate how specific variables moderates the relationship between the independent and dependent variable. There are several conceptual diagrams, called models, that can be used to tests for moderation and mediating effects in a regression. In SPSS, these models are provided in PROCESS. Model 1 (below) is a simple moderation model with a single moderator variable M influencing the size of X's effect on Y.



In this section, all our regressions are computed in SPSS with Model 1. Note that Hypothesis 1E is the only hypothesis where moderation is required to provide a pertinent conclusion. The regression outputs are available in the appendix 11.6.

7.3.1.1 Hypothesis one – customer acquisition

In the difference between mean analysis, we concluded that there is no direct relationship between participants' exposure to VR-images and purchasing decision. However, there may be variables conditioning whenever participants purchase a ticket or not. Moderator variables include demographics of our participants such as gender, age, personal traits or risk-profile.

We have conducted several regressions to see if we can provide further insights on our previous conclusions. These are summarized below.

Concerning **hypotheses 1A**, **1B** and **1C**, we have tested six moderators: *Gender, Age, Snitt_Nature, Planner, Nærøy* and *Flom*. The test results indicate that none of these moderators have conditioning effects on the dependent variables. The interpretation of hypothesis 1A is that neither the participants' gender, age, connectedness to nature or pre-knowledge of the travel destination seems to have a conditioning effect on the purchase of a ticket. The same conclusion applies for hypotheses 1B and 1C with their respective dependent variables.

Let us now consider **hypothesis 1D**: *exposure to virtual reality will increase perceived access to information about the quality of the experience good*. Recalling from our difference between means analysis, we concluded that the means of *Snitt_Telepresens* and *Snitt_Imagination* in the 2D and VR-group were both statistically different from each other. The same way we did with the previous moderating regressions, we explore if the level of telepresence (*Snitt_Telepresens*), mental imagery (*Snitt_Imagination*) and perceived access to information (*Snitt_Accessibility*) is conditioned by the participants' gender, age or pre-knowledge on the travel destination. Based on regression results, none of these variables have moderating effect between the independent and the dependent variables.

We have also tested *Kvalitet* as moderator to see if the independent variable is conditioned upon different value of perceived quality. The results indicates no significant effect with *Snitt_Telepresens* but it seems that perceived quality condition mental imagery for specific values of *Kvalitet*. Available in the appendix 11.6.1, the regression output indicate that the overall model is significant ($F(3,99)= 3.6688$, $p=0.0148<0.05$) with a coefficient of determination of 11.62%. The referential category in this regression is the 2D-group. The variable *Group* is also significant ($t(99)=-2.6451$, $p=0.00<0.05$) with a coefficient of -1.5183. Variable *Kvalitet* has a coefficient of 0.1491 and is not significant ($t(99)=1.2026$, $p=0.2320>0.05$). The interaction term (*Group* multiplied with *Kvalitet*) has a coefficient of -0.0786 and is not significant either ($t(99)=-0.3149$, $p=0.7535>0.05$). Even if the interaction term in this regression is not significant, it is interesting to look at the conditional effect of *Group* on *Snitt_Imagination* based on different values of *Kvalitet*. By moving from one standard deviation below the mean to one standard deviation above the mean, the coefficient is decreasing (from -1.7075 to -1.3290) and becomes significant (from $p=0.1105$ to $p=0.0102$). The interpretation of these results is that VR-exposure increases the level of mental imagery as

concluded before. In addition, images quality does not increases the level of mental imagery by itself, but the combination of VR-exposure and high quality has an interaction effect on the level of mental imagery: perceived quality is known to be significantly higher in the 2D-group but the effect of VR-exposure on mental imagery seems to be higher in the VR-group when considering high values of perceived quality.

Let us now recall **hypothesis 1E**: *exposure to virtual reality will decrease the perceived risk for purchasing the experience good.* What interests us is if the participant's risk-profile has a moderating effect on the actual purchase. This is therefore a moderation hypothesis where we test if *Group* and *Kjøpte_deltagere_billett* is conditioned upon different values of moderators *Snitt_Personal_Trait* and *Pos_usik* separately. Recalling the reliability test we provided in the Methodology chapter, *Snitt_Personal_Trait* was considered to have only medium consistency with the variables forming the construct. We have therefore also tested Model 1 using variables *Trait1, Trait2, Trait3_r, Trait4_r* and *Trait5* individually. The regression results indicate that neither of the constructs have a significant moderating effect on the actual purchasing decision. Based on these results, we reject hypothesis 1E and conclude that conditioning the participants' risk-profile, VR-exposure, compared to 2D-exposure, do not decrease the perceived risk for purchasing the actual good.

7.3.1.2 Hypothesis two – Future implications

Hypothesis 2A considers if *perceived quality of virtual reality images is higher in 2D than in virtual reality*. The results from the difference between means analysis indicated that quality was in fact significantly higher in the 2D group compared to the VR-group. We are however interested in testing if the gender or age of the participants have a moderating effect on perceived quality.

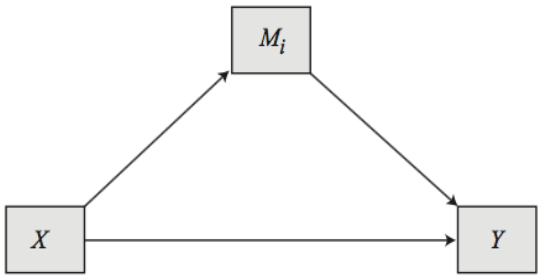
The regression results indicates that only gender has a significant (positive) conditioning effect on perceived quality. The regression output is available in appendix 11.6.2. The referential category in this regression is men in the 2D group. As we can see, the overall model is significant ($F(3, 99)= 28.5434$, $p=0.00<0.05$) with a coefficient of determination of 49.43%.. Variable *Gender* has a coefficient of 0.8422 and is significant ($t(99)=2.1534$, $p=0.0337<0.05$). The interpretation is that women (*Gender*=1) in the 2D-group perceive quality 0.8422 higher than men in the 2D-group (referential group). Variable *Group* has a coefficient og -3.3487 and is also significant as concluded in the difference between mean analysis ($t(99)=-8.8439$, $p=0.00<0.05$). The interpretation is that women in the VR-group perceived quality 3.3487

higher than men in the VR-group. The interaction term (*Group* multiplied with *Gender*) has a coefficient of 1.8333 and is also significant (t(99)=2.3491, p=0.0208<0.05). The interpretation is that women in the VR-group (Gender and Group=1) perceive quality is 1.83333 higher than men in the 2D-group (referential group).

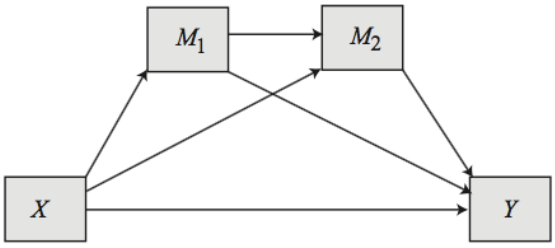
While **hypothesis 2B** was concluded as supported In the difference between means analysis, we want to explore the potential presence of moderators and test for instance if older customers are more susceptive to being positively affected by virtual reality images than younger customers. We have tested the role of *Gender, Age, Snitt_Nature, Kunnskap, Planner, Nærøy* and *Flom* as moderators between the independent variable *Group* and dependent variable *Snitt_Enjoy*. The regression output indicates that none of these demographic variables have a conditioning effect on the level of enjoyment. Considering the age differences with experiment two dataset, we have also tested variables *Gender, Age* and *Snitt_Nature* and the regression results lead to the same conclusions.

7.3.2 Mediating variables

A mediating variable is a variable that transmits an effect from one variable to another. In a mediation model, the effect of variable X (independent variable) on Y (dependent variable) is partitioned into the direct effect of X on Y and the indirect effect of X on Y via one or several mediators M_i. Hypothesis 1D is the only hypothesis where mediation is required to provide a pertinent conclusion. We have below presented two conceptual models that will be used in our mediation analysis.



Model 4 (above) illustrates the default model in PROCESS, which is the simplest mediation situation we will use in our regressions. In this model, the total effect of X on Y is the sum of the direct effect of X on Y and the indirect effect of X on Y through the mediator M_1.



Model 6 (above) is typically used in multiple mediator situations when the mediators are linked in a causal chain. The total effect of X on Y is the sum of the indirect effects of X on Y through the mediators M_1 *and* M_2, the indirect effect in-between the mediators and the direct effect of X on Y. Model 6 can include up to four mediators. In our analysis, we use Model 6 when considering that some constructs may have complementing effect with each other, rather than a competing effect. I this case, serial mediation is more appropriate (Hayes, 2013). There are three conditions required to identify if a variable is a good mediator: there must be a significant relationship between X and Y, there must be a significant relationship between X and the mediator (M) and there must be a significant relationship between X and Y together with the mediator. If the relationship between X and Y when considering the mediator loses its significance, the latter is considered as a good mediator. If the relationship between X and Y when considering the mediator is still significant, the latter is only considered as a partial mediator. In the situation of partial-mediator, a Sobel Z-test is appropriate to test the importance of the mediator in explaining the effect X has on Y. In the literature, it is discussed that it is possible for the first condition to not always be satisfied. Hayes (2013) supports this statement and adds that *a total effect of X on Y should not be a prerequisite to searching for evidence of indirect effects.* In our analysis, we will not consider the significant relationship between X and Y as a required condition to explore the presence of indirect effects between our constructs. This requirement is however satisfied for most of our regressions.

In this section, all our regressions are computed in SPSS with Model 4 and Model 6. The regression outputs are available in the appendix 11.7.

7.3.2.1 Hypothesis one – Customer acquisition

The indirect effects we are testing between the independent variable and the dependent variable from hypothesis 1A, 1B and 1C emphasizes on concepts that are not discussed in the Theory chapter. Concerning **hypothesis 1A**, we are exploring if mediators *Snitt_Intensjon* and *Snitt_Attitude* can lead to specific cases where participants actually make a purchase. When considering the concepts of telepresence and mental imagery, we suspect the level of

telepresence to have an explanatory role in understanding the participant's ability to imagine the travel destination, which could in turn increase the participant's intention or attitude to purchase a ticket and finally lead to the actual purchase of a ticket. The regression analysis results indicate no significant serial or individual mediator effects between the dependent and independent variable. However, we observe a significant serial moderating effect using *Snitt_Imagination* as independent variable, *Snitt_Attitude* and *Snitt_Intensjon* as serial mediators and *Kjøpte_deltagere_billett* as dependent variable, implying that we exclude *Group* from the model. Therefore, we cannot conclude that VR-exposure leads to this casual effect and will not interpret the coefficients. The regression results for this regression is available in the appendix 11.7.1.

When it comes to **hypothesis 1B**, we explore intermediate effect between independent variable *Group* and dependent variable *Snitt_Intensjon* using the same concept as in hypothesis 1A. The regression results indicate that neither *Snitt_Telepresens* and *Snitt_Imagination* have significant mediating effect between the dependent and independent variable.

In the case of **hypothesis 1C**, we explore intermediate effect between independent variable *Group* and dependent variable *Snitt_Attitude*. The mediating effects we have tested here are based on the same logic than hypothesis 1A and 1B: increased telepresence and mental imagery may in turn lead to increased attitude toward purchasing a ticket. The regression results indicate that neither *Snitt_Telepresens* and *Snitt_Imagination* have significant mediating effect between the dependent and independent variable.

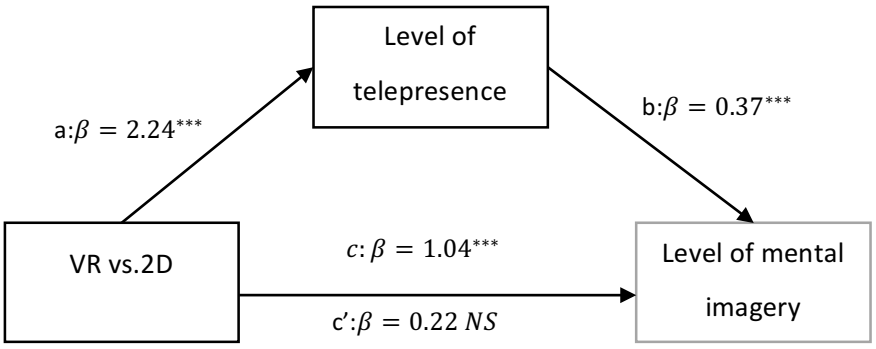
We are now interested in **hypothesis 1D**: *exposure to virtual reality will increase perceived access to information about the quality of the experience good.* This is the only hypothesis that has not been accepted or rejected yet. In the difference between means analysis we concluded that *Snitt_Imagination* and *Snitt_Telepresens* were correlated and that both constructs are significant different in the two groups. We also concluded at a 95% confidence level, that the mean differences in *Snitt_Accessibility* was only marginally significant. We are here exploring the presence of indirect effect between *Group* and *Snitt_Accessibility* using *Snitt_Telepresens* and *Snitt_Imagination* as mediator variables. As mentioned before, the causality of these effects have not been theoretically defined in our theory but telepresence and mental imagery constitutes important concepts in the virtual reality technology literature.

The regressions we have tested indicate that there is a significant mediating effect using *Snitt_Imagination* as mediator between *Group* and *Snitt_Accessibility.* The results also indicate

that *Snitt_Telepresens* has a significant mediating effect between *Group* and *Snitt_Imagination*. Most importantly, the results indicates a serial mediator effect using *Snitt_Telepresens* and *Snitt_Imagination* as serial moderation. Both mediators were also tested using Model 4 to see whenever the constructs could have a competing rather than complementing role in explaining the participant's perceived access to information. The regression results indicate that only *Snitt_Imagination* is significant and thereby confirm that a serial mediation (Model 6) is appropriate.

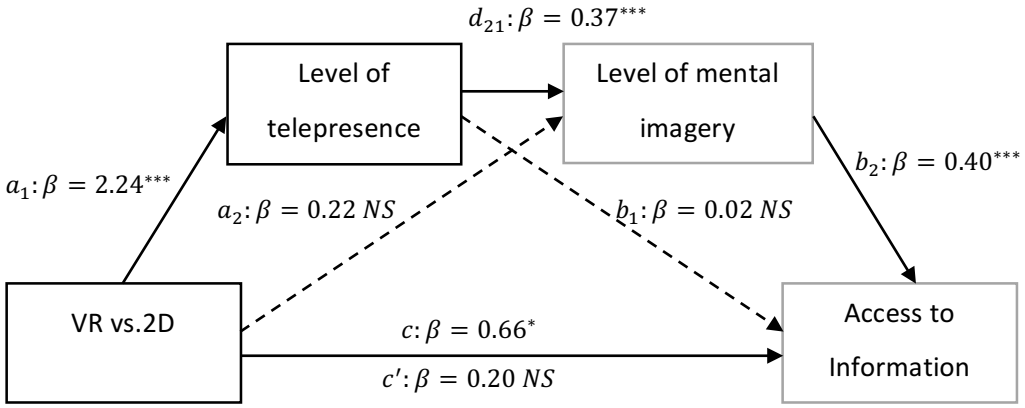
The two last regressions are presented below and the regression are available in the appendix 11.7.2.

7.3.2.1.1 Telepresence mediating mental imagery



The reference category in this regression is the 2D-group. The model measuring the total effects of *Group* through mediator *Snitt_Telepresens* on *Snitt_Imagination* is significant (F(1,103)=20.2950, p=0.00<0.05) with a coefficient of determination of 28.87% and a prediction value of c=1.04. The prediction of the independent variable *Group* on *Snitt_Telepresens* is also significant (F(1,103)=29.7340, p=0.000<0.05) with a coefficient of determination of 22.74% and a prediction value of a=2.2423. The interpretation is that we anticipate a level of telepresence 2.24 higher for participants exposed to VR-images (X=1) compared to participants exposed to 2D-images (X=0). The prediction value between mediator *Snitt_Telepresens* and the dependent variable is b=0.3683 and is also significant. If *Snitt_Imagination* was a perfect mediator, we would expect the prediction value between *Group* and *Snitt_Telepresens* (taking into account mediating effect) to lose its significance. In our case c' does lose its significance (t(102)=0.6616, p = 0,5098>0.05). Therefore, we conclude that *Snitt_Imagination* is a good mediator. This is also confirmed by the decrease in the predictor values from c=1.0439 (direct effect) to c'=0.2180 (Indirect effect through M).

7.3.2.1.2 Telepresence and mental imagery mediating perceived access to information



The reference category in this regression is the 2D-group. The prediction of the independent variable *Group* on the dependent variable *Snitt_Accessibility* is marginally significant (F(1,103)=2.8553, p=0.0942>0.05) with a coefficient of determination of 16.58% and a prediction value of c=0.6623. The prediction of the independent variable *Group* on *Snitt_Telepresens* is significant as presented in the previous regression where we also concluded that it was a good mediator between *Group* and *Snitt_Imagination*. The model measuring the effect of *Group* with mediator *Snitt_Telepresens* on *Snitt_Imagination* is also significant (F(1,103)=5.4467, p=0.0017<0.05) with a coefficient of determination of 37.64% and a prediction value of d_{21}=0.37. The prediction value between the mediators and the dependent variable are b_1=0.02 for Snitt_Telepresens and b_2=0.40 for Snitt_Imagination. In this regression, the c'-value (prediction coefficient between *Group* and *Snitt_Accessibility,* taking into account the effects of both mediators) loses its marginal significance compared to the total effect model and has a predicting value of c'=0.2014. We are therefore confidence that *Snitt_Telepresens* and *Snitt_Imagination* have a serial mediating effect explaining the participant's perceived access of information on the quality of the experience good. Based on our conclusion, we can accept hypothesis 1D and conclude that compared to 2D-images, VR-images increase perceived access to information about the quality of the product.

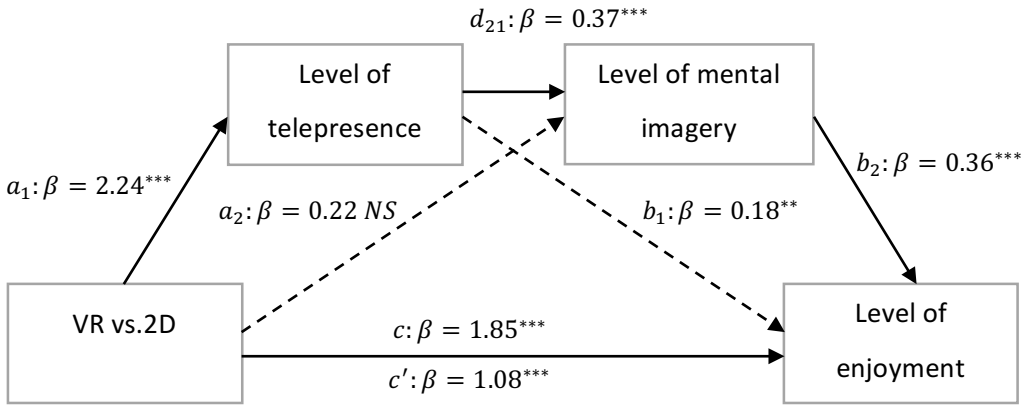
7.3.2.2 Hypothesis two – future implications

In this set of hypotheses, we are only interested in **hypothesis 2B -** *customers enjoy watching virtual reality more than they enjoy watching the same images in 2D pictures.* This hypothesis was established to be supported in the difference between mean analysis, but we are interested

in exploring indirect effects between *Group* and *Snitt_Enjoy* using constructs *Snitt_Telepresens* and *Snitt_Imagination.*

The regression results indicate that both *Snitt_Telepresens* and *Snitt_Imagination* have a mediating effect between *Group* and *Snitt_Enjoy*. We also concluded previously that *Snitt_Telepresens* has a significant role in explaining the level of mental imagery. Based on these results, we are interested in testing whenever *Snitt_Telepresens* and *Snitt_Imagination* have a complementing role in explaining the participant's level of enjoyment. The regression results for these models are presented in the appendix *11.7.3*.

7.3.2.2.1 Telepresence and mental imagery mediating the level of enjoyment



The referential category in this regression is the 2D-group. The prediction of the independent variable *Group* on the dependent variable *Snitt_Enjoy* is significant (F(1,103) = 36.0572, p=0.00<0.05) with a coefficient of determination of 26.31% and prediction value of c=1.8484. The interpretation is that we anticipate a level of enjoyment that is 1.8484 higher for participants exposed to VR-images (X=1) compared to participants exposed to 2D-images (X=0). As concluded before, the prediction of *Group* on *Snitt_Telepresens* is also significant. The prediction of *Snitt_Telepresens* on *Snitt_Imagination* has also been proved to be significant. The model measuring the effects of *Group* with mediator *Snitt_Telepresens* on *Snitt_Imagination* is also significant (F(1,103) = 29.2293, p = 0.00<0,05) with a coefficient of determination of 46.97%. and prediction value of d_{21}=0.37. The prediction value between the mediators and the dependent variable are b_1=0.18 for *Snitt_Telepresens* and b_2=0.36 for *Snitt_Imagination*. In this regression, the c'-value (prediction coefficient between *Group* and *Snitt_Enjoy* taking into account the effects of both mediators) is still significant (t(103)=3.5944, p= 0.0005<0.05) with a predicting value of c'=1.0810. Since we do not have a drop in

significance, we want to make sure that the mediators still have a significant role in the overall model. To do so, we look at the Bootstrap lower and upper values. If the lower value (BootLLCI) crosses zero to meet the upper value (BootULCI), it indicates that the mediators are not statistically significant. As provided in the regression output, the path *ind.2* indicate that the mediator model is significant. We are therefore confident that *Snitt_Telepresens* and *Snitt_Imagination* are serial mediators that explains the participant's enjoyment. This can also be observed in the reduction in the predictor values - from c=1.8484 (direct effect) to c'=1.0810 (Indirect effect through both mediators). The interpretation of this model is that participants exposed to VR-images experience a level of telepresence 0.2180 higher than participants exposed to 2D-images, which in turn lead to a level of mental imagery 0.3567 higher than participants expose to 2D-images and in turn lead to a level of enjoyment 1.0810 higher than participants expose to 2D-images.

7.4 Summary of Findings

7.4.1 Difference between groups

The difference between means analysis results indicate that four variables and constructs have significant differences in the VR and 2D-groups at a $p<0.05$ level: *Kvalitet*, *Snitt_Imagination*, *Snitt_Telepresens* and *Snitt_Enjoy*. Our conclusion is that on average, participants exposed to virtual reality images experience more entertainment and enjoyment than participant exposed to 2D-images. We further concluded that participants exposed to virtual reality images have a higher mental imagery than participants exposed to 2D-images. Also, participants exposed to virtual reality images experience higher immersion and feeling of being virtually present in the destination compared to participants exposed to 2D-images. Finally, we concluded that perceived images quality is on average significantly higher in the 2D-group than the VR-group.

7.4.2 Mediator and moderator variables

The moderator analysis results indicate that gender seems to have a conditioning effect on perceived images quality: women in the VR-group perceived quality higher than men in the VR-group. We also concluded that the level of mental imagery is conditioned by the quality of images for participants in the VR-group that consider VR-images quality as high.

The indirect effect analysis results indicate the presence of individual and serial mediating effects between the constructs constituting our hypotheses. The table below summarize the regressions we found to have significant effects.

Ind. var. X	Mediator M_1	Mediator M_2	Dep. var. Y
*Group**	*Snitt_Telepresens**		*Snitt_Imagination**
*Group**	*Snitt_Telepresens**	*Snitt_Imagination**	*Snitt_Accessibility**
*Group**	*Snitt_Telepresens**	*Snitt_Imagination**	*Snitt_Enjoy**

7.4.3 Hypotheses conclusion

Based on our analyses, the table below summarizes our hypotheses and their following conclusion from the analysis.

Hypothesis	**Description**	**Conclusion**
Hypothesis 1A	*Exposure to virtual reality will increase purchasing for the experience good.*	Hypothesis not supported
Hypothesis 1B	*Exposure to virtual reality will increase the intention to purchase the experience good.*	Hypothesis not supported
Hypothesis 1C	*Exposure to virtual reality will give customers a more positive attitude to purchasing the experience good.*	Hypothesis not supported
Hypothesis 1D	*Exposure to virtual reality will increase perceived access to information about the quality of the experience good.*	Hypothesis supported
Hypothesis 1E	*Exposure to virtual reality will decrease the perceived risk for purchasing the experience good.*	Hypothesis not supported
Hypothesis 2A	*The perceived quality of virtual reality is higher in 2D than in VR.*	Hypothesis supported
Hypothesis 2B	*Customers enjoy watching virtual reality more than they enjoy watching the same images in 2D pictures.*	Hypothesis supported
Hypothesis 3A	*Exposure to virtual reality will increase the expectations for the real experience.*	Hypothesis not supported
Hypothesis 3B	*Exposure to virtual reality will influence customers' memories/evaluations of the real experience.*	Hypothesis not supported

8 Discussion and Implications

From the abovementioned results, we will now look at their meaning and the theoretical implications they provide for business models in the tourism industry. Firstly, we will discuss how our findings point to several implications for business models in the tourism industry. Here we will also look at how some of our results might support different uses for virtual reality. Then, we discuss how our results are likely to change in the future, and then, how we can expect this to affect business models. Finally we will comment on what direction we believe further studies on the subject should take to gain a deeper understanding of the implications of virtual reality in tourism. In this section, we will also critically evaluate the limitations of our study which was not emphasized in the Methodology chapter. This part is particularly important to understand how reliable our findings are and how much we have actually been able to determine with our study. These limitations have, however, inspired us to come up with ideas for how future research might overcome the barriers in our design, and we will also include these suggestions.

8.1 Business Model Implications

As we are unable to find sufficient support for any of our first three hypotheses, we are also not in a position to argue that there should be any immediate drastic changes in the business models. Assuming that all business models in the tourism industry have an underlying goal of profit maximizing, we would need evidence for sales to increase after exposure to the experience in virtual reality to argue that the tourism industry should adapt this technology to acquire more customers. As this is not the case, we will in this section rather focus on the possible business model implications of the things that we have found statistical evidence of. Further we will look at how our results might back up new ways of utilizing virtual reality as part of the business model.

8.1.1 Adapting to a new competitive market

Although not a business model implication, the competitive changes brought to life by virtual reality technology is still important to have in mind to understand the environment in which tourism players operate. Most business models need to fit into a bigger scene of competitors, and understanding the conditions in the competitive market gives us a better understanding of the opportunities and threats influencing the decision to change a business model. By first considering the competitive market, we are able to better support the reasoning for the changes we will later suggest.

Supporting hypothesis 1D opens several implications for competition in the market of consumer goods. The distinction between search and experience goods, based on Nelson's theory, was that search goods often are subject to higher price competition than experience goods. This, due to consumers having better access to information concerning the good. We also described that when it comes to experience goods, consumers have access to information about a limited amount of attributes of the service in question. Price is among one of them, which is often characterized with relatively low elasticity since consumer interpret lower price as indicator of quality (Nelson, 1974).

Let us consider two tourism companies competing in the same market. They may have comparable experiences but different cost structures (one company may be more cost efficient than the other). Because of imperfect information in the market, the two companies use a differentiating strategy to compete. Hence, their pricing strategies are not submitted to competitive prices but on other attributes such as brand reputation or market size. In hypothesis 1D, the concepts of mental imagery and telepresence were proved to have explanatory power in understanding how participants exposed to VR-images perceived the real travel destination: through increased telepresence and increased mental imagery, participants exposed to VR-images perceived a higher access to information compared to participants exposed to 2D-images. Based on our findings, access to information gives consumers the possibility to compare similar experience goods in the market based on their personal experience from being exposed to virtual reality images. Facilitating the access of information of the real experience reduces the consumer dependency to rely on easily accessible attributes such as price. Hence, since price is no longer a dominating product attribute, companies providing experience goods, can defend the prices they set in the market. Since price is no longer the most available attribute to the consumers, it is possible that price elasticities in the experience good market increases making price competition possible for companies competing with each other. In our example, the cost efficient company can compete on prices by improving the way it communicates its product to its customers.

8.1.2 Changes in Customer Channels

The perhaps most important difference between search- and experience goods lies in the customer's ability to attain information of the good before consuming it. The tourism industry have long relied on good reviews and word-of-mouth to convince their potential customers to purchase trips. Their efforts to communicate the quality of an experience has been helped by pictures, and video in some cases, as this is considered more objective, unbiased and

trustworthy information by the customer. Our research has found that there lies a great opportunity to increase the perceived access to information about the trip through virtual reality.

In theoretical terms, this means that the use of virtual reality as a mean for lowering the cost of searching for information of the experience moves the experience in question closer to a search good. In other words, the trips offered in the tourism industry can be considered to a much larger extent for its quality before the consumer actually purchases and experience the real trip. Or at least, that is how the customers would feel as they look at the trip through virtual reality.

For practical purposes in the tourism industry, this might indicate that the telepresence created through virtual reality technology can be utilized to reduce the perceived risk involved in purchasing, and in such, risk-averse customers might be more prone to purchase from them. Although our study was not able to support this hypothesis statistically, purchasing theory does back this claim. Thus we believe it should be considered as a potential benefit to offering trip-information to potential customers.

8.1.3 Customer Segment

As described by Sherman and Craig (2003), recreating virtual reality experience requires the presence of immersion and a form of interactivity, which were only partially considered in our experiments. However, in the difference between mean analysis we came to the conclusion that level of telepresence, the level of mental imagery as well as the level of enjoyment were significant higher for participants exposed to VR-images compared to 2D-images. We also concluded that the two first mentioned concepts have a significant role in explaining the participant's level of enjoyment. The literature we have provided so far describes virtual reality as an innovation susceptible to attract new customer segments for specific consumer goods market (Huang et al., 2009).

In our research, we have gathered some participant demographics that has allowed us to look at how the participant background might influence the effects of virtual reality exposure. Though we lack sufficient data to statistically confirm that there are differences in how different people are affected, we can still see differences in the tendencies. On average, the younger participants (from experiment one) considered VR to be more enjoyable than 2D, while the older participants in the second experiment enjoyed watching the pictures in 2D more. Moreover, the younger generation has better knowledge of virtual reality, and like with most new technology, the younger generation tend to adapt it much earlier than the older. Finally,

we can also see that women were generally less critical to the quality of the images presented In virtual reality than men, with an average difference of about 1 point in our 11-point scale. The difference between women and men in the VR-group was found to be almost 3 point higher for women. This finding is significant in a 95% confidence level but we are cautious about speculating too much. If these findings could be generalized, it could imply that the current quality of the technology might already be good enough for use on the female gender, while it might be considered too low quality to have an equal effect on men. We have no foundation for arguing as to the cause of this tendency, however, and find it premature to speculate without further research.

With this in mind, we will argue that it is likely that an investment in virtual reality would reach out to the younger customers disproportionally. The fact that both male and female, as well as both younger and older, participants found the virtual reality experience to be enjoyable, suggests that offering this as an option to customers would be well-received in the market, with high interest in using it from both younger and older. We are simply arguing that it is more likely to be able to reach the younger generation remotely, as they are more likely to have access to virtual reality headsets privately. For many providers of travel experiences, we believe that this might be an effective tool to increase their customer portfolio with an increased interest from younger customers.

8.1.4 Virtual reality as value proposition

The hypotheses we have tested in our analysis does not indicates wherever virtual reality technology increases the market size or not, but it is worth discussing if the technology could hypothetically facilitate the access to new customer segments by offering customized products. Offering customized products emphasizes on providing product features that are aimed to a particular market segment. In the tourism industry, we are considering whether virtual reality technology can re-create virtual situation of the real experience by focusing on the customer's level of telepresence and mental imagery.

The fact that we found a high enjoyment from use of the virtual reality head mount makes it worth considering that the entertainment of the use can be valuable in itself. In other words, businesses might be able to capture some of the value they are able to add through offering virtual reality experiences. One way this might become a reality, is through offering VR-experiences either as part of the actual experience. In the instance of Hurtigruten, they could for instance offer virtual reality video of destinations that they might pass by during bad

weather with limited visibility. Our third set of hypotheses discussed if virtual reality can alter the real experience for the customers, and found that there were no support for this; the actual experience or memories from it was not changed from having seen it in VR, and the risks involved in offering this to customers is therefore to be considered marginal.

Another way of adding value with VR, is using it as a substitute good for people not able to take part in all the experiences within the journey. For instance, consumers with limited physical capabilities may not consider traveling to places where physical activity is a requirement. Tourism services providing such activities, like some of the excursions on Hurtigruten, would currently not consider these consumers as a target segment. However, by proposing high-ended virtual experiences with fully immersive systems, companies can aim to those consumers. In the case of Hurtigruten, the company could have virtual services on their cruise lines by proposing livestream experiences, even with communication, of the hikes or excursions available along the cruise stops. Consumer with physical disability considering hiking as a valuable attribute, may rely on such virtual experiences to satisfy their wants.

8.2 Future considerations

Despite the obvious inability to do tests about the future, we can still consider some of the likely outcomes based on our current tests. Assuming that the market predictions are right about how virtual reality will increase rapidly, we can also assume that the technology will keep improving and that the accessibility to virtual reality gear will increase. This allows us to use some of our findings to tested parameters to look for hints of what we believe the future might hold for business models in tourism with regard to virtual reality technology.

8.2.1 Quality increase

As time moves forward, technology also tends to improve. Research and development is almost inevitable in a market with a high expected potential for growth. We expect this to include an improvement in the quality of the virtual images, and thus, an increased telepresence and immersion. From our tests, we have found that the quality plays a significant role in explaining users' perceived access to information about experience goods, granted that they found the quality to be high, as well as a causal (serial) effect on the level of enjoyment from being immersed by VR. As the quality increases, it is also expected that the effects we have found will increase further. We also believe that this increase in effect would expand any marginal effects that our experiment was not able to pick up on or confirm with an appropriate level of confidence.

As this access to information increases, it is important to be aware of the related risks. Making a products attributes more searchable before the purchase means that not only will the potential customers be able to find out more about how good a trip looks, but they may also become more aware of negative properties. For instance, if the weather is bad in the virtual reality, that might impact have a greater negative effect on the customers willingness to purchase the trip than a picture of the same might have.

Our participants reported what we would classify as an moderately high level of telepresence with the use of virtual reality. With an increase in quality, and especially considering that this might even include more senses like sound, smell or taste, we can envision what we will label as a "been-there-done-that-effect". By this we mean that the participants might feel a reduced want or longing for the real experience after having experienced something so close to it, leaving the actual experience less appealing. Though we have not been able to identify any such effects in our experiment, it might still be present, and could even be the reason why we were not able to support our hypothesis 1A. If that was the case, we would also expect this effect to increase with a higher level of telepresence or immersion. It is, in other words, a potential possibility for the quality of the virtual reality to become so good that it might cannibalize some of the tourism industry, as the experiences in the virtual reality might provide customers with a high enough perception of experiencing the real trip to decide against traveling.

On the other hand, a high level of telepresence should also set the expectations more accurately for the customers. In this sense, virtual reality could improve the predictability for both the customers traveling, as well as how the travel agencies can expect their trips to be evaluated and reviewed afterwards. This would mean a higher level of predictability and security, but would also increase the competitiveness of the market. It might also lead to a normalization of reviews, as expectations might tend to rarely be exceeded, as companies might need to sell their every benefit to compete in a more informed market. Our findings on hypothesis 3A, indicates with a 90% confidence interval, that the expectations to the experience is reduced after viewing the destination in virtual reality, compared with viewing the images. It is, to our understanding, likely that this effect will not diminish with a higher quality of the images. The benefit of this, might however be that some customers who previously might have been too risk averse to ever purchase trips, may now feel comfortable with purchasing as they can better understand what they might get.

8.2.2 New partners

The final consideration for potential future implications for business models in the tourism industry relates to Osterwalder's business model section labeled "partners". Virtual reality technology is currently demanding technical understanding and gear, and as it develops further, it is not expected to become any easier for non-technical staff to generate suitable media. This means that travel agents and other players in the tourism industry will have to consider partnering with a new kind of businesses, namely 360-degree media creators. This could mean anything from programmers creating CGI, filmmakers who can direct a 360-degree movie, or simply people who take 360 degree photos. They might also need to set up leasing agreements for virtual reality gear or technical support for this.

Players in the tourism arena now need to decide whether to invest in this new technology, either through acquisition of companies and equipment or through setting up partnership agreements and rental deals as well as outsourcing media generation. Or they can wait for the technology to improve, and for the virtual reality headsets to become a more usual commodity. As we learned in the theory section about business model innovation, business models must adapt to the technological drivers, and decide if they want to take the lead on implementing new technology, risking to adapt prematurely, or to follow the market, risking to lose market share.

8.3 Critical evaluation

Our study is limited by a long list of imperfect preconditions. While we believe we have gained valuable insights to how business models in the tourism industry, we are also very aware that our research is not exact science. To fully appreciate what our findings can and cannot comment on, we will point out the limiting factors we consider to be the most critical for our research.

8.3.1 Participant pool

In our first experiment, we only recruited students. Though this has the benefit of having homogenous participants, the downsize, in terms of the usability of our findings, might be even greater. For several of our hypothesis we have only looked at the data for our first experiment because the participants here were the only ones eligible to provide insights on the related hypotheses. This means that we must be very careful about generalizing our findings from this experiment to anybody other than students. It can still be argued that there is no reason that some effects should be different from students to other groups of people, but because we have

not tested that, and there is no existing literature that can state it, we will advise on using caution when generalizing from our findings.

Similarly, the participants of our second experiment can be categorized to a large extent. The majority of the participants were assumed retired, or at least of a relatively high age. It can also be argued that their state of mind, with factors like mood, atmosphere and feelings, were altered towards specific levels due to the fact that they were traveling and had certain expectations to the experience they were about to have. This might have adjusted the responses systematically, and it should therefore be considered that the results might only apply to this specific group of people under these specific circumstances.

We will also very briefly mention that the incentives for participation in the experiments might attract a certain kind of people more than others, but as the incentives are monetary, and therefore relatively universally accepted, we will argue that the systematic differences from this source are insignificant.

8.3.2 Number of participants

To understand the potential reasons for why we were not able to distinguish any differences in some of the parameters in our experiments, we begin by looking at some of the statistical values. In experiment one, we had a total of 103 respondents deemed valid. If we consider that the expected purchasing rate between the respondents in both groups were equal prior to any media exposure, and that our pre-test results showed us that the pricing indicated that less than 30% of participants would make a purchase, the amount of purchases was expected to be limited. Within our limited sample size, the standard deviation for purchased tickets would mean that even a relatively high effect would be considered non-significant in a statistical analysis. I.e. a difference of 2:1 purchases in favor of virtual reality exposed participants would be deemed insignificant if the number of participants purchasing were only six and three in virtual reality- and 2D exposed participants respectively. In other words, as this is an absolute variable, we would need a very distinct difference in the two groups to be able to conclude with a significant explanatory power in the exposure type.

Similarly, in experiment two, the number of participants deemed reliable for our test purposes were 67. In other words, the differences would have to be quite large in order for us to be able to determine any statistical significance in the difference.

8.3.3 Limited destinations

Our first experiment only examined the effect of virtual reality for a single travel experience case. Though this might have been necessary to gain enough usable data, it also limits our ability to generalize. In the first experiment, we used images from the trip "Norway in a Nutshell" exclusively, and in the second, we only used aerial photos from destinations along Hurtigruten route. Thus, we were not able to gain any insights in what types of trips might appeal more to what customer segments. Nor were we able to see if there might be other types of trips, like more sportive or action-based tours, that might have yielded a higher response in VR than in 2D compared to what we were able to identify.

We would also make a short point out of this perspective on the 360 degree images, as the telepresence variable arguably was lessened by the fact that the immersion in the virtual environment placed the participants in an unnatural placement in the images they were looking at. Our findings should be viewed in light of this, and its combination with the participants in the experiments, as there might be biases or undetected effects due to this particular synergy. We would note that what makes trips like these so well suited for our experiment, being their highly unique characteristics, also has the downsize of implying that other types of trips might not show the same effects. Still, we would like to clarify that most of the results in our survey relies on data that is not be considered to be in relation to the depicted destination or trip.

8.3.4 Picture quality

Even though this parameter is controlled for in some of our tests, we also believe it is of relevance to address the quality of the images we used. This, due to the variation in the different virtual reality headsets that are available today, and their different ability to deliver high picture quality, as well as the expectation of improved quality in later generations of the headsets that could enhance the effects that we have found, or even to the extent that new findings might be discovered. For the purpose of our discussion, it is our opinion that the anticipated improvement of the technology should be included when evaluating the future implications of virtual reality technology in the tourism industry.

8.3.5 Media format

The media displayed with virtual reality technology typically comes in three main formats, 360 degree pictures, 360 degree videos or computer generated images (CGI) that can be either still or moving. Our test only considers the first of the three, which means that the evident effects through our results can only be directly linked to this kind of media format. This should,

however, also be considered a strengthening point of the reliability of our findings, as this allowed us to ensure a very close equivalent richness in the media displayed through the smartphone.

8.3.6 Preconditions

In both experiments, the accessibility to participants was limited. This meant that screening the participants to make sure their prerequisites for participating were equal would lead to us not having enough participants. In other words, instead of trying to find participants with mostly similar background, we have instead tried to control for these independent variables in our analysis. This may not be equally accurate because it means fewer responses from each sub-group. Still, having a more diverse group of participants also allows us to see what independent variables are significant to predict outcomes, and for our purpose, this can actually be considered even more important as this means we get a richer picture of how we believe the technology might be used in different settings and for different people.

In an attempt to isolate effects stemming from childhood, we asked the participants of the first experiment what municipality they grew up in, and of the second, what nationality they had. Yet, we found this parameter somewhat difficult to use, as we did not have any foundation for segmenting the different municipalities or nationalities. The lack of objective criteria to classify some municipalities as large or small, urban, suburban or rural, as well as gathering too few participant answers within the same municipality or nationality to use this information directly in any meaningful way, left us with the conclusion that this parameter was best left out of our analysis.

8.3.7 Roof effects

In the second experiment, we experienced a tendency of extreme scoring, meaning that a majority of the participants would use the end-points of the scale to express how they felt. While we cannot say what caused this, remembering the circumstances and background of these participants should be indicators that these factors might have some influence on their response. I.e. it might be that the customers who had bought tickets needed to be especially interested in nature-experiences or in cruise ship tours. It might then be an issue of our scale not being able to measure differences within this group as the median of the participants might have been at the end point of our scales, thus leaving no room to identify marginal differences above this level.

8.3.8 Waiting time

Despite our structured participant scheduling in the first experiment, we ended up having some overbooking at times. In some cases this was due to system errors in the registration module, and one day this was due to unforeseen circumstances that left one of the research leaders unable to take part in the experiments. This unfortunately meant that some of the participants had to wait for approximately 15 minutes after showing up to their scheduled appointment before they were able to take part in the experiment. Fortunately, we had enough participants in the first experiment to be able to limit the potential bias created by adding this waiting time by removing the participants who had to wait in turn from the dataset before doing our analysis. However, the likelihood of finding more significant results in a larger dataset would be higher, and we are therefore sorry to have had to discard 33 responses from our total number of 136 completed responses. Still, as this experiment was conducted in a highly clinical environment otherwise, we felt that this was necessary to keep the integrity of our findings to the highest possible standard.

For our second experiment, on the second trip, we were limited to a total of two rooms in which we could do our experiments. Combined with an improved recruiting strategy that lead to a severe influx of participants, we were forced to line them up in a que, which meant some of them got impatient by the time we got to them. As these were more uncontrolled environments, the bar for accepting a response in this field setting was lower, and we did not have the luxury of being able to reduce our data without seriously harming its statistical power, we did not deem these responses invalid.

8.3.9 Lack of experience

The experiment leaders was entirely made up of Master students, none of whom had ever conducted a scientific experiment previously. Even though this lack of experience was largely made up by careful supervision, planning and training, we cannot exclude that previous knowledge of experimental research could have helped us in reducing any outside noise even more than we were able to.

8.3.10 Gender imbalance

As another short mention, we would point to the fact that we had a higher amount of female participants in both our experiments, and to be weary of generalizing all of our findings to all genders, as we have not controlled for this in all of our tests.

8.4 Ideas for future research

Having looked at the limitations of our thesis, we will here look at potential solutions to overcome some of the barriers and restrictions we have experienced. As this is a yet quite unfamiliar area in the academic world, we would strongly encourage further studies to be done in order to expand on the knowledge gained from our experiments, and it is to that effect that we hope to contribute with some learning points from our research project.

First, we would embrace the experimental methodology for its potential and flexibility. Where few paths have been drawn before us, there was very high value in being able to design the experiment from scratch, and in being able to get the exact data we needed. Taking into consideration that our research project was conducted in partnership with a marketing project did pose some challenges in prioritizing what data should be taken in to consideration. Adding to that, the project "owner" was the Center for Service Innovation. Thus, our research group had limited influence in deciding what data should be gathered. Nevertheless, the capacity increase from being four researchers, with a collective team of three supervisors, gave us incredible resources and possibilities when it came to conducting our experiments and writing our thesis. From this, we consider the total resources and capacity gained as a much bigger asset to our research than the "loss" we experienced in having less freedom of choice in the experimental design.

Next, we would like to consider that recruiting from the student body might have some limitations as to what new insights will be derived in a future experiment. Even if this is a very convenient pool to recruit from, and might in some cases be the only viable option, we believe that efforts should be made to look for a new segment of potential consumers to be tested.

9 Conclusion

The goal of our research was to gain a deeper understanding of the potential implications virtual reality might have on business models in the tourism industry. To achieve this, we conducted two experiments with two independent variables in two groups respectively, namely virtual reality exposure and 2D image exposure. After analyzing our data sets, we put our findings into the context of existing literature and discussed how the statistical findings are likely to impact business models in the tourism industry. Due to limited empirical research conducted in the area of virtual reality, our hypotheses are coined from the limited theory on virtual reality, and our findings are generated only with primary data. Contrary to our and other articles belief, our findings did not find support for the suggestion that virtual reality will have a major impact on purchasing of tourism experience goods. However, we did find that virtual reality had effects on other parameters for potential customers that could have implications for business models.

Firstly, we found that virtual reality provides a higher perceived access to information about the travel experience, and thus is likely to move tourism experiences closer towards the classification "search goods", changing the competitive landscape for providers of these goods. Secondly, due to higher access to information, the channel for reaching out to customers is likely to start including an offering of virtual reality images, videos or tours of destinations, and customers are likely to seek out this format. Thirdly, virtual reality is perceived somewhat differently based on age and gender, and from our findings, it is likely to have be best received from the younger generation, and is likely to create an easier access to this customer segment. The gender difference is not statistically significant, but if our tendencies can be proven, female viewers of virtual reality are less critical to the quality of the images, and are more susceptible to the effects created by the immersive media format. Fourthly, people enjoy seeing things in virtual reality. This means that there is a potential to utilize the technology as part of the value proposition. It is likely that the tourism industry will find ways to include virtual reality experiences as an optional part of the experiences they provide. Finally, as the technology improves, and the quality improves, it is likely that the effects we have found will increase, and we consider it highly possible that it will be possible to isolate other effects of VR, leading to other business model implications in the tourism industry.

There are a number of factors limiting both the validity and reliability of our research, but even considering these elements, we can consider our findings to be insightful and that they are able to provide a much better picture of the effects virtual reality have under given circumstances.

Looking at these effects in light of supplementing theory has lead us to a set of implications that we think have high value, both academically and for companies in the tourism industry.

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11 Appendix

11.1 Questionnaires

11.1.1 Questionnaire from experiment one

The following questions were answered digitally in an online survey from a computer inside the lab We have only included the VR-questionnaire in the appendix as the 2D-version is identical except for the VR-related questions.

A demo of the actual online questionnaires can be viewed at:

VR: https://nhh.eu.qualtrics.com/SE/?SID=SV_bNnhzL8ncSPNtYx

2D: https://nhh.eu.qualtrics.com/SE/?SID=SV_9XHp1gnOwsQb3p3

Vi vil nå stille deg noen spørsmål knyttet til det du nettopp har sett. Vi bruker stort sett en skala fra 0 til 10, og du skal velge det punktet på skalaen som du synes best reflekterer din mening. Svar så ærlig og oppriktig som du klarer på alle spørsmål.

1. Se for deg at du reiser på en organisert dagstur fra Bergen som inkluderer stedene du nå har sett bilder av.

- Hvor glad tror du at denne turen ville gjort deg? (0=Ikke glad, 10=Svært glad)
- Hvor mye ville du følt på en beundring for naturen underveis på reisen? (0=Ingen beundring, 10=Sterk beundring)
- Hvor meningsfullt ville det føltes for deg å reise i naturen på denne måten? (0=Ikke meningsfullt, 10=Svært meningsfullt)
- Hvor sterkt inntrykk tror du at denne type reiseopplevelse ville gjort på deg? (0=Lite inntrykk, 10=Sterkt inntrykk)
- Hvor fornøyd ville du følt deg i ettertid med at du dro på denne type reise? (0=Ikke fornøyd, 10=Svært fornøyd)

2. Hvilke typer opplevelser tror du en slik tur ville gitt deg? (0 = Helt uenig, 10 = Helt enig)

- Reisen ville antagelig gjort sterke inntrykk på sansene mine (det jeg kan se, lukte, høre osv.)
- Reisen ville sannsynligvis gitt interessante sanseopplevelser
- Reisen ville appellert sterkt til sansene mine
- Det er sannsynlig at reisen ville gitt meg mange følelser
- Jeg ville mest sannsynlig hatt sterke følelser underveis
- Reisen ville antagelig blitt svært emosjonell for meg
- Jeg ville sannsynligvis brukt mye tid på å reflektere og tenke underveis
- Reisen ville fått meg til å tenke mye
- Reisen ville nok stimulert nysgjerrigheten min

3. Da du så bildene, hvor tilgjengelig føltes en tur til disse stedene for deg?

- Turen føltes svært tilgjengelig for meg (0 = Svært utilgjengelig, 10 = Svært tilgjengelig)
- Hvor lang avstand føltes det som det var mellom deg og disse stedene? (0 = Svært kort avstand, 10 = Svært lang avstand)

4. Hvordan opplevde du det å se på bildene? (0 = I svært liten grad, 10 = I svært stor grad)

- I hvilken grad fremskapte bildene mentale forestillinger av destinasjonene?
- I hvilken grad inneholdt bildene informasjon som gjorde det lett å forestille seg en reise til disse destinasjonene?
- I hvilken grad hjalp bildene deg til å visualisere en reise til disse stedene?

5. Hvordan opplevde du det å se på bildene? (0 = Helt uenig, 10 = Helt enig)

- Da jeg så bildene var det som om jeg var tilstede på destinasjonene
- Da jeg var ferdig med å se bildene var det som om å komme tilbake til den virkelige verden etter en reise
- Da jeg så bildene av destinasjonene glemte jeg litt hvor jeg egentlig var

6. Hvor enig eller uenig er du i påstanden nedenfor? (0 = Helt uenig, 10 = Helt enig)

- Jeg setter pris på usikkerheten det innebærer å reise til en ny destinasjon uten å vite nøyaktig hvordan turen vil bli.

7. Hva synes du om billedserien i seg selv? (0 = Helt uenig, 10 = Helt enig)

- Jeg synes det å se på bildene var underholdende
- Jeg synes bildene var interessante
- Jeg synes det var gøy å se på bildene

8. Sier en reise til disse stedene noe om deg som person? (0 = Helt uenig, 10 = Helt enig)

- Det å reise til slike destinasjonene reflekterer hvem jeg er som person
- Det å reise til slike destinasjonene sier noe om hvem jeg er til andre mennesker
- Det å reise til slike destinasjoner hjelper meg å bli den type person som jeg ønsker å være

9. Vi vil gjerne vite litt om ditt forhold til naturen akkurat nå. Det er ikke noe riktig eller galt svar på spørsmålene nedenfor. Vi vil at du skal svare nøyaktig slik du føler det. (0 = Helt uenig, 10 = Helt enig)

- Jeg tenker på naturen rundt meg som et samfunn som jeg tilhører
- Jeg føler meg i ett med naturen
- Jeg har en dyp forståelse for hvordan mine handlinger påvirker naturen
- På samme måte som et tre kan være en del av en skog, så føler jeg meg som en liten del av naturen som helhet

10. Hvor mye tror du at du ville angret dersom du bestemte deg for ikke å reise en tur til stedene du så bilder av? (0 = Ikke i det hele tatt, 10 = Svært mye)

11. Helt generelt, hva tenker du om å reise på en organisert dagstur fra Bergen som inkluderer destinasjonene du så bilder av? (0 = Helt uenig, 10 = Helt enig)

- Jeg ville vurdert å reise til denne type destinasjoner neste gang jeg skal reise på en tur
- Jeg ville anbefalt å reise til denne type destinasjoner dersom en venn ringte meg for å få anbefalinger om et reisemål i Norge
- Det er sannsynlig at jeg kommer til å reise på tur denne typen destinasjoner i fremtiden

12. Hva er ditt personlige inntrykk av en dagstur fra Bergen til destinasjonene som du har sett bilder av?
(0 = Svært dårlig, 10 = Svært bra)
(0 = Ikke appellerende, 10 = Svært appellerende)
(0 = Svært ubehagelig, 10 = Svært behagelig)
(0 = Svært lite attraktivt, 10 = Svært attraktivt)
(0 = Svært kjedelig, 10 = Svært interessant)

13. I hvor stor grad føler du påstandene under beskriver deg som person? (0 = I svært liten grad, 10 = I svært stor grad)

- Jeg søker alltid nye ideer og opplevelser
- Jeg liker overraskelser
- Jeg foretrekker heller et liv preget av rutiner enn et uforutsigbart liv med mange endringer
- Jeg har det best når jeg føler meg trygg og sikker
- Jeg liker å møte mennesker som gir meg nye ideer

14. Hvilke erfaringer og planer har du i forhold til destinasjonene på bildene du så?

- Har du besøkt Nærøyfjorden tidligere? (Ja, nei, vet ikke)
- Har du tatt Flåmsbanen tidligere? (Ja, nei, vet ikke)
- Før du deltok i denne undersøkelsen, hadde du planlagt å reise på turen til Nærøyfjorden/Flåm i nær fremtid? (Ja, nei, vet ikke)
- Hvor mye kunnskap har du om turen "Norway in a nutshell" (Norge i et nøtteskall)? (0 = Ingen kunnskap, 10 = Mye kunnskap)

15. Hva er din tidligere erfaring med Virtual Reality (VR)?

- Har du brukt/prøvd VR-briller tidligere? (Ja, nei, vet ikke)
- Har du sett reklamer i VR-format tidligere? (Ja, nei, vet ikke)
- Hvor stor kunnskap hadde du om VR før denne undersøkelsen? (0 = Ingen kunnskap, 10 = Mye kunnskap)

16. I hvilken grad opplevde du følelsene nedenfor da du så på bildene med VR-brillene på? (0 = Ikke i det hele tatt, 10 = I svært stor grad)

- Kvalm
- Ukomfortabel
- Svimmel

17. Hvordan opplevde du kvaliteten på bildene? (0 = Svært dårlig kvalitet, 10 = Svært god kvalitet)

Går du for tiden på Bachelor- eller Masterstudiet?

❍ Bachelor
❍ Master

Hva er din alder? (Kryss av riktig I dropdown meny)

Hva er ditt kjønn?

❍ Mann
❍ Kvinne

Hvilken kommune har du vokst opp i?
Beskriv kort hva du tror var hensikten med dette eksperimentet:

Tusen takk for at du har deltatt i undersøkelsen! Du er nå ferdig. Vennligst henvend deg til forsøksleder.

11.1.1.1 Part of questionnaire filled out by research leader

Hvor lenge så deltakeren på bilder? (kryss av for riktig 30-sekunders intervall)
Hvor mye bevegde deltakeren seg? (1 = Svært lite, 5 = Svært mye)
Hvor mye snakket deltakeren om teknologien? ? (1 = Svært lite, 5 = Svært mye)
Hvor mye snakket deltakeren om det han/ hun så? ? (1 = Svært lite, 5 = Svært mye)

Hvor entusiastisk var deltageren under eksponering? (1 = Svært lite entusiastisk, 5 = Svært entusiastisk)

Oppstod det tekniske utfordringer / problemer?

❍ Ingen problemer
❍ Små problemer
❍ Vesentlige problemer

Brukte deltageren briller/ linser?

❍ Ja, og hadde de på under eksponering
❍ Ja, men hadde ikke på under eksponering
❍ Nei

Kjøpte deltageren billett?

❍ Nei
❍ Ja, 1 billett
❍ Ja, 2 billetter

Er det ellers noen grunn til at denne deltakeren ikke bør regnes som gyldig?

❍ Nei
❍ Ja (kommentér under)

Ikke gyldig fordi:

11.1.2 Questionnaire from experiment two

11.1.2.1 First part of the questionnaire

The following questions were presented in a paper format with scales that participants would check on the paper.

1. **I løpet av reisen vil du se og oppleve alle de stedene vi har vist deg bilder av.**

- Hvor glad tror du at du blir når du kommer til disse stedene? *(0 = Ikke glad, 10 = Svært glad)*
- Hvor mye vil du føle på en beundring for naturen underveis på reisen? *(0 = Ingen beundring, 10 = Sterk beundring)*
- Hvor sterkt inntrykk tror du at denne type reiseopplevelse ville gjort på deg? *(0 = Lite inntrykk, 10 = Sterkt inntrykk)*
- Hvor fornøyd tror du at du vil føle deg i ettertid med at du dro på denne reisen? *(0 = Ikke fornøyd, 10 = Svært fornøyd)*

2. **Hvilke typer opplevelser tror du at denne turen vil gi deg?** *(0 = Helt uenig, 10 = Helt enig)*

- Det er sannsynlig at reisen vil gi meg mange følelser
- Jeg vil mest sannsynlig få sterke følelser underveis
- Jeg vil sannsynligvis bruke mye tid på å reflektere og tenke underveis
- Reisen vil nok få meg til å tenke mye
- Denne turen kommer til å skille seg veldig fra alle andre turer jeg har vært på
- Turen kommer nok til å gi meg helt unike opplevelser

3. **Vi vil nå stille deg noen spørsmål om hvordan du opplevde bildene du så** (0 = Ikke i det hele tatt, 10 = I svært stor grad)

- I hvilken grad fremskapte bildene mentale forestillinger av destinasjonene som du er på vei til nå?
- I hvilken grad inneholdt bildene informasjon som gjorde det lett å forestille seg hvordan det blir å komme til disse destinasjonene?
- I hvilken grad hjalp bildene deg til å visualisere disse stedene?

4. **Hvordan opplevde du det å se på bildene?** (0 = Helt uenig, 10 = Helt enig)

- Da jeg så bildene var det som om jeg allerede var tilstede på destinasjonene
- Da jeg var ferdig med å se bildene var det som om å komme tilbake til den virkelige verden etter en reise
- Da jeg så bildene av destinasjonene glemte jeg litt hvor jeg egentlig var

5. **Hva synes du om billedserien i seg selv?** (0 = Helt uenig, 10 = Helt enig)

- Jeg synes det å se på bildene var underholdende
- Jeg synes bildene var interessante
- Jeg synes det var gøy å se på bildene

6. **Hva tenker du om den reisen du har foran deg?** *(0 = Helt uenig, 10 = Helt enig)*

- Jeg tror reisen vil stimulere nysgjerrigheten min
- Jeg setter pris på det å reise til nye steder uten å vite helt sikkert hva som kommer til å skje

7. **Sier reisen du skal på noe om deg som person?** *(0 = Helt uenig, 10 = Helt enig)*

- Det å reise til slike destinasjoner reflekterer hvem jeg er som person
- Det å reise til slike destinasjonene hjelper meg å bli den type person som jeg ønsker å være

8. **Vi vil gjerne vite litt om ditt forhold til naturen slik du føler det akkurat nå. Det er ikke noe riktig eller galt svar på spørsmålene nedenfor. Vi vil at du skal svare nøyaktig slik du føler det.** (0 = Helt uenig, 10 = Helt enig)

- Jeg tenker på naturen rundt meg som et samfunn som jeg tilhører
- Jeg føler meg ofte i ett med naturen
- Jeg har en dyp forståelse for hvordan mine handlinger påvirker naturen
- På samme måte som et tre kan være en del av en skog, så føler jeg meg som en liten del av naturen som helhet

9. **Hva er ditt generelle inntrykk av den turen du skal på?**

- Dårlig/bra
- Ikke appellerende/apellerende

- Lite attraktivt/Attraktivt

10. **Ville du anbefalt Hurtigruten til en kollega eller en venn?** (0 = Helt usannsynlig, 10 = Svært sannsynlig)

11. **Har du reist med Hurtigruten tidligere?** *(Ja/Nei/Vet ikke)*

12. **Har du vært på noen av de stedene vi viste deg bilder av tidligere?** *(Ja/Nei/Vet ikke)*

13. **Har du brukt/prøvd VR-briller tidligere?** *(Ja/Nei/Vet ikke)*

14. **Hvor stor kunnskap hadde du om VR før denne undersøkelsen?** *(0 = svært lite kunnskap, 10 = svært mye kunnskap)*

15. **I hvilken grad opplevde du følelsene nedenfor da du så på bildene med VR-brillene på?**
(*0 = Ikke i det hele tatt, 10 = I svært stor grad*)

- Kvalm
- Ukomfortabel
- Svimmel

16. **Hvordan dynes du kvaliteten på bildene var?** (0 = Svært dårlig kvalitet, 10 = Svært god kvalitet)

17. **Generelt, hvor mye erfaring har du med ny teknologi?** *(0 = svært lite erfaring, 10 = svært mye erfaring)*

Til slutt trenger vi litt bakgrunnsinformasjon om deg

Kjønn

□ Kvinne

□ Mann

Alder: _____

Nasjonalitet: _____

11.1.2.2 Second part of the questionnaire

1. **Du har nå sett og besøkt alle de stedene vi viste deg bilder av i går. Vi lurer på hvordan du opplevde dette**

- Hvor glad følte du deg? *(0 = Ikke glad, 10 = Veldig glad)*
- Hvor mye følte du på en beundring for naturen underveis? *(0 = Ingen beundring, 10 = Sterk beundring)*
- Hvor sterkt inntrykk gjorde reisen på deg? *(0 = Lite inntrykk, 10 = Sterkt inntrykk)*
- Hvor fornøyd er det med at du reiste på denne turen? *(0 = Ikke fornøyd, 10 = Svært fornøyd)*

2. **Hvilke typer opplevelser hadde du underveis?** *(0 = Helt uenig, 10 = Helt enig)*

- Reisen gav meg mange følelser
- Jeg fikk sterke følelser underveis
- Jeg brukte mye tid på å reflektere og tenke underveis
- Reisen fikk meg til å tenke mye

3. **Hvor godt likte du turen? (-5=Dårligere enn forventet, 0=Som forventet, 5=Bedre enn forventet)**

4. **Jeg synes at turen gav god valuta for pengene** *(0 = Helt uenig, 10 = Helt enig)*

5. **Hva er ditt generelle inntrykk av turen?**
- Dårlig/bra

- Ikke appellerende/apellerende
- Lite attraktivt/attraktivt

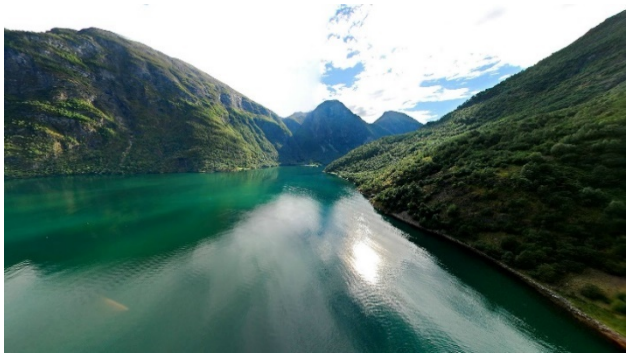
6. Hva synes du om Hurtigruten?

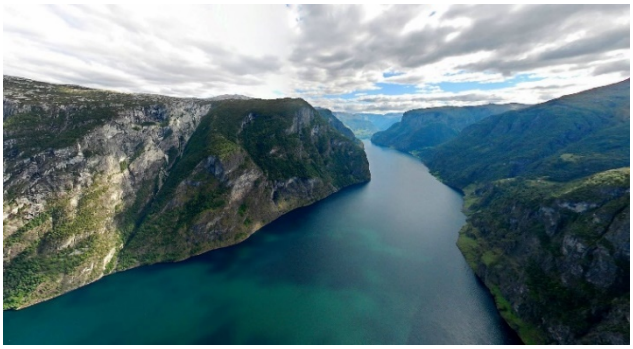
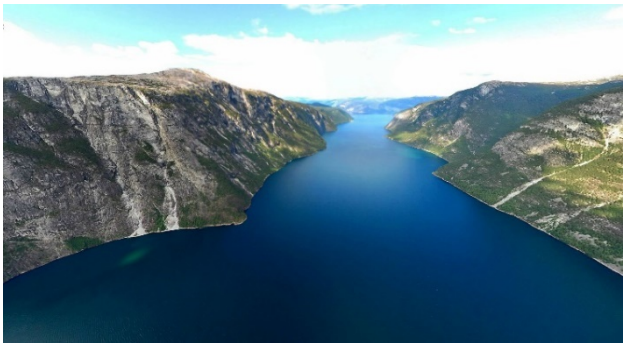
- Jeg ville anbefalt Hurtigruten til en kollega eller en venn (0 = Helt usannsynlig, 10 = Svært sannsynlig)
- Dersom noen spør, har jeg flest positive ting å si om denne turen med Hurtigruten *(0 = Helt uenig, 10 = Helt enig)*
- Det er sannsynlig at jeg kommer til å reise på tur med Hurtigruten igjen i fremtiden *(0 = Helt uenig, 10 = Helt enig)*

7. Til slutt vil vi gjerne stille deg noen spørsmål om innholdet fra denne turen *(0 = Helt uenig, 10 = Helt enig)*
- Utsikten var spektakulær flere steder underveis
- Jeg følte jeg fikk et panoramaperspektiv av norsk natur
- Det var god sikt underveis
- Det var godt vær underveis
- Det var behagelig temperatur underveis

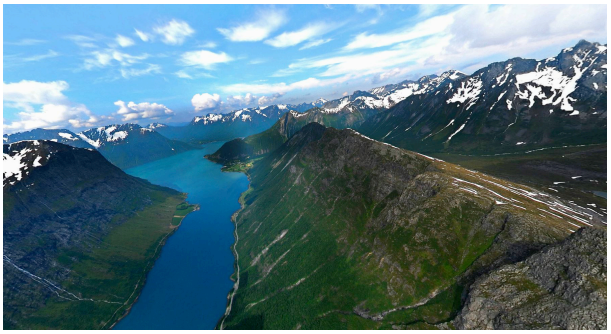
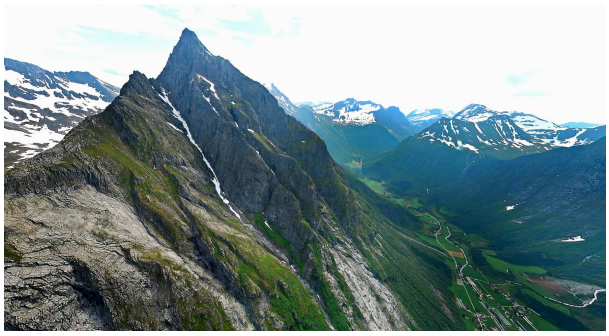
11.2 Pictures used to display destinations in 2D on smartphone

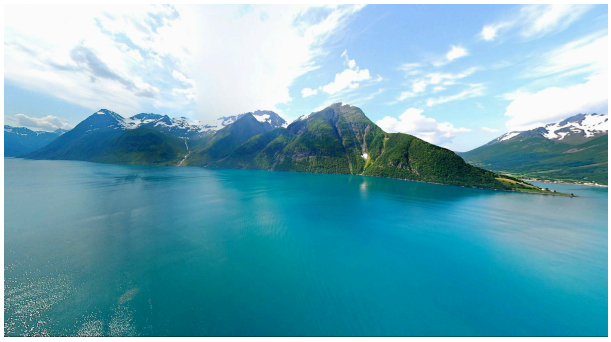
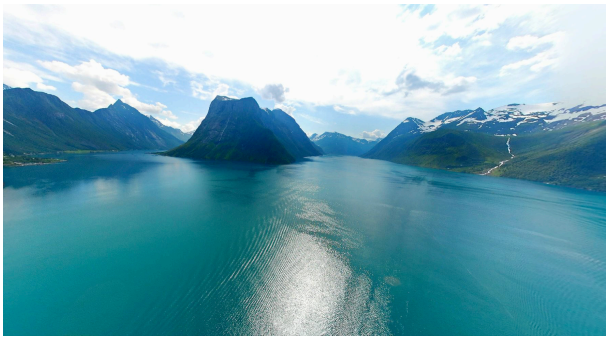
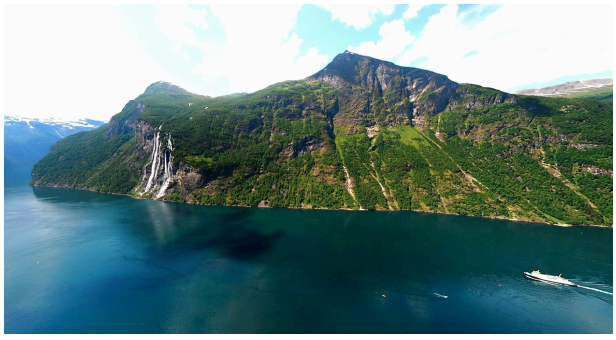
11.2.1 Experiment one

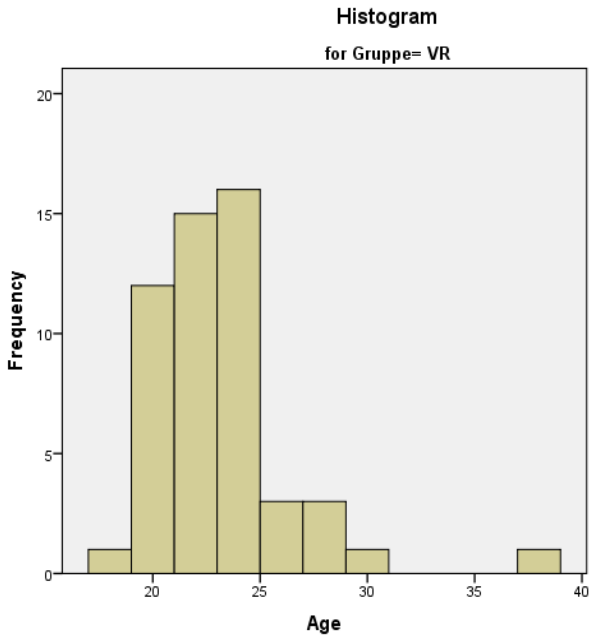
11.2.2 Experiment two

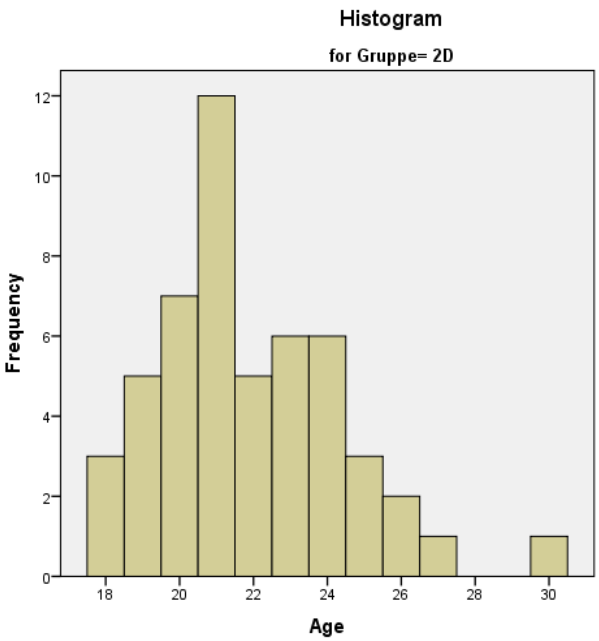




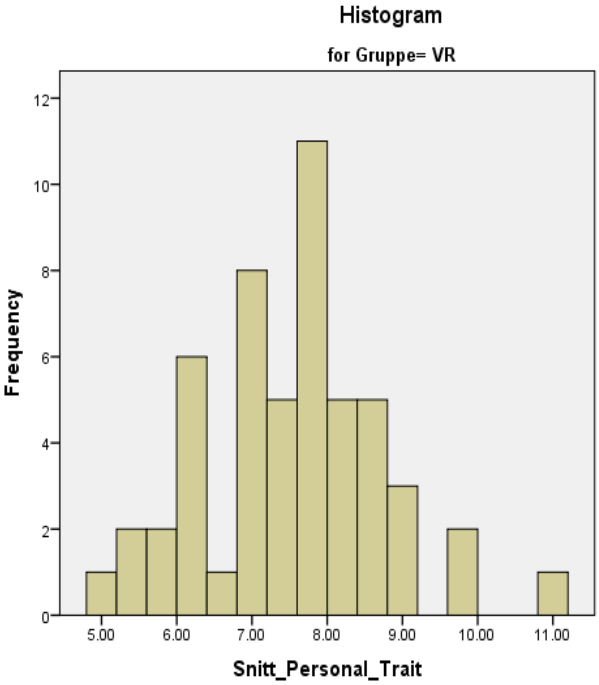




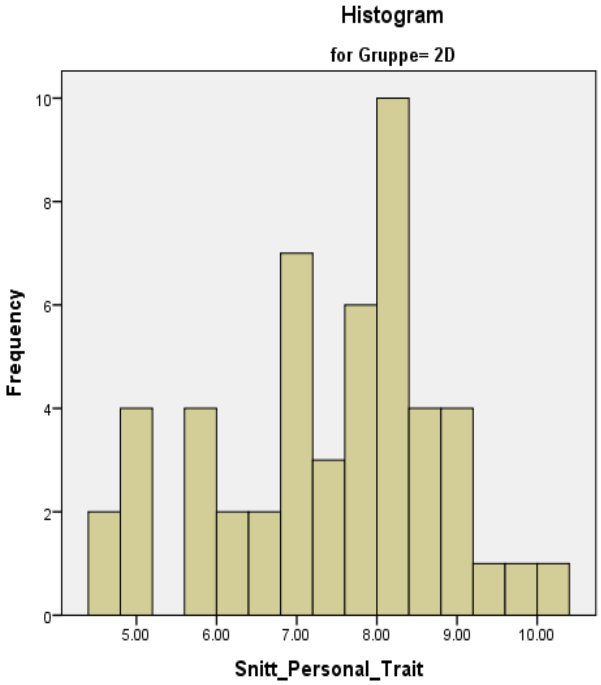
11.3 Descriptive Statistics

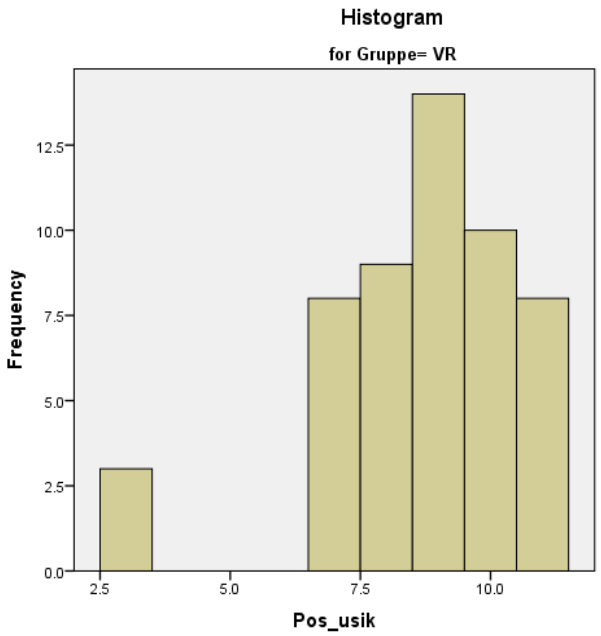
11.3.1 Descriptive statistics: experiment one dataset

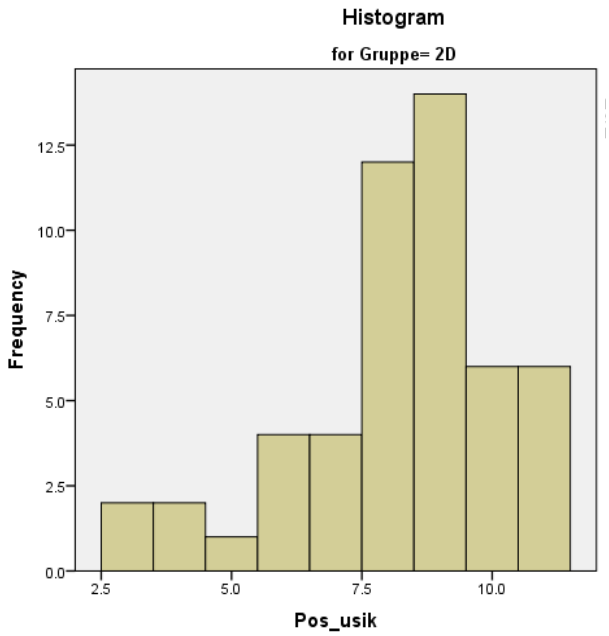


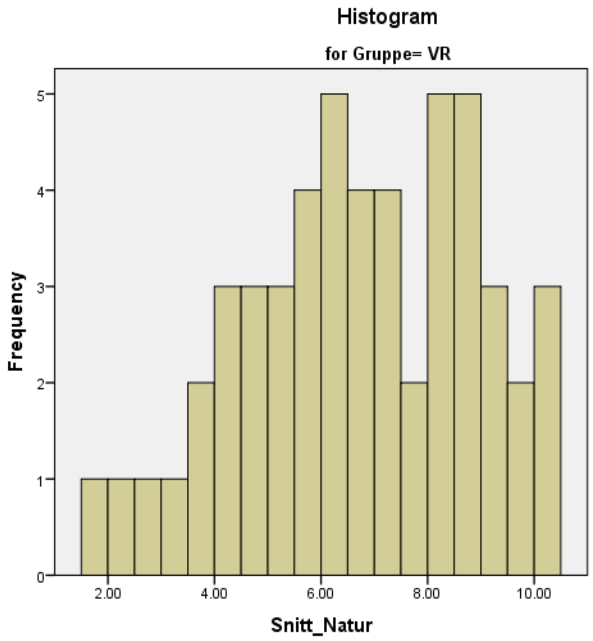


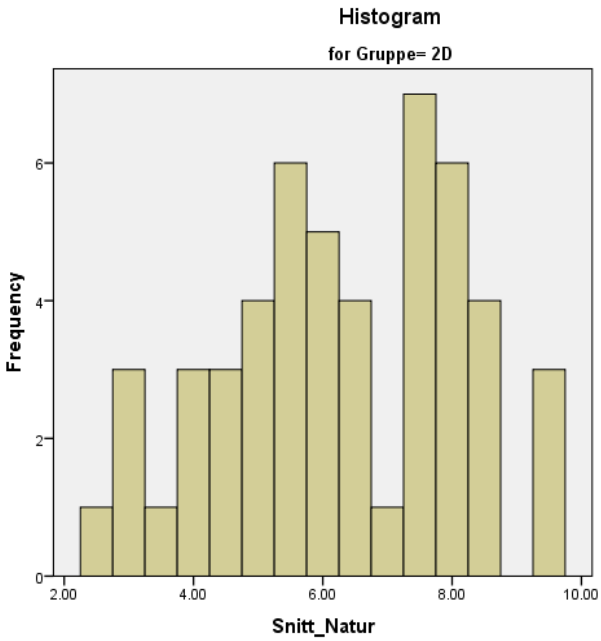


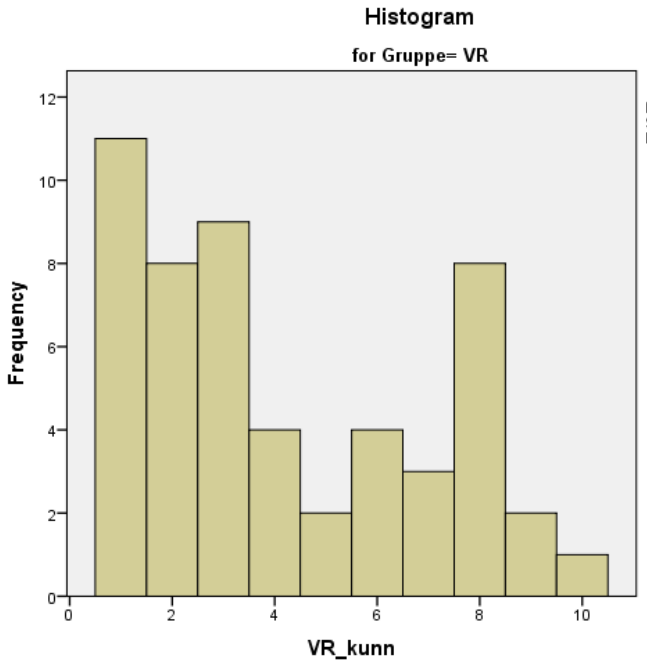



Histogram
for Gruppe= VR
Frequency
Pos_usik


Histogram
for Gruppe= 2D
Frequency
Pos_usik


Histogram
for Gruppe= VR
Frequency
Snitt_Natur


Histogram
for Gruppe= 2D
Frequency
Snitt_Natur



		Frequency	Percent	Cumulative Percent
Valid	VR	52	50.5	50.5
	2D	51	49.5	100.0
	Total	103	100.0	

		Frequency	Percent	Cumulative Percent
Valid	Mann	43	41.7	41.7
	Kvinne	60	58.3	100.0
	Total	103	100.0	

		Frequency	Percent	Cumulative Percent
Valid	Bachelor	72	69.9	69.9
	Master	31	30.1	100.0
	Total	103	100.0	

VR= Tests of Normality[a]

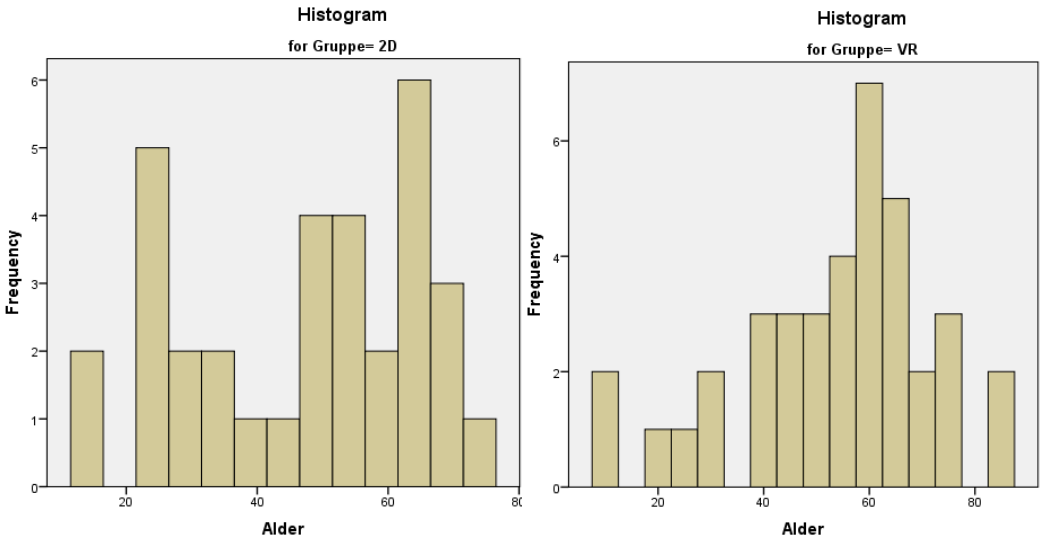
	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Snitt_Sense	.169	52	.001	.906	52	.001
Snitt_Emosjon	.095	52	.200*	.980	52	.520

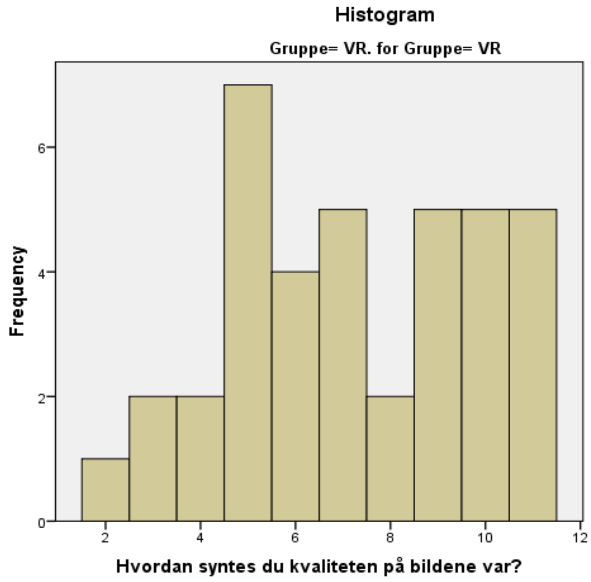
Snitt_Kognisjon	.101	52	.200*	.979	52	.492
Snitt_Imagination	.120	52	.061	.892	52	.000
Snitt_Telepresens	.063	52	.200*	.978	52	.460
Snitt_Enjoy	.132	52	.024	.909	52	.001
Snitt_Self	.064	52	.200*	.978	52	.460
Snitt_Intensjon	.145	52	.008	.924	52	.003
Snitt_Positive_Impression	.105	52	.200*	.937	52	.009
Snitt_Attitude	.150	52	.005	.950	52	.029
Snitt_Accessibility	.134	52	.021	.957	52	.055

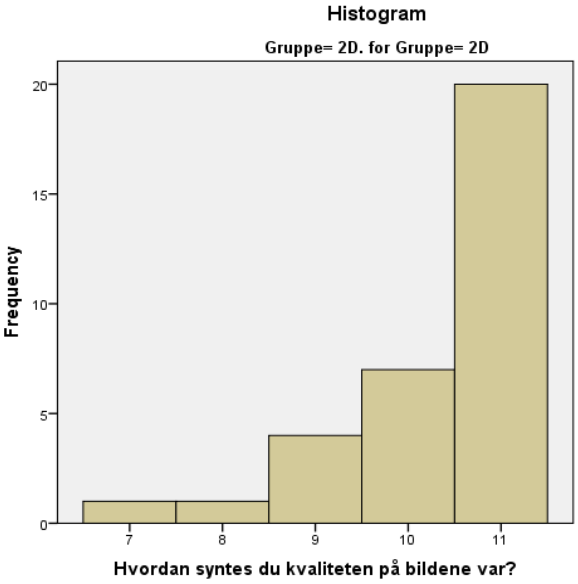
2D= Tests of Normality[a]

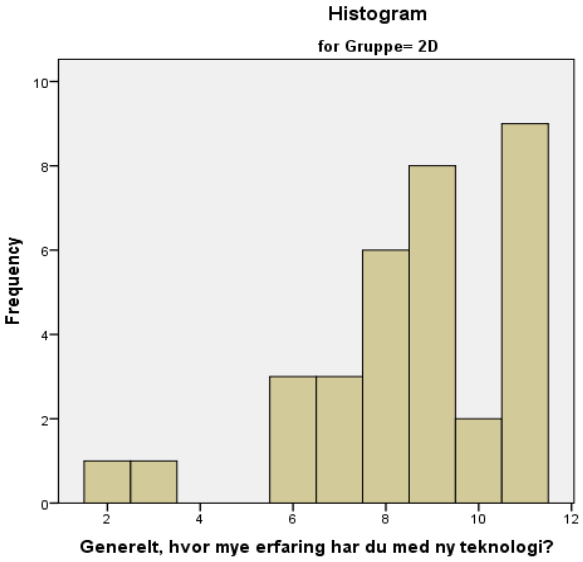
	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Snitt_Sense	.105	51	.200*	.972	51	.257
Snitt_Emosjon	.084	51	.200*	.980	51	.558
Snitt_Kognisjon	.078	51	.200*	.980	51	.547
Snitt_Imagination	.115	51	.089	.928	51	.004
Snitt_Telepresens	.107	51	.200*	.969	51	.205
Snitt_Enjoy	.097	51	.200*	.977	51	.407
Snitt_Self	.123	51	.051	.947	51	.023
Snitt_Intensjon	.119	51	.070	.904	51	.001
Snitt_Positive_Impression	.076	51	.200*	.983	51	.688
Snitt_Attitude	.071	51	.200*	.987	51	.836
Snitt_Accessibility	.096	51	.200*	.983	51	.675

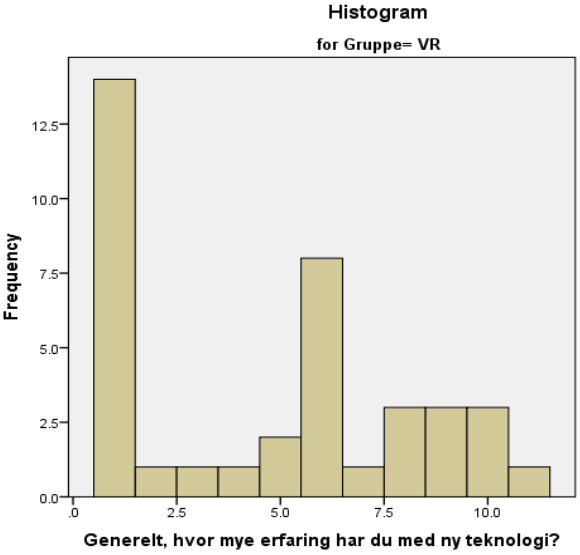
11.3.2 Descriptive statistics: Experiment two dataset

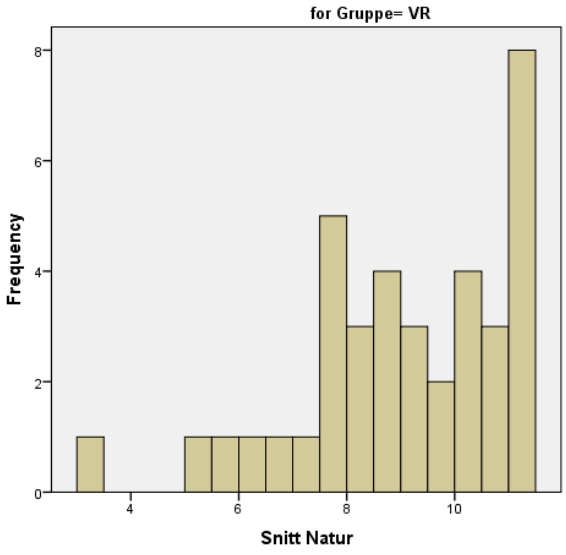


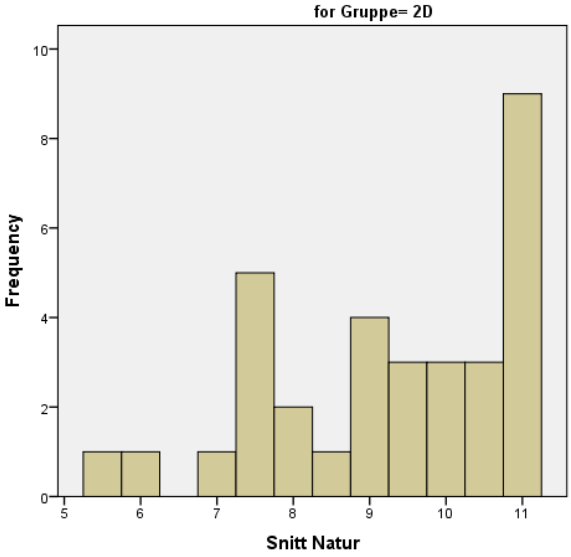

Histogram
Gruppe= VR. for Gruppe= VR
Frequency
Hvordan syntes du kvaliteten på bildene var?

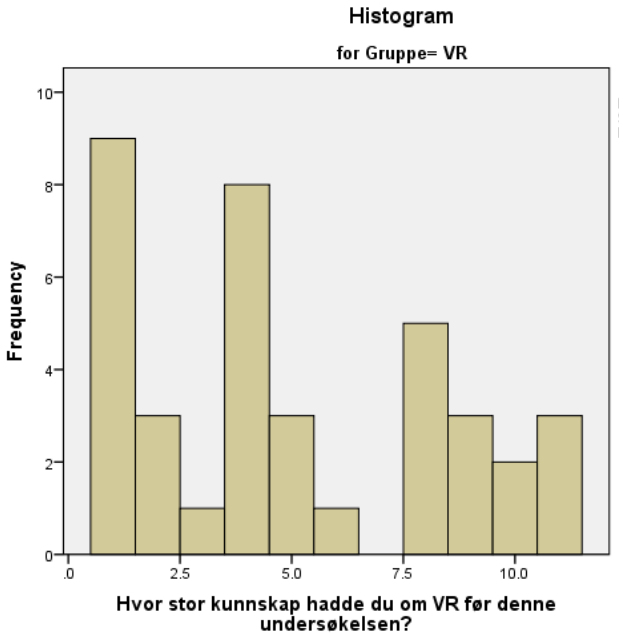

Histogram
Gruppe= 2D. for Gruppe= 2D
Frequency
Hvordan syntes du kvaliteten på bildene var?


Histogram
for Gruppe= 2D
Frequency
Generelt, hvor mye erfaring har du med ny teknologi?


Histogram
for Gruppe= VR
Frequency
Generelt, hvor mye erfaring har du med ny teknologi?


for Gruppe= VR
Frequency
Snitt Natur


for Gruppe= 2D
Frequency
Snitt Natur



VR= Tests of Normality[a]

	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Snitt Emosjon	.142	38	.051	.912	38	.006
Snitt Emosjon skjema 2	.108	38	.200*	.938	38	.036
Snitt Kognisjon	.145	38	.044	.910	38	.005
Snitt Kognisjon skjema 2	.159	38	.016	.923	38	.012
Snitt_Attitude	.150	38	.031	.896	38	.002
Snitt_Attitude2	.166	38	.010	.862	38	.000
Snitt_Positive_Impression	.286	38	.000	.792	38	.000
Snitt_Positive_Impression2	.222	38	.000	.810	38	.000
Snitt_Sikt2	.170	38	.007	.890	38	.001

2D= Tests of Normality[a]

	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Snitt Emosjon	.236	30	.000	.823	30	.000
Snitt Emosjon skjema 2	.159	30	.052	.895	30	.006
Snitt Kognisjon	.123	30	.200*	.919	30	.025
Snitt Kognisjon skjema 2	.152	30	.075	.925	30	.036
Snitt_Attitude	.271	30	.000	.672	30	.000
Snitt_Attitude2	.267	30	.000	.712	30	.000
Snitt_Positive_Impression	.278	30	.000	.713	30	.000
Snitt_Positive_Impression2	.249	30	.000	.715	30	.000
Snitt_Sikt2	.234	30	.000	.788	30	.000

11.4 Factor Analysis

11.4.1 Factor analysis: experiment one dataset

Pattern Matrix[a]

	Component												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Sans3	.850												
Sans1	.824												
Sans2	.800												
Tele2		.863											
Tele3		.836											
Tele1		.725											
Emosjon2			.715										
Emosjon1			.623										
Trait2			.616										
Trait1			.503										
Emosjon3													
Kogn3													
Natur2				.790									
Natur4				.782									
Natur1				.768									

Natur3				.717										
Int3					.909									
Int2					.759									
Int1					.731									
Appell					.706									
Bra														
Trait4_r						.902								
Trait3_r						.845								
Self2							-.852							
Self1							-.679							
Tilgj2_r								.843						
Tilgj1								-.801						
Mening									-.702					
Fornøyd									-.681					
Inntrykk									-.613					
Glad									-.525					
Trait5										.909				
Enjoy3											.811			
Enjoy1											.740			
Enjoy2											.738			

Image1													
Beundr													
Behag												-.768	
Attrakt												-.707	
Interes												-.553	
Self3													
Kogn1													.759
Kogn2													.754
Image2													
Image3													

Structure Matrix

	Component												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Sans3	.917												
Sans2	.882												
Sans1	.841												
Beundr	.578												
Tele3		.881											
Tele2		.880											
Tele1		.780											
Image2													
Emosjon2			.804										
Emosjon1	.532		.761										
Trait2			.681										
Emosjon3			.640										.548
Trait1			.624										

Kogn3														
Natur2				.836										
Natur1				.823										
Natur4				.790										
Natur3				.725										
Int3					.856									
Appell					.824								-.515	
Int2					.787									
Int1					.763									
Bra					.594								-.501	
Trait4_r						.868								
Trait3_r						.847								
Self2							-.857							
Self1							-.795							
Self3							-.525						-.501	
Tilgj2_r								.852						
Tilgj1								-.805						

Mening									-.790					
Fornøyd									-.772					
Inntrykk									-.743					
Glad									-.674					
Trait5										.913				
Enjoy3											.878			
Enjoy2											.852			
Enjoy1		.546									.835			
Image1											.517			
Image3											.510			
Attrakt					.539							-.827		
Behag												-.795		
Interes												-.719		
Kogn1													.819	
Kogn2													.794	

11.4.2 Factor analysis: experiment two dataset

11.4.2.1 Factor Analysis with five components

11.4.2.1.1 Items from the first part of the survey

Pattern Matrix[a]

	Component				
	1	2	3	4	5
Hva er ditt generelle inntrykk av den turen du skal på?	1.016				
Hva er ditt generelle inntrykk av den turen du skal på?	.974				
Hva er ditt generelle inntrykk av den turen du skal på?	.939				
Ville du anbefalt Hurtigruten til en kollega eller en venn?	.541				-.393
Jeg tenker på naturen rundt meg som et samfunn som jeg tilhører		.965			
Jeg føler meg ofte i ett med naturen		.919			
På samme måte som et tre kan være en del av en skog, så føler jeg meg som e...		.798			
Hvor mye vil du føle på en beundring for naturen underveis på reisen?		.455		-.453	
Hvor fornøyd tror du at du vil føle deg i ettertid med at du dro på denne reisen?		.401		-.349	
Jeg vil sannsynligvis bruke mye tid på å reflektere og tenke underveis			1.004		
Reisen vill nok få meg til å tenke mye			.974		
Jeg har en dyp forståelse for hvordan mine handlinger påvirker naturen				.625	
Hvor glad tror du at du blir når du kommer til disse stedene?				-.407	-.388
Det er sannsynlig at reisen vil gi meg mange følelser					-.964
Jeg vil mest sannsynlig få sterke følelser underveis					-.904
Hvor sterkt inntrykk tror du at denne type reiseopplevelse ville gjort på deg?					-.549

Structure Matrix

	Component				
	1	2	3	4	5
Hva er ditt generelle inntrykk av den turen du skal på?	.967	.387	.435		-.549
Hva er ditt generelle inntrykk av den turen du skal på?	.956		.431		-.485
Hva er ditt generelle inntrykk av den turen du skal på?	.953	.345	.466		-.511

Ville du anbefalt Hurtigruten til en kollega eller en venn?	.776	.348	.477		-.693
Jeg føler meg ofte i ett med naturen	.323	.915			-.480
Jeg tenker på naturen rundt meg som et samfunn som jeg tilhører		.906			-.391
På samme måte som et tre kan være en del av en skog, så føler jeg meg som e...	.305	.873	.338		-.567
Hvor mye vil du føle på en beundring for naturen underveis på reisen?	.580	.641	.344	-.535	-.626
Jeg vil sannsynligvis bruke mye tid på å reflektere og tenke underveis	.374		.960		-.442
Reisen vill nok få meg til å tenke mye	.455		.955		-.453
Jeg vil mest sannsynlig få sterke følelser underveis	.550	.567	.497		-.951
Det er sannsynlig at reisen vil gi meg mange følelser	.457	.485	.457		-.915
Hvor sterkt inntrykk tror du at denne type reiseopplevelse ville gjort på deg?	.601	.436	.465	-.347	-.756
Hvor glad tror du at du blir når du kommer til disse stedene?	.631	.350	.582	-.513	-.703
Hvor fornøyd tror du at du vil føle deg i ettertid med at du dro på denne reisen?	.519	.594	.421	-.415	-.620
Jeg har en dyp forståelse for hvordan mine handlinger påvirker naturen	.380	.514	.510	.534	-.540

11.4.2.1.2 Items from the second part of the survey

Pattern Matrix[a]

	Component				
	1	2	3	4	5
Hva er ditt generelle inntrykk av turen?	.962				
Hva er ditt generelle inntrykk av turen?	.920				
Hva er ditt generelle inntrykk av turen?	.755				.389
Hvor fornøyd er du med at du reiste på denne turen?	.414				.314
Hvor glad følte du deg?	.403		.338		
Reisen fikk meg til å tenke mye		1.003			
Jeg brukte mye tid på å reflektere og tenke underveis		.958			
Det var god sikt underveis			.854		
Jeg ville anbefalt Hurtigruten til en kollega eller en venn			.726		.333
Reisen gav meg mange følelser				-.952	
Jeg fikk sterke følelser underveis				-.909	

Hvor mye følte du på en beundring for naturen underveis?				-.608	
Jeg følte jeg fikk et panoramaperspektiv av norsk natur				-.481	.406
Hvor sterkt inntrykk gjorde reisen på deg?			.340	-.455	
Utsikten var spektakulær flere steder underveis					.750

Structure Matrix

	Component				
	1	2	3	4	5
va er ditt generelle inntrykk av turen?	.930		.388	-.373	.322
va er ditt generelle inntrykk av turen?	.910		.384	-.444	
va er ditt generelle inntrykk av turen?	.890	.328	.451	-.379	.646
Hvor fornøyd er du med at du reiste på denne turen?	.732	.376	.542	-.591	.596
Hvor glad følte du deg?	.665	.412	.605	-.580	
Reisen fikk meg til å tenke mye		.981		-.475	
Jeg brukte mye tid på å reflektere og tenke underveis		.976		-.531	
Det var god sikt underveis	.363		.849		
Jeg ville anbefalt Hurtigruten til en kollega eller en venn	.427		.782	-.339	.466
Jeg fikk sterke følelser underveis	.427	.550	.335	-.948	
Reisen gav meg mange følelser	.352	.533		-.948	.333
Hvor mye følte du på en beundring for naturen underveis?	.601	.372	.480	-.776	.471
Hvor sterkt inntrykk gjorde reisen på deg?	.635	.405	.613	-.734	.571
Jeg følte jeg fikk et panoramaperspektiv av norsk natur	.311	.526		-.679	.585
Utsikten var spektakulær flere steder underveis	.468			-.457	.846

11.5 Difference between Means Analysis

11.5.1 Difference between mean: experiment one dataset

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.043[a]	1	.836		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.043	1	.836		
Fisher's Exact Test				1.000	.519
Linear-by-Linear Association	.043	1	.837		
N of Valid Cases	103				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.41.

b. Computed only for a 2x2 table

Report

Q47 - Kjøpte deltageren billett?

Kjønn	Gruppe	Studie	N	Sum	% of Total Sum
Mann	VR	Bachelor	10	28	11.5%
		Master	6	12	4.9%
		Total	16	40	16.4%
	2D	Bachelor	20	54	22.1%
		Master	7	14	5.7%
		Total	27	68	27.9%
	Total	Bachelor	30	82	33.6%
		Master	13	26	10.7%
		Total	43	108	44.3%
Kvinne	VR	Bachelor	23	56	23.0%
		Master	13	28	11.5%
		Total	36	84	34.4%
	2D	Bachelor	19	40	16.4%
		Master	5	12	4.9%
		Total	24	52	21.3%
	Total	Bachelor	42	96	39.3%
		Master	18	40	16.4%

		Total	60	136	55.7%
Total	VR	Bachelor	33	84	34.4%
		Master	19	40	16.4%
		Total	52	124	50.8%
	2D	Bachelor	39	94	38.5%
		Master	12	26	10.7%
		Total	51	120	49.2%
	Total	Bachelor	72	178	73.0%
		Master	31	66	27.0%
		Total	103	244	100.0%

	Gruppe	N	Mean Rank	Sum of Ranks
Snitt_Imagination	VR	52	61.51	3198.50
	2D	51	42.30	2157.50
	Total	103		
Snitt_Telepresens	VR	52	66.51	3458.50
	2D	51	37.21	1897.50
	Total	103		

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Snitt_Attitude	Equal var. assumed	1.341	.250	1.575	101	.118	.38235	.24270	-.09909	.86380
	Equal var. not assumed			1.577	100.604	.118	.38235	.24250	-.09873	.86343
Snitt_Sense	Equal var. assumed	.359	.550	-.019	101	.985	-.00628	.33066	-.66222	.64965
	Equal var. not assumed			-.019	97.628	.985	-.00628	.32999	-.66117	.64861
Snitt_Emosjon	Equal var. assumed	.251	.617	.843	101	.401	.31762	.37681	-.42987	1.06512
	Equal var. not assumed			.843	100.923	.401	.31762	.37664	-.42953	1.06478
Snitt_Kognisjon	Equal var. assumed	.651	.422	-.095	101	.924	-.03507	.36796	-.76499	.69486
	Equal var. not assumed			-.095	97.720	.924	-.03507	.36855	-.76646	.69633
Snitt_Imagination	Equal var. assumed	1.553	.216	3.206	101	.002	1.04387	.32561	.39794	1.68979
	Equal var. not assumed			3.201	98.132	.002	1.04387	.32610	.39675	1.69098
Snitt_Telepresens	Equal var. assumed	.907	.343	5.453	101	.000	2.24233	.41122	1.42659	3.05808
	Equal var. not assumed			5.463	98.271	.000	2.24233	.41047	1.42780	3.05687
Snitt_Accessibility	Equal var. assumed	1.929	.168	1.690	101	.094	.66233	.39196	-.11522	1.43988

	Equal var. not assumed			1.686	95.102	.095	.66233	.39285	-.11756	1.44222
Snitt_Enjoy	Equal var. assumed	.407	.525	6.005	101	.000	1.84842	.30782	1.23777	2.45906
	Equal var. not assumed			5.996	97.971	.000	1.84842	.30830	1.23661	2.46022
Snitt_Self	Equal var. assumed	2.991	.087	-.297	101	.767	-.11777	.39679	-.90490	.66936
	Equal var. not assumed			-.297	96.666	.767	-.11777	.39589	-.90355	.66800
Snitt_Natur	Equal var. assumed	.938	.335	1.003	101	.318	.39593	.39466	-.38698	1.17884
	Equal var. not assumed			1.005	99.374	.318	.39593	.39409	-.38601	1.17786
Snitt_Intensjon	Equal var. assumed	.863	.355	-.021	101	.983	-.00817	.39219	-.78617	.76983
	Equal var. not assumed			-.021	100.743	.983	-.00817	.39192	-.78566	.76932
Snitt_Positive_Impression	Equal var. assumed	3.201	.077	.402	101	.688	.10950	.27213	-.43033	.64933
	Equal var. not assumed			.403	95.842	.688	.10950	.27146	-.42935	.64835
Snitt_Personal_Trait	Equal var. assumed	1.790	.184	.447	101	.656	.11290	.25266	-.38832	.61411
	Equal var. not assumed			.446	98.316	.656	.11290	.25302	-.38920	.61500

11.5.2 Difference between mean: experiment two dataset

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Snitt Emosjon	Equal var. assumed	.117	.733	-.993	65	.324	-.426	.429	-1.283	.430
	Equal var. not assumed			-.992	63.013	.325	-.426	.430	-1.285	.433
Snitt Emosjon 2	Equal var. assumed	2.539	.116	-.006	64	.995	-.003	.488	-.977	.972
	Equal variances not assumed			-.006	53.991	.996	-.003	.499	-1.004	.998
Snitt Kognisjon	Equal var. assumed	2.797	.099	-1.398	65	.167	-.686	.491	-1.666	.294
	Equal var. not assumed			-1.421	64.740	.160	-.686	.483	-1.650	.278
Snitt Kognisjon2	Equal var. assumed	.001	.976	-1.913	64	.060	-1.228	.642	-2.510	.054
	Equal var. not assumed			-1.939	63.903	.057	-1.228	.633	-2.493	.037
Snitt_Positive_Impression	Equal var. assumed	.890	.349	-.490	65	.626	-.10327	.21079	-.52425	.31771
	Equal var. not assumed			-.492	64.424	.624	-.10327	.20988	-.52250	.31596
Snitt_Positive_Impression2	Equal var. assumed	.561	.457	-.674	64	.503	-.16389	.24326	-.64986	.32208
	Equal var. not assumed			-.678	63.092	.500	-.16389	.24180	-.64707	.31929
Snitt_Sikt2	Equal var. assumed	.051	.823	-.073	64	.942	-.01481	.20357	-.42149	.39186
	Equal var. not assumed			-.072	56.425	.943	-.01481	.20707	-.42956	.39993
Snitt_Expectation	Equal var. assumed	2.158	.147	-2.095	65	.040	-.48387	.23094	-.94508	-.02266
	Equal var. not assumed			-2.124	64.950	.038	-.48387	.22785	-.93892	-.02882
Snitt_Expectation2	Equal var. assumed	.081	.777	-.774	64	.442	-.18611	.24050	-.66656	.29434
	Equal var. not assumed			-.765	58.670	.447	-.18611	.24313	-.67266	.30044

11.6 Moderator regression

11.6.1 Moderator: Quality conditioning mental imagery

Run MATRIX procedure:

********** PROCESS Procedure for SPSS Release 2.16.1 **********

Written by Andrew F. Hayes, Ph.D. www.afhayes.com

Documentation available in Hayes (2013). www.guilford.com/p/hayes3

****

Model = 1

Y = Snitt_Im

X = Gruppe

M = Kvalitet

Sample size:103

****

Outcome: Snitt_Im

Model Summary

R	R-sq	MSE	F	df1	df2	p
,3408	,1162	2,7119	3,6688	3,0000	99,0000	,0148

Model

	coeff	se	t	p	LLCI	ULCI
constant	8,1837	,2854	28,6769	,0000	7,6175	8,7500
Kvalitet	,1491	,1240	1,2026	,2320	-,0969	,3951
Gruppe	-1,5183	,5740	-2,6451	,0095	-2,6572	-,3794
int_1	,0786	,2497	,3149	,7535	-,4168	,5741

Product terms key:int_1 Gruppe X Kvalitet

R-square increase due to interaction(s):

	R2-chng	F	df1	df2	p
int_1	,0016	,0992	1,0000	99,0000	,7535

****

Conditional effect of X on Y at values of the moderator(s):

Kvalitet	Effect	se	t	p	LLCI	ULCI
-2,4069	-1,7075	1,0602	-1,6105	,1105	-3,8113	,3962
,0000	-1,5183	,5740	-2,6451	,0095	-2,6572	-,3794
2,4069	-1,3290	,5072	-2,6202	,0102	-2,3355	-,3226

Values for quantitative moderators are the mean and plus/minus one SD from mean.

Values for dichotomous moderators are the two values of the moderator.

********** JOHNSON-NEYMAN TECHNIQUE **********

Moderator value(s) defining Johnson-Neyman significance region(s)

Value	% below	% above

-1,2930 26,2136 73,7864

Conditional effect of X on Y at values of the moderator (M)

Kvalitet	Effect	se	t	p	LLCI	ULCI
-6,0291	-1,9924	1,9188	-1,0383	,3016	-5,7997	1,8149
-5,5791	-1,9570	1,8097	-1,0814	,2822	-5,5478	1,6339
-5,1291	-1,9216	1,7010	-1,1297	,2613	-5,2968	1,4536
-4,6791	-1,8862	1,5929	-1,1842	,2392	-5,0468	1,2744
-4,2291	-1,8508	1,4853	-1,2461	,2157	-4,7981	1,0964
-3,7791	-1,8154	1,3786	-1,3169	,1909	-4,5509	,9200
-3,3291	-1,7801	1,2728	-1,3985	,1651	-4,3056	,7455
-2,8791	-1,7447	1,1682	-1,4934	,1385	-4,0627	,5734
-2,4291	-1,7093	1,0653	-1,6045	,1118	-3,8230	,4045
-1,9791	-1,6739	,9644	-1,7357	,0857	-3,5875	,2397
-1,5291	-1,6385	,8664	-1,8912	,0615	-3,3576	,0806
-1,2930	-1,6200	,8164	-1,9842	,0500	-3,2399	,0000
-1,0791	-1,6031	,7723	-2,0759	,0405	-3,1355	-,0708
-,6291	-1,5678	,6837	-2,2931	,0240	-2,9244	-,2112
-,1791	-1,5324	,6031	-2,5408	,0126	-2,7290	-,3357
,2709	-1,4970	,5341	-2,8028	,0061	-2,5568	-,4372
,7209	-1,4616	,4817	-3,0341	,0031	-2,4174	-,5058
1,1709	-1,4262	,4518	-3,1569	,0021	-2,3226	-,5298
1,6209	-1,3908	,4488	-3,0992	,0025	-2,2813	-,5004
2,0709	-1,3555	,4732	-2,8642	,0051	-2,2945	-,4164
2,5209	-1,3201	,5213	-2,5322	,0129	-2,3545	-,2857
2,9709	-1,2847	,5872	-2,1878	,0310	-2,4499	-,1195

****

Data for visualizing conditional effect of X on Y

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

```
DATA LIST FREE/Gruppe Kvalitet Snitt_Imagination.
BEGIN DATA.
    -,4951   -2,4069    8,6704
     ,5049   -2,4069    6,9628
    -,4951    ,0000    8,9355
     ,5049    ,0000    7,4172
    -,4951    2,4069    9,2006
     ,5049    2,4069    7,8716
END DATA.
GRAPH/SCATTERPLOT=Kvalitet WITH Snitt_Imagination BY Gruppe.
```

********** ANALYSIS NOTES AND WARNINGS **********

Level of confidence for all confidence intervals in output: 95,00

11.6.2 Moderator: Gender conditioning quality

Run MATRIX procedure:

********** PROCESS Procedure for SPSS Release 2.16.1 **********

Model = 1

Y = Kvalitet

X = Gruppe_d

M = Kjønn_d

Sample size: 103

****

Outcome: Kvalitet

Model Summary

R	R-sq	MSE	F	df1	df2	p
,7031	,4943	3,0185	28,5434	3,0000	99,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	7,9275	,1895	41,8326	,0000	7,5515	8,3035
Kjønn_d	,8422	,3911	2,1534	,0337	,0662	1,6183
Gruppe_d	-3,3487	,3786	-8,8439	,0000	-4,1000	-2,5974
int_1	1,8333	,7804	2,3491	,0208	,2848	3,3819

Product terms key: int_1 Gruppe_d X Kjønn_d

R-square increase due to interaction(s):

	R2-chng	F	df1	df2	p
int_1	,0337	5,5184	1,0000	99,0000	,0208

****

Conditional effect of X on Y at values of the moderator(s):

Kjønn_d	Effect	se	t	p	LLCI	ULCI
-,5825	-4,4167	,6193	-7,1313	,0000	-5,6456	-3,1878
,4175	-2,5833	,4749	-5,4401	,0000	-3,5256	-1,6411

****

Data for visualizing conditional effect of X on Y

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

```
DATA LIST FREE/Gruppe_dummy Kjønn_dummy Kvalitet.
BEGIN DATA.
    -,5049     -,5825     9,6667
     ,4951     -,5825     5,2500
    -,5049      ,4175     9,5833
     ,4951      ,4175     7,0000
END DATA.
GRAPH/SCATTERPLOT=Kjønn_dummy WITH Kvalitet BY Gruppe_dummy.
```

11.7 Mediator regression

11.7.1 Mediator: Hypothesis 1A

11.7.1.1 Snitt_Imagination → Snitt_Attitude → Snitt_Intensjon → Kjøpte_deltageren_billett

****

Model = 6

Y = Q47

X = Snitt_Im

M1 = Snitt_At

M2 = Snitt_In

Sample size: 103

****

Outcome: Snitt_At

Model Summary

R	R-sq	MSE	F	df1	df2	p
,3462	,1199	1,3676	13,7564	1,0000	101,0000	,0003

Model

coeff	se	t	p	LLCI	ULCI
constant	6,6586	,5652	11,7819	,0000	5,5375	7,7797
Snitt_Im	,2489	,0671	3,7090	,0003	,1158	,3820

****

Outcome: Snitt_In

Model Summary

R	R-sq	MSE	F	df1	df2	p
,3764	,1417	3,4332	8,2537	2,0000	100,0000	,0005

Model

coeff	se	t	p	LLCI	ULCI
constant	2,9066	1,3798	2,1065	,0377	,1691	5,6441
Snitt_At	,5386	,1577	3,4165	,0009	,2258	,8514
Snitt_Im	,0997	,1133	,8799	,3810	-,1251	,3245

****

Outcome: Q47

Coding of binary DV for analysis:

Q47	Analysis
2,00	,00
4,00	1,00

Logistic Regression Summary

-2LL	Model LL	p-value	McFadden	CoxSnell	Nagelkrk	n
79,8509	18,6374	,0003	,1892	,1655	,2689	103,0000

Model

coeff	se	Z	p	LLCI	ULCI

constant -9,3608 2,7369 -3,4202 ,0006 -14,7250 -3,9966

Snitt_At ,7776 ,3414 2,2777 ,0227 ,1085 1,4467

Snitt_In ,4818 ,2296 2,0988 ,0358 ,0319 ,9318

Snitt_Im -,4284 ,1928 -2,2214 ,0263 -,8063 -,0504

********** DIRECT AND INDIRECT EFFECTS **********

Direct effect of X on Y

Effect SE Z p LLCI ULCI

-,4284 ,1928 -2,2214 ,0263 -,8063 -,0504

Indirect effect(s) of X on Y

Effect Boot SE BootLLCI BootULCI

Total: ,3061 ,1267 ,1196 ,5759

Ind1 : ,1935 ,0861 ,0633 ,3908

Ind2 : ,0646 ,0445 ,0153 ,1922

Ind3 : ,0480 ,0828 -,0703 ,2479

Indirect effect key

Ind1 : Snitt_Im -> Snitt_At -> Q47

Ind2 : Snitt_Im -> Snitt_At -> Snitt_In -> Q47

Ind3 : Snitt_Im -> Snitt_In -> Q47

------ END MATRIX -----

11.7.2 Mediator: Hypothesis 1D

11.7.2.1 Group → Snitt_Telepresens → Snitt_Accessibility

****

Model = 4

Y = Snitt_Ac

X = Gruppe_d

M = Snitt_Te

Sample size:103

****

Outcome: Snitt_Te

Model Summary

R R-sq MSE F df1 df2 p

,4769 ,2274 4,3539 29,7340 1,0000 101,0000 ,0000

Model

coeff se t p LLCI ULCI

constant 4,7320 ,2922 16,1954 ,0000 4,1524 5,3116

Gruppe_d 2,2423 ,4112 5,4529 ,0000 1,4266 3,0581

****

Outcome: Snitt_Ac

Model Summary

R R-sq MSE F df1 df2 p

,2392 ,0572 3,8732 3,0338 2,0000 100,0000 ,0526

Model

coeff se t p LLCI ULCI

constant 5,2704 ,5227 10,0839 ,0000 4,2335 6,3074

Snitt_Te ,1666 ,0939 1,7753 ,0789 -,0196 ,3528

Gruppe_d ,2887 ,4413 ,6543 ,5144 -,5867 1,1642

********** TOTAL EFFECT MODEL **********

Outcome: Snitt_Ac

Model Summary

R R-sq MSE F df1 df2 p

,1658 ,0275 3,9557 2,8553 1,0000 101,0000 ,0942

Model

coeff se t p LLCI ULCI

constant 6,0588 ,2785 21,7550 ,0000 5,5063 6,6113

Gruppe_d ,6623 ,3920 1,6898 ,0942 -,1152 1,4399

********** TOTAL, DIRECT, AND INDIRECT EFFECTS **********

Total effect of X on Y

Effect SE t p LLCI ULCI

,6623 ,3920 1,6898 ,0942 -,1152 1,4399

Direct effect of X on Y

Effect SE t p LLCI ULCI

,2887 ,4413 ,6543 ,5144 -,5867 1,1642

Indirect effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Te ,3736 ,2397 -,0239 ,9345

Partially standardized indirect effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Te ,1862 ,1172 -,0167 ,4478

Completely standardized indirect effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Te ,0935 ,0586 -,0068 ,2267

Ratio of indirect to total effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Te ,5641 13,9580 -,5252 4,8826

Ratio of indirect to direct effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Te 1,2939 114,6594 -,3078 559,6339

R-squared mediation effect size (R-sq_med)

Effect Boot SE BootLLCI BootULCI

Snitt_Te ,0235 ,0244 -,0057 ,0975

Normal theory tests for indirect effect

Effect se Z p

,3736 ,2247 1,6630 ,0963

------ END MATRIX -----

11.7.2.2 Group → Snitt_Imagination → Snitt_Accessibility

****

Model = 4

Y = Snitt_Ac

X = Gruppe_d

M = Snitt_Im

Sample size_103

****

Outcome: Snitt_Im

Model Summary

R R-sq MSE F df1 df2 p

,3039 ,0924 2,7298 10,2776 1,0000 101,0000 ,0018

Model

coeff se t p LLCI ULCI

constant 7,7190 ,2314 33,3638 ,0000 7,2600 8,1779

Gruppe_d 1,0439 ,3256 3,2059 ,0018 ,3979 1,6898

****

Outcome: Snitt_Ac

Model Summary

R R-sq MSE F df1 df2 p

,3760 ,1414 3,5275 8,2320 2,0000 100,0000 ,0005

Model

coeff se t p LLCI ULCI

constant 2,8793 ,9118 3,1576 ,0021 1,0702 4,6883

Snitt_Im ,4119 ,1131 3,6417 ,0004 ,1875 ,6363

Gruppe_d ,2323 ,3885 ,5980 ,5512 -,5385 1,0031

********** TOTAL EFFECT MODEL **********

Outcome: Snitt_Ac

Model Summary

R R-sq MSE F df1 df2 p

,1658 ,0275 3,9557 2,8553 1,0000 101,0000 ,0942

Model

coeff se t p LLCI ULCI

constant 6,0588 ,2785 21,7550 ,0000 5,5063 6,6113

Gruppe_d ,6623 ,3920 1,6898 ,0942 -,1152 1,4399

********** TOTAL, DIRECT, AND INDIRECT EFFECTS **********

Total effect of X on Y

Effect SE t p LLCI ULCI

,6623 ,3920 1,6898 ,0942 -,1152 1,4399

Direct effect of X on Y

Effect SE t p LLCI ULCI

,2323 ,3885 ,5980 ,5512 -,5385 1,0031

Indirect effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Im ,4300 ,2495 ,0497 1,0055

Partially standardized indirect effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Im ,2143 ,1192 ,0242 ,4759

Completely standardized indirect effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Im ,1076 ,0596 ,0123 ,2378

Ratio of indirect to total effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Im ,6492 40,5257 -1,0395 6,1775

Ratio of indirect to direct effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Im 1,8506 96,8289 ,1601 1507,7427

R-squared mediation effect size (R-sq_med)

Effect Boot SE BootLLCI BootULCI

Snitt_Im ,0244 ,0261 -,0080 ,1061

Normal theory tests for indirect effect

Effect se Z p

,4300 ,1824 2,3568 ,0184

------ END MATRIX -----

11.7.2.3 Group → Snitt_Telepresens → Snitt_Imagination

****

Model = 4

Y = Snitt_Im

X = Gruppe_d

M = Snitt_Te

Sample size:103

****

Outcome: Snitt_Te

Model Summary

R R-sq MSE F df1 df2 p

,4769 ,2274 4,3539 29,7340 1,0000 101,0000 ,0000

Model

coeff se t p LLCI ULCI

constant 4,7320 ,2922 16,1954 ,0000 4,1524 5,3116

Gruppe_d 2,2423 ,4112 5,4529 ,0000 1,4266 3,0581

****

Outcome: Snitt_Im

Model Summary

R R-sq MSE F df1 df2 p,

5373 ,2887 2,1607 20,2950 2,0000 100,0000 ,0000

Model

coeff se t p LLCI ULCI

constant 5,9762 ,3904 15,3091 ,0000 5,2017 6,7507

Snitt_Te ,3683 ,0701 5,2541 ,0000 ,2292 ,5074

Gruppe_d ,2180 ,3296 ,6616 ,5098 -,4358 ,8719

********** TOTAL EFFECT MODEL **********

Outcome: Snitt_Im

Model Summary

R R-sq MSE F df1 df2 p

,3039 ,0924 2,7298 10,2776 1,0000 101,0000 ,0018

Model

coeff se t p LLCI ULCI

constant 7,7190 ,2314 33,3638 ,0000 7,2600 8,1779

Gruppe_d 1,0439 ,3256 3,2059 ,0018 ,3979 1,6898

********** TOTAL, DIRECT, AND INDIRECT EFFECTS **********

Total effect of X on Y

Effect SE t p LLCI ULCI

1,0439 ,3256 3,2059 ,0018 ,3979 1,6898

Direct effect of X on Y

Effect SE t p LLCI ULCI

,2180 ,3296 ,6616 ,5098 -,4358 ,8719

Indirect effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Te ,8258 ,2062 ,4907 1,3411

Partially standardized indirect effect of X on Y

Effect Boot SE BootLLCI BootULCI

Snitt_Te ,4785 ,1017 ,3137 ,7214

Completely standardized indirect effect of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Snitt_Te	,2404	,0508	,1589	,3627

Ratio of indirect to total effect of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Snitt_Te	,7911	2,6001	,4142	2,1367

Ratio of indirect to direct effect of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Snitt_Te	3,7875	234,4143	,9095	9813,8686

R-squared mediation effect size (R-sq_med)

Effect	Boot SE	BootLLCI	BootULCI
Snitt_Te	,0892	,0463	,0082	,1917

Normal theory tests for indirect effect

Effect	se	Z	p
,8258	,2202	3,7510	,0002

------ END MATRIX -----

11.7.2.4 Group → Snitt_Telepresens → Snitt_Imagination → Snitt_Accessibility

****

Model = 6

Y = Snitt_Ac

X = Gruppe_d

M1 = Snitt_Te

M2 = Snitt_Im

Sample size:103

****

Outcome: Snitt_Te

Model Summary

R	R-sq	MSE	F	df1	df2	p
,4769	,2274	4,3539	29,7340	1,0000	101,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	4,7320	,2922	16,1954	,0000	4,1524	5,3116
Gruppe_d	2,2423	,4112	5,4529	,0000	1,4266	3,0581

****

Outcome: Snitt_Im

Model Summary

R	R-sq	MSE	F	df1	df2	p
,5373	,2887	2,1607	20,2950	2,0000	100,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	5,9762	,3904	15,3091	,0000	5,2017	6,7507
Snitt_Te	,3683	,0701	5,2541	,0000	,2292	,5074
Gruppe_d	,2180	,3296	,6616	,5098	-,4358	,8719

****

Outcome: Snitt_Ac

Model Summary

R	R-sq	MSE	F	df1	df2	p
,3764	,1417	3,5619	5,4467	3,0000	99,0000	,0017

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,8755	,9165	3,1375	,0022	1,0570	4,6940
Snitt_Te	,0190	,1017	,1871	,8520	-,1827	,2207
Snitt_Im	,4007	,1284	3,1212	,0024	,1460	,6555
Gruppe_d	,2014	,4241	,4748	,6360	-,6401	1,0428

********** TOTAL EFFECT MODEL **********

Outcome: Snitt_Ac

Model Summary

R	R-sq	MSE	F	df1	df2	p
,1658	,0275	3,9557	2,8553	1,0000	101,0000	,0942

Model

	coeff	se	t	p	LLCI	ULCI
constant	6,0588	,2785	21,7550	,0000	5,5063	6,6113
Gruppe_d	,6623	,3920	1,6898	,0942	-,1152	1,4399

********** TOTAL, DIRECT, AND INDIRECT EFFECTS **********

Total effect of X on Y

Effect	SE	t	p	LLCI	ULCI
,6623	,3920	1,6898	,0942	-,1152	1,4399

Direct effect of X on Y

Effect	SE	t	p	LLCI	ULCI
,2014	,4241	,4748	,6360	-,6401	1,0428

Indirect effect(s) of X on Y

	Effect	Boot SE	BootLLCI	BootULCI
Total:	,4610	,3189	-,0644	1,1763
Ind1 :	,0426	,2305	-,4457	,4841
Ind2 :	,3309	,1531	,0928	,7214
Ind3 :	,0874	,1579	-,1338	,4742
(C1)	-,2883	,3125	-1,0675	,2335
(C2)	-,0447	,2669	-,6181	,4271

(C3) ,2436 ,1842 -,0161 ,7895

Partially standardized indirect effect of X on Y

	Effect	Boot SE	BootLLCI	BootULCI
Total:	,2297	,1553	-,0383	,5592
Ind1 :	,0212	,1157	-,2223	,2452
Ind2 :	,1649	,0718	,0478	,3378
Ind3 :	,0435	,0777	-,0675	,2296

Completely standardized indirect effect of X on Y

	Effect	Boot SE	BootLLCI	BootULCI
Total:	,1154	,0776	-,0189	,2812
Ind1 :	,0107	,0578	-,1111	,1226
Ind2 :	,0829	,0359	,0252	,1700
Ind3 :	,0219	,0389	-,0337	,1150

Ratio of indirect to total effect of X on Y

	Effect	Boot SE	BootLLCI	BootULCI
Total:	,6960	49,1500	-1,2247	6,7190
Ind1 :	,0644	12,0142	-2,1523	1,6909
Ind2 :	,4997	44,8217	,0472	9,5356
Ind3 :	,1319	7,4778	-,6493	1,6009

Ratio of indirect to direct effect of X on Y

	Effect	Boot SE	BootLLCI	BootULCI
Total:	2,2893	23473,3975	,2666	1659772,19
Ind1 :	,2118	12902,4101	-,8129	158,8787
Ind2 :	1,6435	6462,4013	,4044	456869,395
Ind3 :	,4339	4109,3229	-,1311	297,2984

Indirect effect key

Ind1 : Gruppe_d -> Snitt_Te -> Snitt_Ac

Ind2 : Gruppe_d -> Snitt_Te -> Snitt_Im -> Snitt_Ac

Ind3 : Gruppe_d -> Snitt_Im -> Snitt_Ac

Specific indirect effect contrast definitions

(C1) Ind1 minus Ind2

(C2) Ind1 minus Ind3

(C3) Ind2 minus Ind3

------ END MATRIX -----

11.7.3 Mediator: Hypothesis 2B

11.7.3.1 Group → Snitt_Imagination → Snitt_Enjoy

****

Model = 4

Y = Snitt_En

X = Gruppe

M = Snitt_Im

Sample size:103

****

Outcome: Snitt_Im

Model Summary

R	R-sq	MSE	F	df1	df2	p
,3039	,0924	2,7298	10,2776	1,0000	101,0000	,0018

Model

coeff	se	t	p	LLCI	ULCI
constant	9,8067	,5133	19,1039	,0000	8,7884	10,8250
Gruppe	-1,0439	,3256	-3,2059	,0018	-1,6898	-,3979

****

Outcome: Snitt_En

Model Summary

R	R-sq	MSE	F	df1	df2	p
,6616	,4377	1,8802	38,9210	2,0000	100,0000	,0000

Model

coeff	se	t	p	LLCI	ULCI
constant	6,7329	,9151	7,3578	,0000	4,9174	8,5483
Snitt_Im	,4602	,0826	5,5727	,0000	,2964	,6240
Gruppe	-1,3680	,2836	-4,8230	,0000	-1,9308	-,8053

********** DIRECT AND INDIRECT EFFECTS **********

Direct effect of X on Y

Effect	SE	t	p	LLCI	ULCI
-1,3680	,2836	-4,8230	,0000	-1,9308	-,8053

Indirect effect of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Snitt_Im	-,4804	,1705	-,8853	-,1983

------ END MATRIX -----

11.7.3.2 Group → Snitt_Telepresens → Snitt_Enjoy

****

Model = 4

Y = Snitt_En

X = Gruppe

M = Snitt_Te

Sample size:103

```
**************************************************************************
Outcome: Snitt_Te
Model Summary
R       R-sq       MSE         F         df1         df2          p
,4769     ,2274     4,3539    29,7340     1,0000   101,0000      ,0000
Model
coeff         se         t         p       LLCI       ULCI
constant    9,2167     ,6483    14,2168     ,0000    7,9306    10,5027
Gruppe     -2,2423     ,4112    -5,4529     ,0000   -3,0581    -1,4266
**************************************************************************
Outcome: Snitt_En
Model Summary
R       R-sq       MSE         F         df1         df2          p
,6225     ,3875     2,0481    31,6317     2,0000   100,0000      ,0000
Model
coeff         se         t         p       LLCI       ULCI
constant    8,4110     ,7703    10,9193     ,0000    6,8828     9,9393
Snitt_Te     ,3076     ,0682     4,5069     ,0000     ,1722      ,4430
Gruppe     -1,1587     ,3209    -3,6111     ,0005   -1,7954     -,5221
******************** DIRECT AND INDIRECT EFFECTS *************************
Direct effect of X on Y
Effect         SE         t         p       LLCI       ULCI
-1,1587     ,3209    -3,6111     ,0005   -1,7954     -,5221
Indirect effect of X on Y
Effect    Boot SE   BootLLCI   BootULCI
Snitt_Te     -,6897     ,2142    -1,1693     -,3230
------ END MATRIX -----
```

11.7.3.3 Group → Snitt_Telepresens → Snitt_Imagination → Snitt_Enjoy

```
**************************************************************************
Model = 6
Y = Snitt_En
X = Gruppe_d
M1 = Snitt_Te
M2 = Snitt_Im
Sample size: 103
**************************************************************************
Outcome: Snitt_Te
Model Summary
R       R-sq       MSE         F         df1         df2          p
```

,4769 ,2274 4,3539 29,7340 1,0000 101,0000 ,0000

Model

coeff se t p LLCI ULCI

constant 4,7320 ,2922 16,1954 ,0000 4,1524 5,3116

Gruppe_d 2,2423 ,4112 5,4529 ,0000 1,4266 3,0581

****

Outcome: Snitt_Im

Model Summary

R R-sq MSE F df1 df2 p

,5373 ,2887 2,1607 20,2950 2,0000 100,0000 ,0000

Model

coeff se t p LLCI ULCI

constant 5,9762 ,3904 15,3091 ,0000 5,2017 6,7507

Snitt_Te ,3683 ,0701 5,2541 ,0000 ,2292 ,5074

Gruppe_d ,2180 ,3296 ,6616 ,5098 -,4358 ,8719

****

Outcome: Snitt_En

Model Summary

R R-sq MSE F df1 df2 p

,6853 ,4697 1,7911 29,2293 3,0000 99,0000 ,0000

Model

coeff se t p LLCI ULCI

constant 3,9619 ,6499 6,0960 ,0000 2,6723 5,2515

Snitt_Te ,1762 ,0721 2,4442 ,0163 ,0332 ,3193

Snitt_Im ,3567 ,0910 3,9176 ,0002 ,1760 ,5373

Gruppe_d 1,0810 ,3007 3,5944 ,0005 ,4842 1,6777

********** TOTAL EFFECT MODEL **********

Outcome: Snitt_En

Model Summary

R R-sq MSE F df1 df2 p

,5129 ,2631 2,4397 36,0572 1,0000 101,0000 ,0000

Model

coeff se t p LLCI ULCI

constant 7,5490 ,2187 34,5147 ,0000 7,1151 7,9829

Gruppe_d 1,8484 ,3078 6,0048 ,0000 1,2378 2,4591

********** TOTAL, DIRECT, AND INDIRECT EFFECTS **********

Total effect of X on Y

Effect SE t p LLCI ULCI

1,8484 ,3078 6,0048 ,0000 1,2378 2,4591

Direct effect of X on Y

Effect	SE	t	p	LLCI	ULCI
1,0810	,3007	3,5944	,0005	,4842	1,6777

Indirect effect(s) of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Total:	,7675	,2315	,3799	1,3019
Ind1 :	,3951	,1946	,0677	,8425
Ind2 :	,2946	,1206	,1012	,5923
Ind3 :	,0778	,1238	-,1573	,3451
(C1)	,1006	,2415	-,3647	,5872
(C2)	,3173	,2384	-,1452	,7973
(C3)	,2168	,1856	-,0413	,7224

Partially standardized indirect effect of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Total:	,4239	,1204	,2115	,6790
Ind1 :	,2182	,1079	,0323	,4623
Ind2 :	,1627	,0620	,0591	,3093
Ind3 :	,0430	,0679	-,0912	,1833

Completely standardized indirect effect of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Total:	,2130	,0602	,1079	,3429
Ind1 :	,1096	,0540	,0171	,2340
Ind2 :	,0817	,0310	,0304	,1553
Ind3 :	,0216	,0340	-,0453	,0917

Ratio of indirect to total effect of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Total:	,4152	,1239	,2041	,6885
Ind1 :	,2138	,1119	,0280	,4640
Ind2 :	,1594	,0699	,0551	,3436
Ind3 :	,0421	,0687	-,0970	,1737

Ratio of indirect to direct effect of X on Y

Effect	Boot SE	BootLLCI	BootULCI
Total:	,7100	,7817	,2544	2,2098
Ind1 :	,3655	,6138	,0376	1,3351
Ind2 :	,2725	,3162	,0773	,8536
Ind3 :	,0719	,2471	-,1655	,4161

Indirect effect key

Ind1 : Gruppe_d -> Snitt_Te -> Snitt_En

Ind2 : Gruppe_d -> Snitt_Te -> Snitt_Im -> Snitt_En

Ind3 : Gruppe_d -> Snitt_Im -> Snitt_En

Specific indirect effect contrast definitions

(C1) Ind1 minus Ind2

(C2) Ind1 minus Ind3

(C3) Ind2 minus Ind3

------ END MATRIX -----