ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL

CO-DESIGN APPROACH TO RAISE AWARENESS: A CASE ON FERTILITY

M.Sc. THESIS

Reşat ŞAŞİK

Department of Industrial Design

Industrial Design Programme

JULY 2021

ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL

CO-DESIGN APPROACH TO RAISE AWARENESS: A CASE ON FERTILITY

M.Sc. THESIS

Reşat ŞAŞİK
(502171910)

Department of Industrial Design

Industrial Design Programme

Thesis Advisor: Dr. Deniz LEBLEBİCİ BAŞAR

JULY 2021

ISTANBUL TEKNİK ÜNİVERSİTESİ ★ LİSANSÜSTÜ EĞİTİM ENSTİTÜSÜ

ORTAK TASARIM YAKLAŞIMI İLE FARKINDALIK ARTIRIMI: DOĞURGANLIK ÜZERİNE BİR ÇALIŞMA

YÜKSEK LİSANS TEZİ

Reşat ŞAŞİK
(502171910)

Endüstriyel Tasarım Anabilim Dalı

Endüstriyel Tasarım Programı

Tez Danışmanı: Dr. Öğr. Üyesi Deniz LEBLEBİCİ BAŞAR

TEMMUZ 2021

Reşat Şaşik, a M.Sc. student of ITU Graduate School student ID 502171910, successfully defended the thesis entitled "CO-DESIGN APPROACH TO RAISE AWARENESS: A CASE ON FERTILITY", which he prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Thesis Advisor :	**Dr. Deniz LEBLEBİCİ BAŞAR** İstanbul Technical University	.....
Jury Members :	**Prof. Dr. Gülname Turan** Istanbul Technical University	.....
	Dr. Gülşen TÖRE YARGIN Middle East Technical University	.....

Date of Submission : 11 June 2021
Date of Defense : 12 July 2021

To Melek Umay for being always with me,

FOREWORD

First of all, I would like to thank my thesis advisor Dr. Deniz LEBLEBİCİ BAŞAR for her continuous invaluable support and patience during my thesis study. I am particularly grateful to her immense guidance.

I would like to express my sincere gratitude to Emb. Dr. Murat BAŞAR and his team. Also, I offer special thanks to all participants of this thesis study for their contribution.

I am deeply grateful to my mother, Fatma CAN, and my brother, Mahmut ŞAŞİK, for their eternal love. Also, I should thank Umut TÜZ and our family members for their support.

Last but not least, I could not have completed this study without my beloved spouse, Melek Umay. Her supportive attitude and accompaniment kept me focused on this study. Thank you, my love.

July 2021 Reşat ŞAŞİK

TABLE OF CONTENTS

Page

ABBREVIATIONS

ITU : Istanbul Technical University
IVF : In Vitro Fertilization
FBM : Fogg Behavior Model
TDHS **:** Turkey Demographic and Health Survey
UNFPA : United Nations Population Fund
UN **:** United Nations
WHO **:** World Health Organization
AMH **:** Anti-Mullerian Hormone

LIST OF TABLES

Page

LIST OF FIGURES

Page

CO-DESIGN APPROACH TO RAISE AWARENESS: A CASE ON FERTILITY

SUMMARY

Since many societies are affected by taboo topics and every society absorbs them in its own way, changing people's beliefs and behaviors on a taboo topic can be challenging. Fertility, as a taboo issue, has been a hot topic for a long time because there is a trend to delay childbearing in most countries, notably among higher educated individuals. Delaying childbearing is a personal choice; however, it should be taken consciously considering its consequences as aging related social issues. Most people lack sufficient or accurate information about their reproductive health. Due to the social context based on taboos, when behavioral change is desired through design, it should be within the framework of co-design and participatory approach. Therefore, the current study took women's fertility as a case and aimed to explore how designed material may create awareness and encourage behavior change compared to underdesigned material on a taboo topic. A mixed method approach was taken as methodology. First, an extensive literature review was held on the key areas including fertility awareness, participatory design, and behavior change. The interdisciplinary nature of the study area enabled design, psychology, and medical subjects to merge in this design research study. In the light of the literature, the design of the experiment consisted of pre-post surveys, expert interviews, a co-design workshop, and data analyses. The career goals-associated delayed childbearing among higher educated individuals may occur fertility problems. The selected participant group was higher educated Turkish university students and academicians aging between 18 to 45 years. Firstly, the pre-survey was completed with 153 participants, 106 of whom gave their e-mail addresses to attend the post-survey. The first findings from the pre-survey showed that even highly educated people had insufficient knowledge about their fertility, which is in line with literature. After the pre-survey, expert interviews were conducted with four experts to get insights and discover unknown facts. In the co-design workshop, both empathy mapping and brainstorming sessions were organized with twelve shareholders to explore the main features of the behavioral change model in regard to fertility potential. With these co-design sessions, a fear-inducing video was designed to motivate people by reminding them of the aging process and describing how to learn their fertility potential. The experimental group was informed with a fear-inducing video and the control group was informed with a brief-text at the beginning of the post-survey. A comparison-based analysis was performed to determine whether the video-informed participants gained awareness on their fertility or not compared to text-informed ones. The findings showed that both groups gained information; however, fertility awareness of the video-informed ones increased significantly as compared to the text-informed ones. This increased awareness can be considered the first step of the behavior change on fertility issues. While almost all of the participants of the video-informed group changed their ranking of the most important factor as "ovarian reserve" contrary to their initial rankings, only half of the text-

informed group ranked it as the most important. Furthermore, the video-informed group increased their true statement selections by about 70% and decreased false statement selection by 45% according to comparative analysis between their pre- and post-survey responses. In conclusion, this study showed that a designed material was more effective than an underdesigned material in creating awareness and encouraging behavior change on a taboo topic in the case of fertility. While raising awareness and encouraging behavior change, this study embraced a shift from a "designing for them" approach to a "designing with them" approach. Taken all together, this thesis can be considered as one of the first studies to contribute to the literature by studying how a designed material can create awareness and encourage behavior change on taboo topics through a co-design approach. Nevertheless, there were some limitations during the study. The Coronavirus pandemic affected the study plan and decreased the sample size of the participants. All meetings were conducted online because of the pandemic. Also, long-term observation and social impact assessment could not be performed because of the short time schedule of thesis.

ORTAK TASARIM YAKLAŞIMI İLE FARKINDALIK ARTIRIMI: DOĞURGANLIK ÜZERİNE BİR ÇALIŞMA

ÖZET

Pek çok toplum tabu konulardan etkilendiğinden ve her toplum onları kendi tarzında özümsediğinden, insanların tabu bir konudaki inanç ve davranışlarını değiştirmek zor olabilir. Dünya genelindeki doğurganlık hızının düşmesiyle etkisi artan nüfus yaşlanması bağlamında doğurganlık ertelenmesi eğilimi de tabu nitelikli konular arasında yer almaktadır. Artan eğitim düzeyi, kariyer hedefleri veya ekonomik kaygılardan dolayı doğurganlık ertelenmekte ve sadece eşlerden oluşan çekirdek aile yapısı artmaktadır. Çocuk doğurmayı geciktirmek kişisel bir seçimdir; ancak yaşlanmaya bağlı oluşan doğurganlık potansiyelinin düşmesiyle çocuk sahibi olma ihtimali azalmaktadır. İleri yaş ile olası doğum sırasındaki sağlık problemleri artabiliyor veya insanlar karar değiştirip çocuk sahibi olmak istese dahi çocuk sahibi olamayabiliyor. Kişisel karşılaşılan sorunların dışında, toplumun doğurganlık hızı düşüşü nüfusun yenilenme hızını geriletmekle birlikte ilerleyen sağlık teknolojisi, yaşam sürelerinin artması ve doğum oranlarının düşmesi ile genç nüfusun azalıp yaşlı nüfusunun artması toplumlar için ekonomik ve sosyal olumsuz etkilere sebep olmaktadır. Tüm bunlarla beraber her insanın kendi doğurganlık potansiyeli yani üreme sağlığı hakkında bilgi sahibi olması, kendi istekleri doğrultusunda bilinçli kararlar almasına olanak sağlamaktadır. Doğurganlık konusuyla ilgili bir diğer önemli durum ise çoğu insanın üreme sağlığı hakkında yeterli veya doğru bilgiye sahip olmamasıdır, özellikle eğitimli insanlarda dahi bu bilgiler yetersizdir. Tabulara dayalı, sosyal bağlamı nedeniyle doğurganlık ve üreme sağlığı çoğu ülkede olduğu gibi ülkemizde de bu durumdan kaynaklı yanlış veya eksik bilgilerle iç içedir.

Bu doğrultuda tasarım yoluyla farkındalık yaratmak ve davranış değişikliği için zemin hazırlamak istendiğinde, bu çalışmanın ortak tasarım ve katılımcı yaklaşım çerçevesinde olması faydalı olacaktır. Son yıllarda da endüstriyel tasarımcıların sosyal konularda aktif bir şekilde yer aldığı görülmektedir. Tasarımcıların rolü önceden sadece işlev ve biçimi önemseyen problem çözücüler olarak görülmekteydi. Döneminin teknolojisi ile somut ürünler yapan tasarımcılar rolünden, zaman geçtikçe kullanıcı deneyimini veya sürdürülebilirliği dikkate alan tasarımcılar rolüne bürünmeye başladılar. Daha fazla insan odaklı, sosyal ve etik konuları da göz ardı etmeyen ve bu alanlardaki problemlerle ilgilenmeye başlayan bir rol ile tasarımcılar günümüzde aktif olarak bulunmaktadır. Bu problemlerle ilgilenirken sürece hem başka disiplinlerden meslek gruplarını dâhil ederken hem de problemin doğrudan ya da dolaylı muhataplarıyla çalışmaya özen göstermektedir. Bu tez çalışmasında da tabu konular gibi konuşulmayan, toplum tarafından hassas olarak nitelendirilen konularda yaşanılan sorunları ele alırken tek başına çalışmak yerine paydaşların olduğu, çoğulcu bir yaklaşım benimsenmiştir. Bu nedenle, bu çalışmanın amacı herhangi bir tabu konusunda tasarlanmamış bilgi materyaline kıyasla tasarlanmış bilgi materyalinin nasıl farkındalık yaratabileceğini ve davranış değişikliğini nasıl teşvik edebileceğini araştırmaktır. Ayrıca tabu konularda farkındalık yaratmak isteyen ve devamında davranış değişikliği hedefleyen araştırmacılara örnek

alabilecekleri bir tasarım metodolojisi oluşturmaktır. Tabu konulardan ise kadın doğurganlığını bir problem alanı olarak inceleyip araştırmayı belirli bir metodolojik yaklaşımla bu örnek üzerinde yapmıştır. Bu çalışma, metodoloji olarak ise karma yöntem yaklaşımını benimsemiştir.

İlk olarak, doğurganlık farkındalığı, katılımcı tasarım ve davranış değişikliği gibi kilit alanlarda kapsamlı bir literatür taraması yapılmıştır. Çalışma konusunun disiplinler arası doğası gereği psikoloji ve biyoloji konularının da bu tasarım araştırması çalışmasında yer almasına olanak vermiştir. Literatür doğrultusunda deneyin tasarımı, ön anketler, uzman görüşmeleri, ortak tasarım çalıştayı ve veri analizlerinden oluşmaktadır. Literatürün işaret ettiği gibi, doğurganlık sorunları çoğunlukla eğitimli insanların, özellikle de ilk çocuklarına sahip olmayı erteleyen insanların karşılaştığı bir durumdur. Bu yüzden seçilen katılımcı grubu 18-45 yaş arası eğitimli kişilerden oluşmuştur. İlk olarak 18-45 yaş aralığında, 106'sı e-posta adresini paylaşan toplamda 153 katılımcı ile ön anket tamamlanmıştır. Ön anketten elde edilen ilk bulgular, literatürle uyumlu olarak, eğitimli kişilerin bile doğurganlıkları hakkında yetersiz bilgiye sahip olduğunu göstermiştir. Ön anketin ardından, içgörü elde etmek ve bilinmeyen, dışarıdan baktığınızda hemen farkedilmeyecek gerçekleri keşfetmek için dört uzman ile ayrı ayrı düzenlenen yarı yapılandırılmış görüşmeler yapılmıştır. Bu uzmanlardan üçü embriyolog, biri de hasta ilişkileri uzmanı göreviyle bir tüp bebek kliniğinde çalışmaktaydılar. Hem üreme sağlığı hakkında bilgi edinirken hem de teknolojinin güncel durumu hakkında teknik bilgiler elde edilmiştir. Bunların yanı sıra, kliniği arayan kişilerin ve hastaların ruh halleri, yalnız mı birileriyle mi geldikleri, tavırları ve karşılaştıkları duruma karşı tepkileri uzmanlar tarafından özetlenmiştir. Uzman görüşmelerinden sonra ise ortak tasarım çalıştayı düzenlenmiştir. Bu çalıştayda, davranış değişikliği modelinin doğurganlık potansiyeline ilişkin temel özelliklerini keşfetmesi için on iki paydaşla hem empati haritalama hem de beyin fırtınası oturumları düzenlenmiştir. Bu oturumlarda hem doktor ve embriyolog gibi sağlık alanından uzmanlar hem de daha önce doğurganlık sorunları ile karşılaşmış ve tüp bebek yöntemi ile gebe kalan bir katılımcı katılmıştır. Bu ortak tasarım oturumları sonucunda elde edilen veriler ile davranış değişikliği modeli temelinde motivasyon, yapılabilirlik ve tetikleme başlıkları için uygun faktörler tespit edilmiştir. Bu üç başlık çerçevesinde insanlara yaşlanma sürecini hatırlatarak, doğurganlık potansiyellerini nasıl öğreneceklerini açıklayarak ve motive etmek için korku uyandıran bir video tasarlanmıştır. Bu tasarlanan video, izleyen katılımcılara doğurganlık potansiyeli hakkında bilgilendirme yaparken, bu video haricinde katılımcıları bilgilendirecek bir materyal daha hazırlanmıştır. Bu materyal ise aynı bilgilerle, kısa bir metin halinde katılımcıları doğurganlık potansiyeli hakkında bilgilendirmek için hazırlanmıştır. Araştırmanın devamında ikincil ankete katılmak için gönüllü olan katılımcılar iki gruba ayrılarak, deney grubuna korku uyandıran bir video ile bilgi verilirken, kontrol grubuna ise kısa bir metin ile bilgi verilmiştir.

Video ile bilgilendirilen katılımcıların metin ile bilgilendirilenlere kıyasla doğurganlıkları konusunda farkındalık kazanıp kazanmadıklarını belirlemek için karşılaştırmaya dayalı bir analiz yapılmıştır. Bulgular, her iki grubun da bilgi edindiğini göstermiştir; ancak video ile bilgilendirilenlerin, metinle bilgilendirilenlere göre doğurganlık farkındalığı önemli ölçüde artmıştır. Bu artan farkındalık, doğurganlık konularında davranış değişikliğinin ilk adımı olarak kabul edilebilir. Video ile bilgilendirilen grubun katılımcılarının neredeyse tamamı, ilk sıralamalarının aksine en önemli faktörlerden olan “yumurtalık rezervi” sıralamasını

en önemli olarak değiştirirken, metinle bilgilendirilen grubun sadece yarısı en önemli faktör olarak derecelendirmiştir. Ayrıca, videoyla bilgilendirilmiş grup, anket öncesi ve sonrası yanıtları arasındaki karşılaştırmalı analize göre doğru-yanlış sorusunda "doğru önerme" seçimlerini yaklaşık %70 oranında artırmış ve "yanlış önerme" seçimini %45 oranında azaltmıştır.

Sonuç olarak, bu çalışma, doğurganlık konusu örneği üzerinden tabu bir konuda farkındalık yaratma ve davranış değişikliğini teşvik etmede tasarlanmış bir materyalin, tasarlanmamış bir materyalden daha etkili olduğunu göstermiştir. Bu tez, ortak tasarım yaklaşımıyla tasarlanan bir materyalin tabu konularda nasıl farkındalık yaratabileceğini ve davranış değişikliğini nasıl teşvik edebileceğini inceleyerek literatüre katkı sağlayan öncü çalışmalardan biri olarak kabul edilebilir. Bu tez çalışmasında, tabu konular hakkında farkındalık yaratmak ve devamında davranış değişikliği amaçlayan tasarımcıların kendi çalışmalarını kurgulayabilmeleri için örnek alabileceği bir tasarım yöntemi sunulmuştur. Bu tez çalışması temel alınarak, tasarım sürecine karar alıcı kişi veya kurumların dâhil edilmesi ile daha büyük ölçekte bir çalışma düzenlenebilir.

Ayrıca, çalışmanın gerçekleştiği dönemde Coranavirüs pandemisinin meydana gelmesi ve yaşam şartlarını değiştirmesi sebebiyle tez çalışmasının planı etkilenmiştir. Pandemi önlemleri örneklem büyüklüğünün azalmasına sebep olmuş ve tüm toplantılar çevrimiçi olarak gerçekleştirilmiştir. Tezin zaman çizelgesinin de kısa olması göz önüne alındığında uzun süreli gözlemler yapmak için fırsat olmadığından davranış değişikliği sosyal etki analizleri yapılamamıştır.

1. INTRODUCTION

1.1 The Motivation and the Aim of the Study

There are several definitions of Industrial Design and designers' role and these definitions have evolved with time (Moody, 1980; Perks et al., 2005). Although industrial designers were usually placed in a role involving coping with styling and form in the early 19th century, this role shifted to prioritize users' needs and material improvement (Industrial Designers Society of America, 2020). According to some, industrial designers are called contributors as they improve user experiences while focusing on the usability of the product, its function, its form and the experiences to be delivered in the new design process (Hertenstein et al., 2005). They were generally considered to be excellent makers. On the other hand, they can be seen in society, culture, or environment-related issues as public attendants and they are concerned with user experience, interaction, or sustainability (Nichols, 2013; Ramirez, 2012; Rodríguez-Ferradas et al., 2016). In this wide scope, this thesis adopts the definition of the World Design Organization (WDO), which defines industrial designers as:

> Industrial Designers place the human in the center of the process. They acquire a deep understanding of user needs through empathy and apply a pragmatic, user-centric problem-solving process to design products, systems, services, and experiences. They are strategic stakeholders in the innovation process and are uniquely positioned to bridge varied professional disciplines and business interests. They value the economic, social, and environmental impact of their work and their contribution towards co-creating a better quality of life. (WDO, 2020)

As the WDO states, creating a better quality of life through any design or design-related discipline requires focusing more on human-centered design approaches or business strategies shifting designers from the role of a maker to that of a doer. While being an excellent maker or problem solver through technology, as doers, industrial designers are concerned with social and ethical issues and act as social innovators (Wang, 2013). Doer industrial designers help social innovators and they connect with societies by using design thinking (Fajardo et al., 2012). Designers'

involvement in more social issues has become more obvious in recent years. The projects of IDEO which is an organization that aims to “design a more just and inclusive world” can be examples for the designerly way of involving social issues. It collaborates with stakeholders, communities, and governments to improve the lives of people. For example, IDEO’s team contacted with Ethiopian farmers, agricultural engineers, and experts to help them improve cultivation methods because the cultivation of Teff, which is ancient grain of Ethiopia, was stalled (IDEO, 2012). After learning everything about the cultivation, the designer team of the IDEO designed an agricultural tool to improve the production of Teff. They also continued to study how to improve cultivation methods and tools with the post graduate students of the local universities. Another example from IDEO is about the reorganization of access to social benefits in Dallas, USA. Although there was a long-standing federal program, WIC, that provides food, dietary education, and nutrition advice in WIC’s clinic for low-income parents, there was no efficient enrollment by the citizens who need it. When the IDEO design team conducted some interviews with stakeholders, they realized that people were aware of benefits of WIC but did not apply to this social benefits program because of the barriers which made access complicated with a non-user friendly interface. Therefore, they designed a brochure with local stakeholders and members of the WIC to guide the people to buy proper food when they are shopping at grocery store. Also, they redesigned the environment of WIC’s clinics to be warmer and community-centered (IDEO, 2021b). Therefore, the IDEO team became the key factor for change through the use of the design-driven approach. Not only the IDEO but also municipalities and universities deal with social issues within the framework of design. For example, the northwest area of Milano was selected to explore the social issues of local people in the one of the European projects. The design team of this project collaborated with the municipality, the University of Politecnico di Milano and urban planners and organized a few co-design meetings (Deserti et al., 2018). As a result, the design team presented a service called Quarto Food Club. This service involved not only delivering food to single elderly locals to improve their lives but also finding jobs for students of the hoteling schools. At the same time, an interaction occurred between elderly citizens and students so that the elderly people could overcome their feelings of loneliness and students could gain work experience in their education life. In these examples, it can be seen that designers can get involved in the social lives of people

and gather necessary information from different geographic areas about different social issues. Also, they can provide a solution to those social issues through collaboration within the framework of design.

Moreover, there are ads and campaigns focusing on public issues because public issues have gained more attention recently. Design Council, an organization in the UK, established a team called RED that focuses on the transformation of public services and it used design to change the public system for socially-developing outcomes (Burns et al., 2006). After two RED reports, Design Council embraced public consideration in its aim and it defined its purpose as "making life better by design." Not only design organizations but also popular media such as Netflix have undertaken some projects about social issues. Two documentary films (Cowspiracy and Seaspiracy) were released recently on Netflix which is one of the most popular streaming platforms (Bean, 2020). Both documentaries present facts about environmental sustainability and create an impact on their audience about this issue. Netflix also launched a collection of series, films, and documentaries that were picked by female creators and actors in collaboration with UN Women so this campaign aimed to make visible the invisible by putting women both at the front and at the center to create gender equity (Montero, 2020). Women-centered projects also increase in Turkey. For example, a civil society initiative called We Need to Talk supports a gender mainstreaming strategy and works against the taboo about women's menstruation. It has also published a guide about women's menstruation so it aims to change the attitudes and misconceptions of people (Serin et al., 2020). Another example from Turkey is a project called Child Brides, which was conducted by The Flying Broom Women's Communication and Research Foundation. This project aimed to change the attitudes of people towards child brides so it organized lots of panels and seminars to raise the awareness of families, educators and both religious, communities' leaders (The Flying Broom, 2013). Another project on empowerment of women, Kız Kardeşim, is aimed to strengthen women's social and economic positions to take an active role in economic development in Turkey (Kız Kardeşim, 2021). Besides dealing with social issues, Changemakers, which is a social platform to support activists and social entrepreneurs who produce innovative suggestions to social issues (Sabancı Vakfı, 2021). The aim of Changemakers is inspiring the community and making visible the invisible for people. This aim of

Changemakers overlaps with the aim of the aforementioned collaborative campaigns of UN Women and Netflix above. It can be seen that women's voices are rising so several campaigns have been conducted about women-related issues in both Turkey and other countries (UN WOMEN, 2020). Since Phumzile Mlambo-Ngcuka, the Under-Secretary-General and Executive Director of UN Women said "we don't have an equal world now, but we won't stop until we get one," it seems that women-centered campaigns will stay for a long time (UN WOMEN, 2020).

Taken all together, social design, which aims to improve current social conditions, focuses mostly on the behavior change of humans and also societies. Behavior change needs to start by understanding the current situation and becoming aware. When these readings are merged with women-centered issues generally, the topic of taboo subjects becomes the field of interest. Among the taboo subjects on women, the most-encountered one, fertility, was chosen in this study. As the nature of the taboo notion is based on ambiguity and building hidden social boundaries, many people are affected by unwritten rules that consist of these social barriers and culture. This thesis is especially focused on women more because they are not fully equal to men although they are half of the population worldwide (Nussbaum, 2002). Since women encounter some social boundaries and social beliefs that are rooted in traditional, cultural, or religious reasons, these barriers negatively affect women's lives (Mukhopadhyay et al., 2019). With this motivation, the current study takes women's fertility as a case study and aims to investigate how a designed material may create awareness and change behavior compared to underdesigned material on a taboo topic. The reproductive health and fertility issues of both men and women, which constitute taboo topics in almost in every culture, was selected as a focus subject to study (M. Lee, 2019). Some people lack of information about reproductive health and encounter some barriers and taboos in learning the facts about it (Hammarberg et al., 2017). This is in spite of the fact that reproductive health is one of the basic health conditions of human beings and according to the United Nations Population Fund (UNFPA), good reproductive health which is a condition of absolute "physical, mental and social well-being" is one of the rights of people (United Nations Population Fund, 2016). Also, all people should be able to make their own choices including about their reproductive health; it is a right of every individual.

This thesis aims to investigate how design can be used to raise awareness on a taboo subject as framed on women's fertility issues as a case on the present study. Based on this purpose, the research question and sub-questions is formulated as:

- How can a designed material create awareness and change behavior compared to underdesigned material?
- How can a design methodology formulated that increases awareness about taboo topics be prepared in the perspective of design to guide taboo-related cases?

1.2 Methodology

An experimental study plan was designed to explore the answers of the research question of how to increase awareness and change behavior on the fertility issue through designed material within the framework of a mixed method (Figure 1.1). Through mixed method, both quantitative and qualitative approaches were used to obtain not only numeric values to make comparisons but also interpretable data to infer them (Schoonenboom & Johnson, 2017). After an extensive literature review on key notions about fertility awareness, social innovation, co-design approach, and behavioral change, the research continued with a pre-survey, expert interviews, a co-design workshop, and a post-survey. While the pre-survey provided initial numeric data about the participants, expert interviews contributed to the literature. In the co-design workshop, the study focused on designing what type of tools could be used and how they could be implemented to increase awareness about the fertility issue. After a designed material was created in this co-design workshop, control and experimental groups were informed at the beginning of the post-survey by different types of materials. While the experimental group was informed by a designed material and the control group received same context-information via a brief text, the study measured what kinds of differences could occur between the two groups.

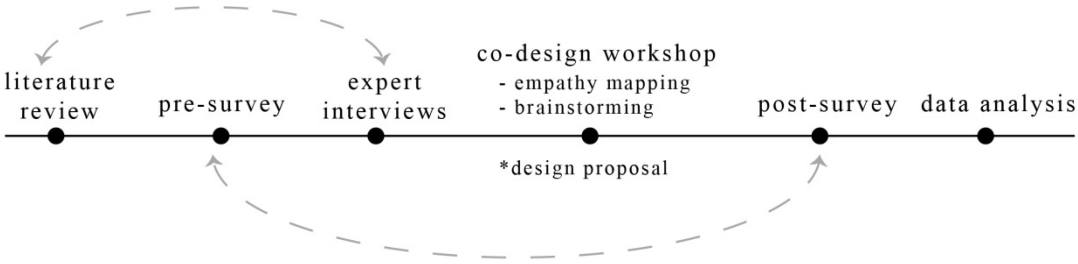


Figure 1.1 : The methodology schema of this study.

1.3 Limitations of the Study

First of all, the Coronavirus pandemic was the main limitation during this study. Due to the pandemic, people's concerns and priorities changed so the plan and expectations of the study changed correspondingly. Person-to-person meetings like the expert interviews and the co-design workshop were performed online. These online meetings might have affected attendance and also interaction among participants and researchers. The sample size of the post-survey was lower than what the study expected. Also, due to both the time limitation of thesis study and the pandemic, the study relied only on participants' expressions about the behavioral change process.

2. THEORETICAL BACKGROUND

2.1 Taboo Subjects

There are issues which people do not want to be seen, done, heard, or spoken about openly (Allan & Burridge, 2006). The reasons for this desire might be religious, cultural, or moral (Fershtman, Gneezy, & Hoffman, 2011). This can be explained as there have been some unrecorded and non-obvious laws since ancient times and these laws create some hidden borders in the social life of people (Freud, 1955). These laws and borders keep people in a certain direction and require them to think twice when they think, speak, act, or eat. Because of these social influences, people repress their instincts, feelings, and opinions. Thus, people are stuck in these social barriers (Freud, 1955). Without being able to express themselves freely, people cannot share their opinions with others and, thus, might live unaware of their problems. To break these social boundaries and barriers, people should speak about these culturally-avoided things. These proscriptive phenomena, called taboos, are defined by the Encyclopedia Britannica as "the prohibition of an action based on the belief that such behavior is either too sacred and consecrated or too dangerous and accursed for ordinary individuals to undertake" (Britannica, 2020). The word taboo is a Polynesian-based word that refers to the forbidden, a ban, or a restriction. Basically, it denotes an unwritten rule that defies logic and simple explanation (Douglas, 1979). No one can explain the concept of taboo well but it has existed among us for many years so taboo can be qualified as a cumulative process based on traditional values such as culture and history (Evans et al., 1999). Being traditional allows transmissibility. Thus, taboo systems pass with the culture of communities to the next generations (Evans et al., 1999). Also, every generation absorbs taboo systems in their own way and adopts them to their own social context and this adaption keeps the taboo dynamic, not static (Douglas, 1979). Its relation to tradition, culture, and social context show that the concept of taboo is a social-based issue (Lambek, 2001). Thus, in order to understand a taboo properly, you should be in the social context where the taboo lives (Douglas, 1979). Being in the social context

means that taboo topics may take effect just in a specific cultural area. Also, eating, wearing, or using a thing might be forbidden in different cultures due to taboo so the taboo notion has been studied on different social topics; however, the most-studied ones are on sexuality, race, and gender (Lambek, 2001). Two of them, sex and race, are considered sensitive topics because taboo topics usually trigger the reflexes of people and can create excitement and tension (Evans et al., 1999). Issues like homosexuality, abortion, pornography, and incest are sensitive topics and remain taboos in many societies (Evans et al., 1999; Freud, 1955; Press, 2010). Other most-studied social topics on taboo are gender and the bodily behaviors of the people. Speaking about sexual pleasure and interest in sex are extremely taboo topics for women and they have been surrounded with stereotypes, social constraints, and imposed rules for many years in many societies (Vance, 1984). Furthermore, Paula Webster stated that under the motherhood mission that has been given to women, the taboo notion restricts women's thoughts and behaviors so they have not communicated with each other about what they need, want, and think (Vance, 1984). In most societies, being a woman is explained with maternity and if there is any problem with having a baby, women are seen as the failed ones, not men (Ombelet et al., 2008). Women who decide not to have a baby or already have a baby but not to breastfeed their baby are stigmatized (Johnston-Robledo et al., 2007; Lamastro, 2001). Moreover, natural women's body processes including the menstrual cycle and menopause have been considered as strong taboos so women have not talked or shared their experiences with each other freely. This inadequate communication between women causes misunderstanding and negative psychological influences (Chrisler, 2013). The same circumstance has been seen on fertility and infertility issues. For instance, women who are not able to have a baby are neglected and relegated to a lower status in their social life (Shahzadi et al., 2007). In Hong Kong, mentioning fertility or infertility issues freely is an unwelcome situation and other sex topics are still taboo (Chan, Chan, Peterson, Lampic, & Tam, 2015). Shahzadi et al., (2007) also stated that having a baby is a natural instinct, and the inability to have children is considered a failure. For example, an English photographer, Zoë Noble, built a community, We Are Childfree, that "inspires and empowers women to embrace their childfree decision" (Noble, 2021). She takes photographs and spreads stories of the women who are stigmatized by societies due to their decision not to

have a child (Tramontana, 2021). This stigmatization leads to a lack of self-esteem, feeling of loneliness, and guilt on women (Ramazanzadeh et al., 2009).

Nowadays, a taboo-breaking movement has arisen and it has been used as positive exposure. For example, podcasting has been used to break the taboo through talking about a taboo topic instead of avoiding it. In Singapore, a woman podcaster talks about everything related with women's reproductive health that is still taboo in many Asian countries and she thinks that talking about taboo is "empowering" and "liberating" (Catherine, 2020; Wiersema et al., 2006). In addition, the BBC has two independent episodes of taboo-breaking podcasts called "Busting Period Taboos" and "Breaking Taboos in Iran. While in "Busting Period Taboos," two women from Tanzania and India mention menstruation directly to eliminate the taboo on this issue, in "Breaking Taboos in Iran," a woman shares her experiences on abusive marriage and women's roles in Iran. One of the most popular podcasts in Turkey, "Kamusal Alanda Tabusal Konular (KATK)," can be presented as a good example for Turkey. Rayka Kumru, a sexologist, features KATK with her guests to break the taboos through talking and working on taboo topics in public areas (Kumru, 2020). Not only sounds but also visual elements are used to normalize taboo issues so the organization "Positive Exposure" uses photography, films, exhibitions, and educational programs to show people how taboos dominate our lives and minds. The aim is promoting a more inclusive world through changing how people see (Guidotti, 2021). Last but not least, Emily Erwin Culpepper made a film about menstruation, which is one of the most taboo subjects in many cultures (Chrisler, 2013; Culpepper, 2006). She wanted to show all process of menstruation, which is the one of normal process of their body, as visuals including showing all typically-avoided elements of the period that are related with blood, the color red, and flowing. There were also some advertisements to break the taboo. One of them was the commercial showing the package design of Orkid-brand pads based on the appearance of a newspaper (Figure 2.1). It refers to social stigmatization on women's menstruation pad because when menstrual pads are purchased in Turkey, they are often wrapped in a newspaper or put into a black bag so that they remain unseen by anyone except the purchaser (Gazan, 2019). Since women's period is considered to be taboo even in TV broadcasting which sees the blood of the period unacceptable, another women's pad company, Libresse, started a campaign with a video to show that women's period is

normal (Figure 2.1) (Ketchum, 2017). Besides these pad ads, a tea company in Turkey, Doğadan, launched its special tea for women during their period and Doğadan has a collaboration with one of the women-supporter foundation for this special tea for women during their period (Doğadan, 2021). Apart from its marketing strategy, simply being on the shelves of supermarkets with the taboo word "regl," meaning period in Turkish, can be considered a taboo-breaking action (Figure 2.1). These examples showed the ways of breaking taboo. It is all about normalizing the taboo and people can use showing and talking about taboo subjects as a tool to increase awareness and change behaviors (Hensoldt-Fyda, 2018).

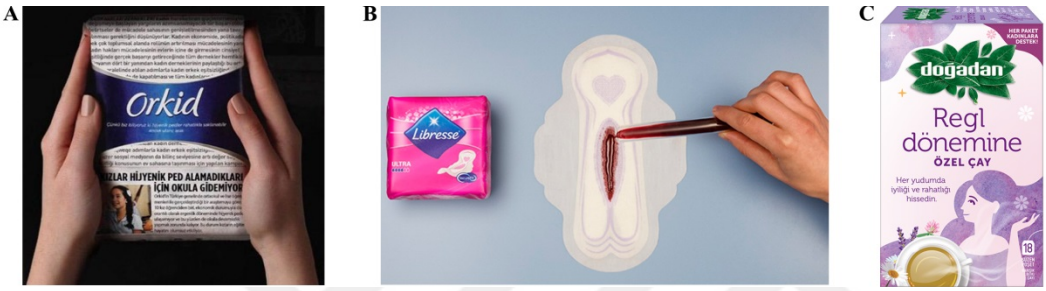


Figure 2.1 : Taboo breaking ads (Gazan, 2019;The Guardian, 2017;Doğadan, 2021).

2.2 The Concept of Fertility

In recent years, while fertility is defined as the capability of clinical pregnancy, the infertility of males and females has been placed on the lists of the International Classification of Diseases (ICD-11) (WHO, 2018; Zegers-Hochschild et al., 2017). Also, the World Health Organization (WHO) defines infertility as "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse." (WHO, 2020). Although fertility and infertility issues are related with reproductive health, the studies show that there is poor knowledge of fertility among young people who are aged less than twenty four (Boivin et al., 2019). This fertility awareness gap is based on insufficient biological information on the human body and the presence of misinformation which can be personal or cultural (Almeida-Santos et al., 2017). However, it has to be known that men's and women's fertility is primarily associated with age (Prior et al., 2018)., The motto of Fertility Day in Italy, "beauty has no age, fertility does," shows the importance of age on fertility (Pedro et al., 2018). Age is important not only for women's fertility but also for men's fertility. In addition to age, men's and women's fertility is associated with many variables that can be genetic, physiological, and

environmental (Vander Borght & Wyns, 2018). Thus, it is not only related to women's health but also related to men's health (Baylis, 2012).

Although studies have shown that infertility is not a failure of women exclusively, there is a misconception that blames women (Ombelet et al., 2008). Social pressure, plural marriage, shame, neglect, and being charged with failure are some of the issues that women have been exposed to discriminatorily in many societies (Baylis, 2012; Ombelet et al., 2008; Wiersema et al., 2006). For example, women have more concerns about being infertile than men, and even wives are stressed about their husbands' infertility in Taiwan (T. Y. Lee et al., 2001). Infertility also can be seen as a consequence of the unhealthy lifestyles of people like drinking alcohol, smoking, and having a poor diet (Jurewicz et al., 2014; Kühnert & Nieschlag, 2004). In addition, infertility might be the result of bad and unconscious or conscious choices such as delayed birth of the first child. Delayed childbearing is an intentional personal decision; however, it can be late if this decision is taken unconsciously.

2.2.1 Delayed childbearing

Over the past 30 years, women who live in many developed countries have delayed the birth of their first child in comparison with previous centuries (Lampic et al., 2006). Postponing childbearing is a social trend and, considering fertility issues, the decision of delaying childbirth becomes important issue (Chan et al., 2015). The mean age of women in the European Union (EU) at the birth of their first child gradually increased from 29.7 in 2008 to 30.8 in 2018 (Figure 2.2).

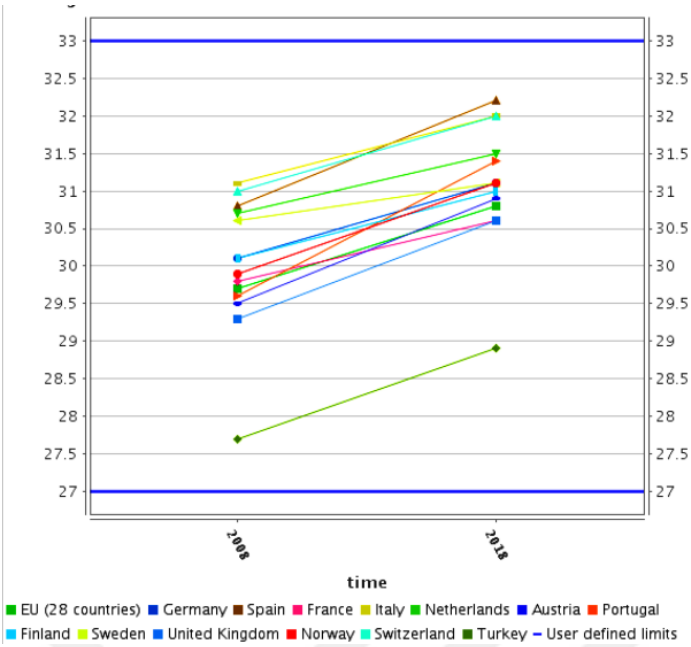


Figure 2.2 : The mean age of women at childbirth is the mean age of women when their children are born. This graph has been created automatically by Eurostat software according to external user specifications (Eurostat, 2020).

Concurrently, there was a significant rise from 27.7 to 28.9 in Turkey, which has a lower mean age value compared to EU countries. On the other hand, in the USA the rate of first births of women who are between 35–44 years old, increased significantly from 1990 to 2018 (Figure 2.3) (Martin et al., 2019).

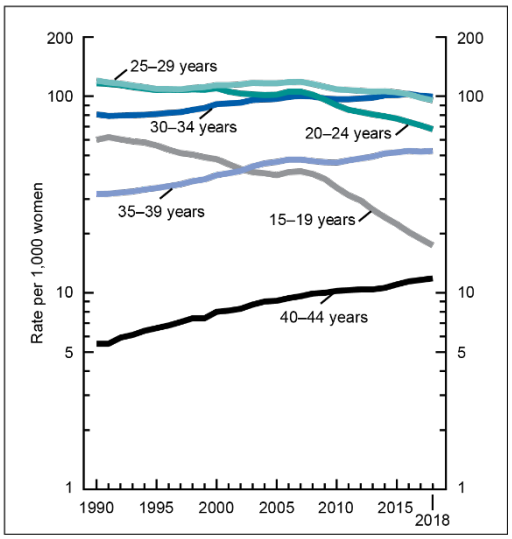


Figure 2.3 : Birth rates by age of mother in the United States. This graph was adapted from NCHS, National Vital Statistics System, Natality (Martin et al., 2019).

According to a study in Canada, while male participants want to become a father after a mean of 36.8 years old, they think that a mean of 29.5 years old is the best age to have the first child as well. In addition, despite the desire for motherhood of female participants after a mean of 32.4 years old, they believe that the ideal age of having a first child is a mean of 26.8 years old (Daniluk & Koert, 2012). In Turkey, from 1993 to 2018, the fertility rate decreased from 3.1 to 2.8 and from 2.4 to 2.2 in rural and urban regions, respectively, causing the total fertility rate to decrease from 2.7 to 2.3 (Figure 2.4) (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019).

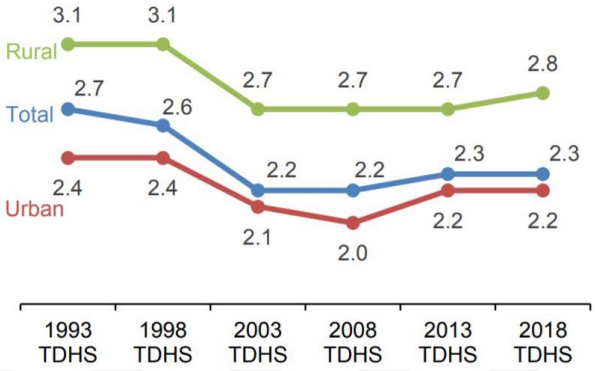


Figure 2.4 : Total Fertility rates by residence between 1993-2018 in Turkey. Adapted from Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019. TDHS: Turkey Demographic and Health Survey (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019).

Also, according to a Hacettepe University report, in 1993, the age-related highest birth rate was among 20-24 ages, while this rate changed to the 25-29 age range in 2018 (Figure 2.5) (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019).

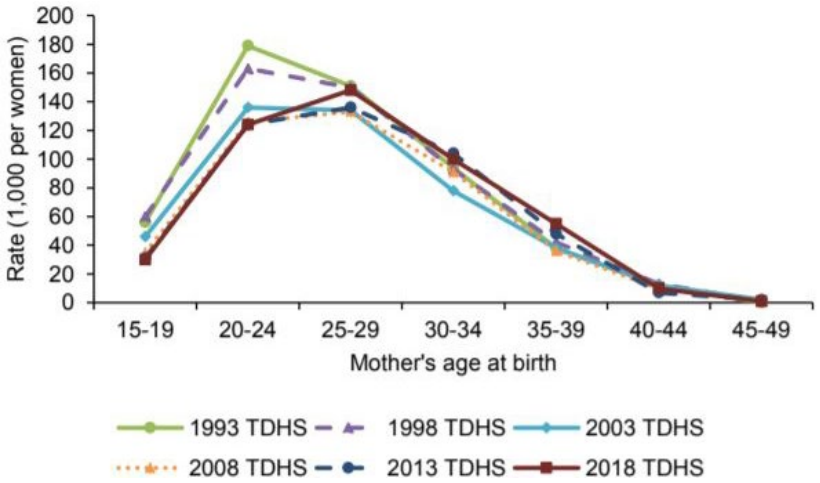


Figure 2.5 : Trends in age-specific fertility rates, between 1993-2018 in Turkey. Adapted from Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019. TDHS: Turkey Demographic and Health Survey (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019).

2.2.2 Fertility awareness

In last seventy years, tendency to delay the birth of a first child is common in the different regions of the world, as mentioned before because there is a dilemma between having career goals and having a baby for women (Figure 2.6) (Stentz et al., 2016).

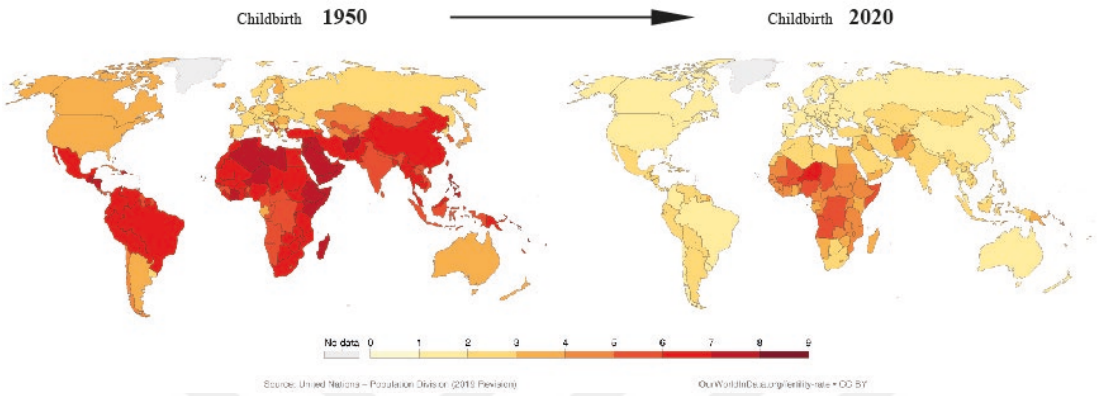


Figure 2.6 : Fertility Rate comparison between 1950 and 2020 (Roser, 2017).

In addition to career goals, changing lifestyles, higher educational backgrounds, financial insecurity and not finding a suitable partner affect women's priorities and lead them to choose activities other than motherhood (Mills et al., 2011). Also, economic uncertainty and the absence of supportive family policies can be included among the reasons mentioned above (Mogilevkina et al., 2016). Postponing childbearing is a choice either willingly or compulsorily but it brings some accompanying disadvantages. While couples, especially women, delay the first birth, their ages increase concomitantly. With increasing age, the ability of fecundity or reproduction decreases for women (Lampic et al., 2006), and age-related infertility has been seen in males with obesity, excessive alcohol consumption, and smoking (Johnson et al., 2015; Kühnert & Nieschlag, 2004). The reason for age-related infertility in women is a decrease in the ovarian reserve; thus, women who are less than 25 years old are twice as likely to get pregnant compared women who are older than 35 years old (Hassan & Killick, 2003). However, women can learn their oocyte reserve with a peripheral blood test, which measures the level of Anti-Mullerian Hormone (AMH) concentration in blood (Kelsey et al., 2011; Kruszynska & Slowinska-Srzednicka, 2017). AMH is used to measure ovarian aging and Fong et al., (2008) have defined it as "dimeric glycoprotein and member of the transforming growth factor-β superfamily." The maturation and growing of ovarian follicles

depend on the role of AMH and the family of which it is a part (Durlinger et al., 2002). Durlinger et al. (2002) also stated that AMH helps to mark ovarian response in women undergoing in vitro fertilization (IVF) treatment. Fanchin (2018) emphasizes the importance of IVF for infertility treatment: "in vitro fertilization (IVF) is an assisted reproductive technology (ART) used to treat infertility, to prevent the transmission of some genetic diseases, or to preserve and re-establish fertility potential after fertility-damaging treatments of diseases." (Fanchin, 2018). Therefore, many women and men believe incorrect information and they have misunderstandings and misconceptions regarding both male and female fertility; age-related fertility is especially overlooked in western countries (Kudesia et al., 2017). Also according to a false belief, IVF, the most popular advanced reproductive treatment, can provide the solution to age-related fertility problems (Peterson et al., 2012). Considering IVF, belief in postponed childbearing and the opinion of having a baby at a more convenient time can cause subfertility in the future (Maheshwari et al., 2008). Tough et al. (2002) draw attention to the importance of awareness about fertility: "pregnancies in older mothers are also at increased risk of low birth weight, preterm delivery, miscarriage, Down's syndrome, and other chromosomal anomalies."

Awareness of fertility requires reliable information but the knowledge level of fertility issues is significantly less than it should be and studies have remarked that males and females overestimate the possibility of getting pregnant and stay unconscious about their bodies' capabilities (Almeida-Santos et al., 2017). In the study of Daniluk, Koert, & Cheung (2012), although participants did not give the right answer to the questions, they considered themselves to be sufficiently conscious about assisted reproductive technologies and fertility in the pre-questionnaire. Hence women, even female medical trainees who have basic medical knowledge or easy to access reliable knowledge, are situated in the risky area of postponing childbirth (Kudesia et al., 2017). While women do not have enough information and awareness about fertility, they use the internet, which is one of the most used sources to access the information (Daniluk & Koert, 2015). Also, studies have shown that most women do not search for information until they encounter problems on fertility issues (Hammarberg, 2005). On the other hand, there are some concerns about the quality, legibility, and reliability of the information which is available online (Korp, 2006).

The risky side of having false beliefs, biases, or misconceptions about fertility is that such can be transmitted to new generations (Maeda et al., 2015).

The aforementioned issues related to fertility ignorance have bigger social impacts and are studied under the concept of aging. Lack of knowledge about fertility along with increasing postponed childbirth creates a public health problem which is a primary cause of societal aging in many countries nowadays (Mills et al., 2011). It also causes many countries to be faced with aging populations, which is an important issue for governments both socially and economically (Yusuf et al., 2020; Zhang et al., 2012). Since the aging population and the acceleration of the aging rate is considered to be a social issue, governments have some concerns about low fertility rates and delayed childbearing (Pham & Vo, 2020; Reynaud & Miccoli, 2018; Yusuf et al., 2020; Zhang et al., 2012). For example, in China, on the one hand, the elderly population is growing due to rising life expectancies while on the other hand, the young population is decreasing due to the former "one child policy" of the China and increasing tendency of delayed childbearing (Zhang et al., 2012). This aging population issue occurs due to decreasing mortality rates and increased medical services while the fertility rate drops due to career goals (Yusuf et al., 2020). Even in Minnesota, USA, there is a campaign called "Face Aging MN" to draw attention to the aging population in Minnesota (Face Aging MN, 2021).

The examples show that culturally avoided subjects, i.e., taboo topics, prevent open communication between people, especially between women, and create barriers to their thoughts and behaviors. Therefore, thoughts and conversations restricted because of taboos cause misunderstanding and miscommunication between women. This situation misguides them and affects their psychology negatively. However, breaking taboos allows women to talk about the topics that they are afraid to speak about with each other. Thus, women should realize that they are not the only ones who encounter difficulties or problems. In addition, being in touch with each other inhibits gossip, misinformation, and loneliness while enabling one to be aware of what really happens.

Considerations of postponing childbirth, fertility issues and increasing awareness about it are becoming increasingly important because it is a health-based problem and people cannot understand it until it happens. Being aware helps people to understand the situation, make the right decisions deliberatively, and disambiguates

the unclear future. Because of these reasons, creating awareness has become crucial; increasing awareness provides continuity and keeps people awake. Examples from the literature show that there are some ways to change behavior and design can be a tool in this manner so this study will contribute to the literature from the perspective of the design and the awareness of the fertility problem was chosen for a case in this study. To create awareness on fertility and infertility issues, many studies have been conducted, government-supported projects have carried out, and famous media members have published articles on their web pages as well. For example, the New York Times published an article which was entitled "Are You as Fertile as You Look?" (Boncompagni, 2011) and the Wall Street Journal also published the article “My Fertility Crisis” (Finn, 2011). In both articles, the unawareness of women on age-related reproductive problems was explained. The Australian Government funded a program that was a health advertisement on fertility called “Your Fertility” in 2011 (Hammarberg et al., 2017). For this purpose, a website was designed to spread knowledge of the program (www.yourfertility.org.au). Another example is about considering insufficient fertility education in the UK. stakeholders established “Fertility Education Initiative (FEI)” to inform all men and women and help to make their decision consciously (Harper et al., 2017). There is an initiative founded by fertility patients and art producers called “Fertility Fest.” This initiative described its three main topics on its webpage; firstly “to improve understanding of the emotional journey of people who struggle or go on a complex journey to conceive;” secondly, “to improve the level of public conversation about infertility and reproductive science;” and lastly, “to improve fertility education” (Vautier & Hepburn, n.d.).

2.3 The Concept Awareness And Behavior Change

As the term “awareness” may differ according to the context, it is equivocal and may refer to deliberateness, understanding, and intelligence (Schmidt, 2002). Awareness is also considered as the status of realization, being vigilant, and, in short, being conscious (Young, 2014). Being aware requires some kind of arousal because some forms of arousal affect the reaction of people in specific ways such as fear and sexual attitude (Hughes, 2008). As Schmidt stated, awareness refers to ‘‘a person’s being or becoming aware of something’’ in a social context of interactions between individuals (Schmidt, 2002).

As mentioned before, the term of awareness may differ regarding context and thus the usage of awareness can be seen in the context of sustainability, local problems, medical issues, and gender. For instance, a game was designed to increase the awareness about electricity usage because fun experiences like games can enhance awareness and change their attitudes (Shrubsole et al., 2011). In another study, a couple of infographics were designed and utilized in public places to create awareness about local issues (Claes & Vande Moere, 2013). Local ad displays have already been used in urban areas and the designation of visual expressions-related social issues in the neighborhood was found to be an effective way to inform and raise awareness (Figure 2.7). Moreover, social media has been utilized to create awareness. The study of Lapointe, Ramaprasad, & Vedel (2014) showed the power of social media while forming support communities for those who suffer from cancer on the multi-social platform. With these communities, people shared their experiences and knowledge with each other, which provided awareness (Lapointe et al., 2014). Organizing events including festivals, heritage walks, and related plays reach people in their daily lives in various contexts and help keep them aware (Shimray, 2019). In addition, there are also some advertisements designed to increase awareness on a social issue. For example, Global Action in the Interest of Animals (GAIA) designed a series of plastic bags and magazine packages to raise awareness on animal rights (Figure 2.7) (Van Gurp, 2008). Also, Mastercard, a payment network company, launched a digital gift card to support Conservation International, which aims to protect endangered species (Figure 2.7). There are some endangered animals and the card's expiry dates on those gift cards emphasize how short a timeframe remains for those animals (Mastercard, 2021). Mastercard both increases the awareness of people and contributes to Conservation International by selling digital gift payment cards. Not only animal rights but also environmental sustainability is considered to be a topic about which greater awareness is needed so the company IKEA has the same consideration as well. IKEA announced its decision to discontinue its use of all single-use plastic products such as plastic straws at its bistros and restaurants (IKEA, 2020). Apart from sustainability and animal rights, another example focuses on human rights, especially women's rights. This Girl Can, funded by The National Lottery of England, aims to promote exercise while highlighting that there is no right method to do exercise (This Girl Can, 2021). It supports women in overcoming daily social boundaries and social judgments on their

bodies while exercising and being physically active in their own methods. The study of Case (2007) also aimed to point out social pressure on women's lives. She was interested in reducing sexism and breaking male privilege. In order to raise awareness about modern sexism, hostile attitudes, prejudice against women, and male privilege in our social life, she arranged two courses to teach university students in a feminist pedagogical framework (Case, 2007).

Figure 2.7 : Some awareness-increasing ads (Claes & Vande Moere, 2013; Van Gurp, 2008; Mastercard, 2021).

In the aforementioned literature, the actors tried to raise awareness to encourage behavior change and these efforts were described in the "Fogg Behavior Model" (FBM). Three primary elements, motivation, ability, and triggers were emphasized in FBM (Figure 2.8). If a behavioral change is desired then there should be increased motivation, supported ability, and a trigger that comes on time (the term of trigger changed to prompts) (Fogg, 2020). All three factors should be necessary to achieve the change so Fogg gave an example about himself in his conference paper (Fogg, 2009). Although he wanted to play ukulele every day and he thought that it was entertaining (motivation) and easy to play (ability), he did not practice sometimes. He had adequate levels of motivation and ability but there were not any prompts around him to take action (Fogg, 2009).

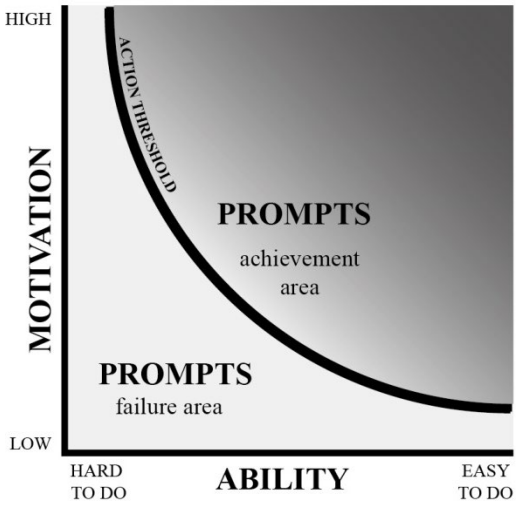


Figure 2.8 : The Fogg's Behavior Model on how to change behaviors (Fogg, 2009). Adapted from Fogg's Model.

In addition to FBM, Montaño & Kasprzyk, (2008) mentioned the "Theory of Behavior Change" and some principal factors of it that have similarities with FBM for behavior change in a chapter of a book, the editors of which were Glanz, Rimer, and Viswanath (Montaño & Kasprzyk, 2008). These key elements of behavior change were listed as threat, fear, response efficacy, self-efficacy, barriers, benefits, subjective norms, attitudes, intentions, cues to action, and reactance (CommGAP, 2010; Montaño & Kasprzyk, 2008). While the key elements of behavior change including threat, fear, and benefits refer to the motivation element of FBM, cues to action and reactance elements address the prompts factor of Fogg and, last but not least, barriers, attitudes, and intentions evoke Fogg's ability factor (Figure 2.9).

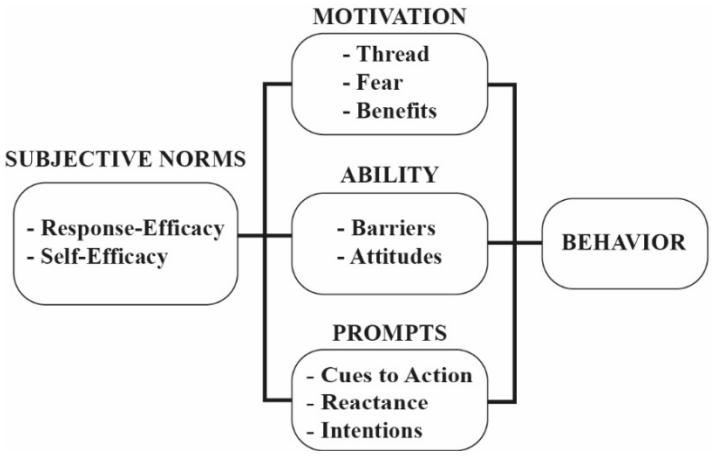


Figure 2.9 : Theory of Behavior Change (Montaño & Kasprzyk, 2008).

These elements and factors are usually used to change behavior in many studied areas. An example of them is the usage of shocking imagery on cigarette packages

(Figure 2.10) because fear-inducing visual media emphasizes how urgent the relevant subject is and what happens in case of inaction (de Vries, 2020). Also, the usage of negative emotion evokers can be seen in environmental campaigns (Figure 2.10) to draw attention the climate change (Salama & Aboukoura, 2018). Not only the usage of shocking imagery but also the expression of a cause-effect relationship has been used in social marketing campaigns to change behavior. For example, a condom TV commercial in Pakistan was used to encourage behavioral change by describing motivation, ability, and trigger of the concept in visual form (Beaudoin et al., 2016).

Figure 2.10 : Advertisements on Behavior Change (Choahan, 2018; WWF, 2013).

2.4 Design For Behavior Change And Social Innovation

For the last several years, designing for behavior change has been used as a strategy to encourage social change (Niedderer et al., 2016). Also, it has become an important area for both design practice and design research (Cash et al., 2017). According to Verplanken & Roy (2015), when providing behavior change on a topic, a leading problem arises. Although most people know that their behaviors are a characteristic of their decisions, they also tend to neglect the facts and do not pay attention to rational rules (Verplanken & Roy, 2015). Actually, this negligent attitude comes from ineradicable habits of societies so it reminds people of taboo issues. It is understood that a gap exists between attitude and behavior to work on and understanding how to approach when designing behavior change (Cash et al., 2020). The basics of behavior change embody convincing people to do something or not to do it; however, Lockton (2017) summarized the strategy of design into three approaches: “enabling, motivating and constraining” (Lockton, 2017). It is all about making behavior change action easier, desirable, and triggering it through design. When design-driven approach is used for behavioral change, considering people in their social context is inevitable; thus, the design for behavioral change approach

overlaps with design for social innovation due to their natural human-centered feature (Janzer & Weinstein, 2014; Tromp & Hekkert, 2014). Since design thinking is considered to be a trigger of change, it is used to encourage social change in the social innovation design process and also to support people in reconsidering problems and ideas (Schrage, 2000; Valentine et al., 2017).

While the European Commission has defined social innovation as "developing new ideas, services and models to better address social issues" (European Commission, 2020), according to Mulgan (2006) social innovation focuses on raising the living standards of people and generates new ideas to meet their needs that have not been met yet (Mulgan, 2006). Manzini (2015a) described the main characteristic of social innovation as aiming at socially-connected issues (Manzini, 2015a). Therefore, design researchers should be aware that if they study social issues, they need to get involved in the habitat of people who are going to be affected by design (Sanders, 2020). Moreover, the designing-for-others approach has evolved to designing together, involving users, actors, and stakeholders who are in the design process (Meroni et al., 2013). Also, Manzini (2014) stated that designers play a considerable role during designing both with communities and for communities (Manzini, 2014). This is how designers intervene in communities and change their social life (Markussen, 2013). Designing for social innovation is defined as efficient participation for the tangible outcome and successful initiatives to change the present social realities and then allows new ones to be created consciously (Fine, 2017; Papanek, 1972). According to Fine (2017), social design is an approach that includes others and improves their capabilities through solving problems while caring about social changes (Fine, 2017). All variances in daily life and the environment of society refer to these social changes including social beliefs, social values, and rules (Kentsel Strateji, 2015).

In this context, the interdisciplinary, human-centered, social-based, change-aimed features of both the design for behavior change and design for social innovation approaches are enabled to deal with social issues (Chick, 2012; Mulgan et al., 2008; Niedderer, 2013; Niedderer et al., 2016; Papanek, 1972). Many organizations, governments, and medical sectors that seek behavior change and social innovation on certain social issues use design-driven strategies. For example, IDEO and the Shimano designed a bike that aimed to get back to basics to change the cycling usage

habits of Americans who loved to ride a bike when they were children. The aim of this collaborative project between the two organizations was to support them to remember their childhood memories and increase the usage of the bike again like in their childhoods (IDEO, 2008). In health-related issues, providing efficient health education is a strategy used to try to change the health behavior of people (Glanz et al., 2008). For supporting health behavior change, an effective tool is used in health education. This tool is a narrative-based communication strategy that aims at an entertaining education approach (Slater, 2002). Therefore, a designed video was offered as a tool that included narratives and visual components to change the behavior of people about their health (Adam et al., 2019). Furthermore, this video should be designed by inclusive and human-centered approaches because the current behaviors, needs, and attitudes of the people, i.e., end users or participants, must be understood first (Adam et al., 2019; Lockton, 2017). An example of a designed video on changing breastfeeding behavior was created by the Stanford Center for Health Education and several stakeholders in South Africa. The initiative, called 100% Breastfed, was designed to create awareness and increase knowledge about breastfeeding (The Digital Medic, 2018). In this study, both illustrations and footage of interviews were used as a source for the video (Figure 2.11). There is an online video course that has been designed and presented via the Stanford School of Medicine that aims to show that all children deserve to "nurture and love" by teaching "gender identity and the gender spectrum" (Adam, 2017). Another educational video series was designed to improve maternal knowledge because both maternal and baby deaths can be prevented by increasing awareness and changing behaviors (Figure 2.11) (The Digital Medic, 2015). As mentioned in the previous examples, the essence of behavioral change and social innovation is being collaborative and human-centered. On one hand, designing for behavior change approach creates a motivation with emotions, provides ability by showing how easy it is to do, and last but not least, prompts people to take action (Adam et al., 2019; Cash et al., 2020; Fogg, 2009; Lockton, 2017; Niedderer et al., 2016). On the other hand, the designing for social innovation approach deals with complex social issues, improves the awareness of people, and generates new ideas to support behavior change.

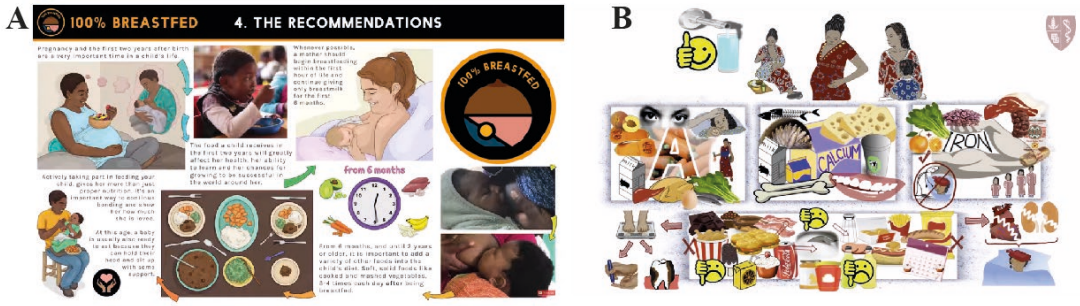


Figure 2.11 : Two campaigns from the social design approach for behavioral change (The Digital Medic, 2015, 2018).

Almost every behavior of people is considered as the consequence of their decisions (Verplanken & Roy, 2015). Therefore, including non-designers who are stakeholders, users, and target groups in the decision-making process and also understanding their needs and opinions can guide the designers and design researchers while changing behaviors (Lockton, 2017). Moreover, the practice-based feature of the social innovation allows variable scenarios to be generated in the different social contexts and proposes multiple definitions (Caulier-Grice, Davies, Patrick, & Norman, 2012). Thus, it generally gathers different disciplines, stakeholders, and actors with one purpose which seeks to enhance the living standard of communities and to increase abilities to react (Mulgan, Tucker, Ali, & Sanders, 2008). Therefore, co-design can be a necessary tool for the practice-based and participatory features of social innovation approaches that are suitable for designing behavior change.

2.5 Co-Design

In recent years, people have been more included in the design process and have wanted to take more initiative to show their expertise. Thus, users are considered as partners for the design process and this approach is defined as participatory design (Andersen et al., 2015). Notions of co-design are seen in the participatory design and defined as collaborative creative activities in which users, stakeholders, and designers work together (Sanders & Stappers, 2008). Also, Kleinsmann and Valkenburg (2008) stated that co-design is a sharing of knowledge process with people who are involved in the design process from various disciplines (Kleinsmann & Valkenburg, 2008). In the co-design mindset, collectivity and pluralist generativity are preferred over singularity (Sanders, 2000). Since co-design is based on the

participants, stakeholders, and users who are both designing and affected by design, it supports social innovation which cares about the active involvement of users and stakeholders with designers (Scrivener et al., 2000). The participation of diverse people in the co-design process creates a design thinking session in a collaborative way because design thinking does not only consider generating products and services in the human-centered framework but also considers the whole process of it by including people comprehensively (Brown & Wyatt, 2010). Design thinking combines a human-centered design approach with innovation actions and meets the needs of people through the designer's reflexes and design methods (Brown, 2008). In that sense, the human feature of design thinking fits with the co-design so design thinking can inspire the co-design approach. Design thinking-inspired co-design sessions can be created with three main phases of design thinking: inspiration, ideation, and implementation (Brown & Wyatt, 2010). Design thinking is a cyclical and iterative process because it returns to the previous phases several times, especially to the inspiration and ideation phases, to refine problems or brief and to make new decisions (Brown, 2008). The inspiration phase is about developing empathy with the people who are designing, understanding the problem, and creating a brief (Brown & Wyatt, 2010). Also, observing and asking what and why questions help design researchers to understand and reframe the problem (Brown, 2008). Surveys and focus groups are the common ways to use in the inspiration phase but are not enough because people's needs can be understood not only by asking them but also by observing them explore what people really need (Brown & Wyatt, 2010; IDEOU, 2020a). After understanding and discovering the need of people and getting inspired by them, the next phase should generate multiple ideas and make an inference to offer a fresh solution for change in the second step, which is the ideation phase (IDEOU, 2020a, 2020b). To gain more ideas, a structured brainstorming activity with multidisciplinary participants is crucial (Brown & Wyatt, 2010). The last phase is implementation which is about making ideas tangible because the ideas generated in the ideation phase should be tested to find out what works and how it can be improved (IDEOU, 2020a, 2020b). Changing intangible ideas to actual models, prototyping, plays a significant role in the implementation phase because testing a prototype shows pros and cons. Thus, prototypes can be refined and iterated (Brown & Wyatt, 2010). The whole process might be seen as linear steps but lacks strict rules that can be applied more than once and are suitable for every specific

case. These phases guide the design researchers both before and while performing co-design sessions. Between these main phases, Design Council, UK describes the design thinking process in four main steps (Figure 2.12): discover, define, develop, and deliver (Design Council, 2020).

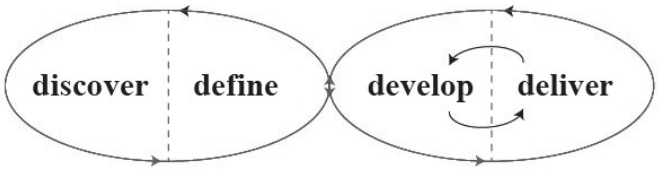


Figure 2.12 : Design Thinking Process. Redrawn from Design Council (Design Council, 2020).

On the other hand, the Stanford Design School identifies the components of design thinking in the five modes: empathize, define, ideate, prototype, and test (Doorley et al., 2018). These design thinking processes also coincide with IDEO's three main design activities, which are inspiration, ideation, and implementation (Figure 2.13) (Brown, 2021).

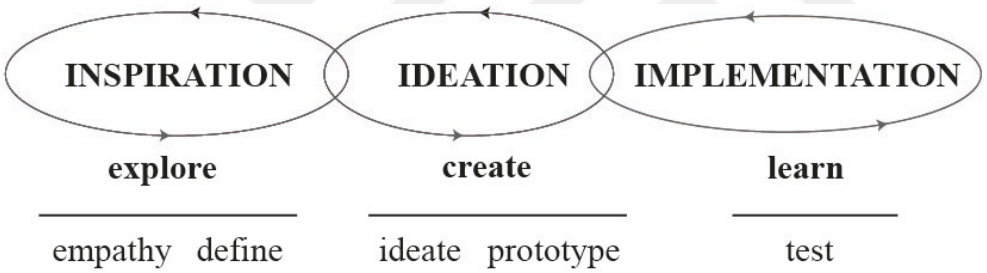


Figure 2.13 : Redrawn design thinking components and activities (Brown, 2021; Doorley et al., 2018).

Generative design thinking tools that contain visual and verbal materials are used in the co-design sessions (Van Mechelen et al., 2019). Brainstorming, empathy mapping, moodboarding, storyboarding, scenarios, role playing, rapid prototyping, think-aloud protocol, and usability testing, are some tools to get participants engaged around the problem for which a solution is sought (Design Kit, 2021; Retegi et al., 2019; Sanders, 2000). Thus, participants can express their opinions and feelings by making artifacts from these toolkits and, usually, workshops are organized to help participants communicate with each other and generate ideas while using these toolkits (Sanders, 2000). These co-design sessions support Manzini's approach of "design, when everybody designs" (Manzini, 2015b). Therefore, to reveal the thoughts of participants in this study and to generate ideas with them, co-design

sessions were organized. Supportive qualification of co-design to social innovation is schematized (Figure 2.14) in the study of Meroni et al. (2013), while the journey of the social innovation was described.

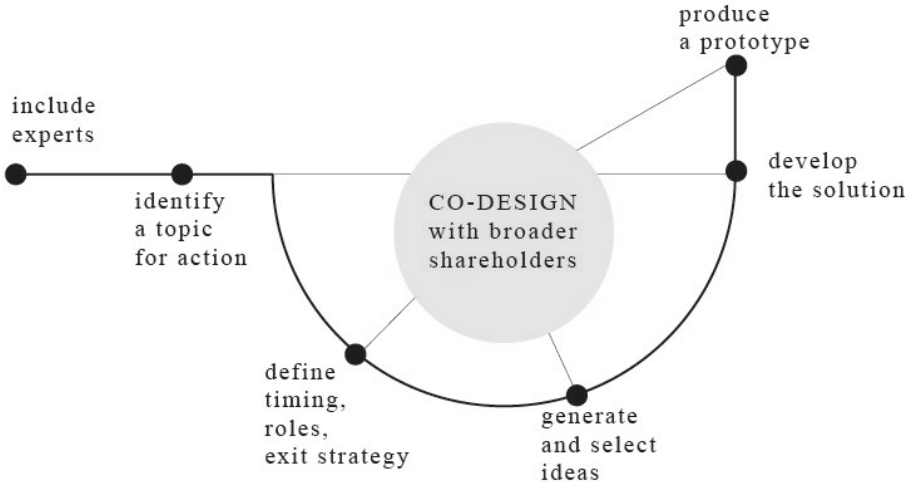


Figure 2.14 : The schema of the co-design-assisted social innovation journey was redrawn from the study of Meroni et al. (2013).

From researchers and educators to organizations and governments, the co-design approach can be seen in almost every collaborative study (Zamenopoulos & Alexiou, 2019). An example co-design sessions can be given from the New Zealand Ministry for Primary Industries. The ministry aims to protect its industries of gardening and agriculture from disease and pernicious invasive insect species. The ministry organized three co-design sessions and members of indigenous Maori people were included into sessions so the ministry expected to acquire community advocacy for behavior change (Sherring, 2021). The sessions were performed with both card sorting and open discussion with small groups to involve the participants in the design thinking process. In this example, the study aimed at both understanding and informing local people by including them in the process. Another example was about designing a social robot with children. An intergenerational design team, KidsTeam, at the University of Washington explored a co-creation and co-inquiry process with intergenerational people. 8 or 10 children and 6 researchers gathered for 90 minutes two times every week of the school year to explore how a social robot should be (Arnold et al., 2016). Each co-design sessions started with eating snacks and playing games due to the adaptation of children and then everyone gathered in a circle on the ground to think about the design question. The last two activities were about prototyping and presenting their robots. The approach of the KidsTeam is one of the

good examples of the designer's evolving role from "designing for them" to "designing with them" (Meroni et al., 2013). Children-collaborated co-design sessions can be challenging but in the co-design approach everyone is creative and a design thinker (Van Mechelen et al., 2019). After teaching participants how to use design thinking methods, collaborative creative sessions start like the study of Van Mechelen et al., (2019). They try to create a scaffold that is about presenting co-design settings in high-ratio children-involved environments such as schools. In these settings, they expect to create an adult-free environment wherein children can work relatively independently. For their co-design sessions, they used design thinking phases such as sensitizing, exploring, and defining the problem, ideation, developing a solution, prototyping, and, lastly, the iteration phase (Van Mechelen et al., 2019). Another example of co-design approach on social issues can be given from Finland with a chatbot that was a machine-system information portal. The study aimed to design a user-friendly and apprehensible information portal for immigrants because searching for information in the official portals can be a troublesome experience. Therefore, the study in Finland performed three co-design sessions with two researchers and five immigrants, three of whom were in the first session and two of whom where in the next sessions (Chen et al., 2020). This example study used empathy probes, brainstorming, prototyping with a generative toolkit, and creating user persona during the generative design thinking process. In the aforementioned examples, a collaborative approach of co-design and how it deals with social problems can be seen (Steen, 2013; Szebeko et al., 2010).

3. METHODOLOGY

This study was designed to examine the effects of designed and underdesigned materials on creating awareness and changing behavior. The experimental study was conducted with a mixed method to create awareness and shape an experience to encourage behavior change through design, with a designed informing material in this case. The mixed method integrates both quantitative and qualitative approaches by collecting and analyzing closed-ended and open-ended data (Creswell & Poth, 2018; Leech & Onwuegbuzie, 2009; Wisdom & Creswell, 2013). The quantitative and qualitative approaches differ from one another in terms of how information is identified and found out. Quantitative approaches consider comparing and generalizing quantifiable findings, while qualitative approaches embrace findings and discover the meaning of them instead of generalizing (Lapan et al., 2012). The quantitative approach has some specific features such as being linear, caring about accurate numerative measurements, and doing statistic evaluation (Creswell & Poth, 2018). However, qualitative approaches consider listening to people who have some certain experiences on the research subject and asking questions about a related research area to get some insight from their emotions and behaviors (Corbin & Strauss, 2014). In general, two perspectives are embraced in qualitative approaches: critical and interpretivist. While the interpretivist perspective considers finding out opinions of participants, in addition to this, the critical perspective also focuses on how people can be empowered to transform their environments, communities, and themselves (Lapan et al., 2012). This study also was needed to test the current knowledge level of participants and compare it with their knowledge level of the end of the study. Therefore, it could be determined whether increasing awareness encourages behavior or not as theories on behavior change literature suggests (Grizzell, 2021; Kim & Hunter, 1993; Prochaska et al., 1998; Zanna & Rempel, 1988).

3.1 The General Structure of Methodology

The literature research was the starting point of the present study to understand the circumstances of phenomena. During this research, the concepts of taboo, awareness, fertility, childbearing, social innovation, and social design, which constituted the base of this study, were researched in books, journal articles, web sources, and previous thesis studies. In addition to this literature research, expert interviews were conducted to gain scientific, technical, and social perspectives and learn recent technologies and innovations (Figure 3.1). It was also aimed to develop empathy on the feelings, attitudes, behaviors, and environment of the target group.

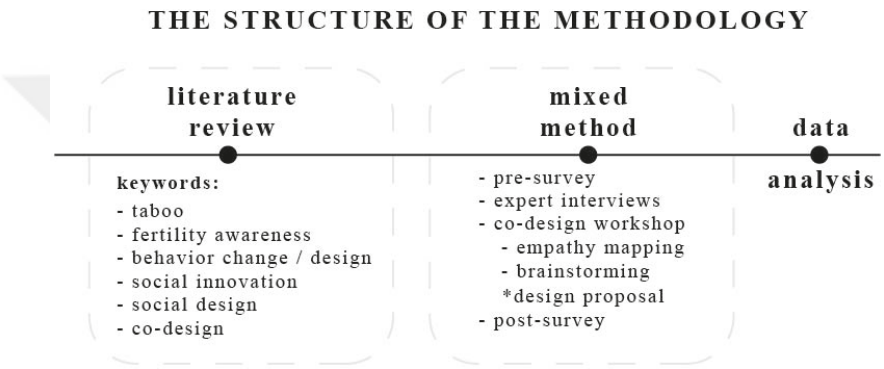


Figure 3.1 : The research methodology of this study. *The designed material was created from the outputs of the co-design sessions.

The literature research helped to prepare the online questionnaire content and understand how to approach such delicate notions. The next steps were online pre-survey, expert interviews, co-design workshop, and online post-survey. An online pre-survey was aimed to specify the demographic information and the knowledge level of people who are undergraduates, graduate students, and academics aged 18-45 at Istanbul Technical University, Turkey. While preparing the content of the online survey, fertility questions were arranged from previously published articles (García et al., 2016; Hammarberg, 2005; Lampic et al., 2006; Mogilevkina et al., 2016; Sørensen et al., 2016; Svanberg et al., 2006; Vassard et al., 2016). The online survey was preferred due to COVID-19 precautions and it was also faster and easier to implement and analyze than a face-to-face survey (Gunn, 2002). The online pre-survey provided quantitative data.

After the online pre-survey, expert interviews were performed with three embryologists and a patient relationship manager. These meetings were important to get initial insights and learn existed assisted reproductive technologies. Then, a co-

design workshop was organized with the people who had different backgrounds and opinions. Some of them were doctor or embryologist, a few who worked in an IVF center, a couple of people willing and unwilling to have a baby, and, last but not least, three designers. The reason for including them in the co-design workshop was to hear different experiences and perspectives. The experiences of experts from the IVF center, and doctors' evaluations of patients who come for fertility problems and other reproduction issues were expected to give some insight before designing a material. The feelings and attitudes of the people who want a baby and those who do not want one yet were considered to be a key step of the workshop.

The whole point of the co-design workshop was banded together with various participants who were relevant to the study and deliberated together. With the insights obtained from the togetherness of the co-design workshop, empathizing and generating ideas were performed by designers. At the end of the workshop, a designed material was planned to be applied in the online post-survey.

In the last step of methodology, an online post-survey was implemented for the participants who shared their e-mail information in the online pre-survey. Participants were split into half; while half of them were informed about fertility issues with the designed material generated in the second workshop, the other half were informed with a brief text. On the other hand, both groups answered the same questions that had already been asked in the pre-survey. Therefore, it could be determined whether the designed material makes a difference in awareness of fertility or not according to their answers.

3.2 Participants

Both women and men were the target group of the study because both groups have their own reproductive potential and it decreases due to various reasons (M. Lee, 2019). Therefore, it would be better to be aware of not only own reproductive system but also each other's systems. The ages of the participants ranged between 18 and 45 years old and they were undergraduates, graduate students, and academic staff at Istanbul Technical University, Turkey. The study focused on those aged 18-45 because they are more likely to delay their childbearing because of their career goals and tend not to have sufficient information about their own reproductive health despite being highly-educated (Chan et al., 2015; Mac Dougall et al., 2013a; Stentz

et al., 2016). The e-mail network of Istanbul Technical University (ITU) was used to reach all undergraduates and graduates as the participants of the pre- and post-survey of the study. Therefore, the study specified its participants and target group based on the purpose of this study. In the beginning of the study, the research was approved by ITU Social and Human Sciences Ethics Committee (project number 149) and an informed consent was taken by all participants of the surveys. While 153 participants joined the pre-survey, 106 of them shared their e-mail addresses to continue to the post-survey voluntarily. They were divided into two groups because the research design was to identify and quantify the awareness levels of two groups, one experimental and one control group. At the beginning of the post-survey, it was planned that the experimental group would receive information about fertility through the designed material, while the control group would receive the same information with an email fact sheet. All of them got an e-mail for the post-survey and then three reminder e-mails were sent over the course of two weeks and 44 participants responded to the post-survey. Since participation in the study was totally on voluntary basis, no one would have to feel any need to explain themselves and no one was questioned about why they did not attend the study.

After profiling the target group and main participants of the study, the next step was gathering new participants who were the experts to be interviewed. It seemed that contacting a clinic that focuses only on reproductive systems was proper. An international medical service provider clinic was found and contacted. It and its members showed interest in the study. Thus, four participants for expert interviews were gathered.

The last step was creating a multidisciplinary group to join voluntarily the co-design workshop from the perspective of social design. It was important to gather people who had different backgrounds and it was imperative to include people who were affected by design. Therefore, in addition to three designers, there were two participants who attended the expert interviews, one of whom was an embryologist and the other of whom was a customer relationship manager, two new members of the clinic who were a gynecologist and an IVF coordinator, a couple who desired to have a baby, an IVF-pregnant woman, and a 25-year-old woman and a man of the same age.

3.3 Surveys

This study planned to perform two connected surveys one by one. While the pre-survey determined the initial knowledge of the participants, the post-survey checked the current knowledge level of them after instructional intervention, which included both designed and underdesigned materials in this study. Different approaches were considered to create these materials. While design material which was a visual-guided informative content was created with findings of co-design sessions, underdesign material which was a text-based informative content was prepared in accordance with previous informative brochures and websites (Cardiff Fertility Studies Research Group & Woods, 2016). The pre-post surveys are used to evaluate the impact of the planned intervention and to analyze how things may change (Davis et al., 2018; Readex Research, 2020).

3.3.1 Pre-survey

After an extensive literature review, this study started with an online pre-survey because it was necessary to determine the knowledge level of participants and their demographic information. Gathering the opinions of participants on an issue and their demographic information in the short term are the key and quantitative characteristics of the survey (Creswell, 2006; Groat & Wang, 2004). Thus, the questions of the online survey were adapted based on previous publications (García et al., 2016; Hammarberg, 2005; Lampic et al., 2006; Mogilevkina et al., 2016; Sørensen et al., 2016; Svanberg et al., 2006; Vassard et al., 2016). For adaptation, the questions were translated into Turkish and customized according to Turkish culture. The online survey was created on Google Forms (Figure 3.2) and delivered to participants via the e-mail network of ITU.

All questions were arranged as compulsory to complete so the participants could not proceed to the next part without having answered all the previous questions. The first four demographic questions were about age, gender, education level and marital status of the participants. The fifth question, which asked whether or not they had a child, was used to divide the participants into two groups based their answer. The participants who already had a child or were going to have a child answered the question about at which age they had had a child or were going to whereas the other participants who had not had a child answered the question about why they do not

want to or why they had postponed childbearing. The question that was identifying reasons behind not considering and delayed childbearing behaviors was selected from previous studies and adopted in the framework of Turkish culture (Hammarberg, 2005; Lampic et al., 2006; Mogilevkina et al., 2016; Svanberg et al., 2006).

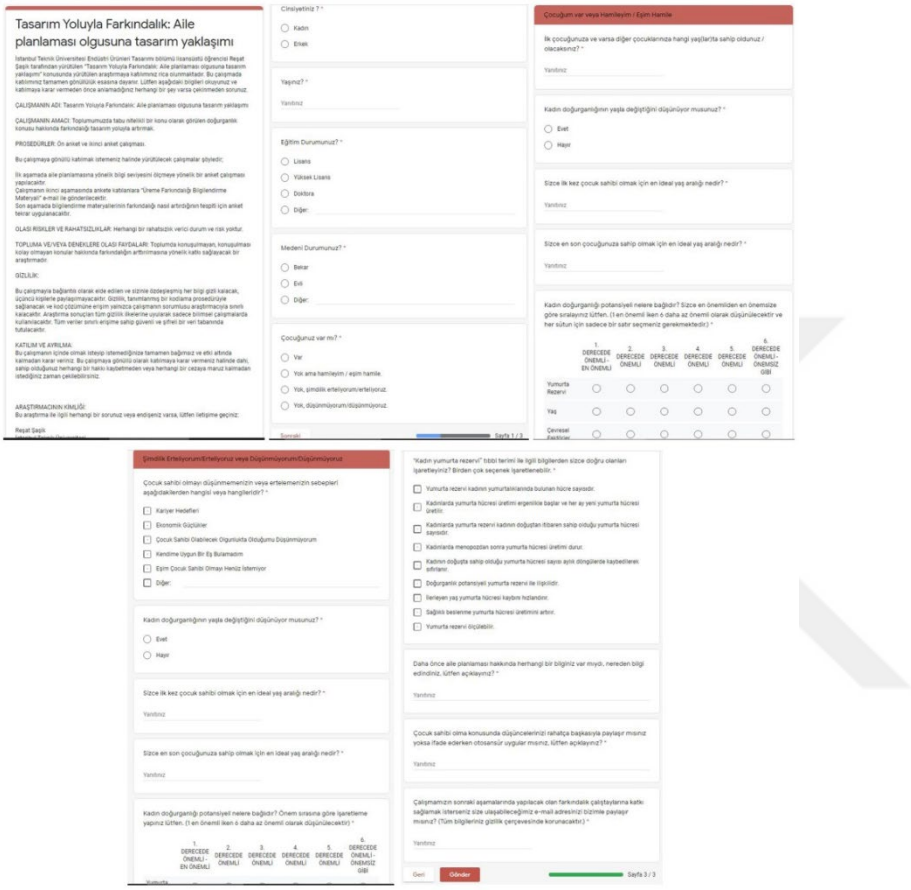


Figure 3.2 : The screenshots from pre-survey via Google Forms.

The following questions for both groups were the same to specify their opinions and knowledge levels. In previous studies, relation of women's fertility and aging was examined in two questions which were asking ages of both slight and marked decreased women's fertility (García et al., 2016; Lampic et al., 2006; Peterson et al., 2012; Sørensen et al., 2016). In the current study, seventh question combined those two age related questions as "does female fertility changes with age?" to prevent confusing between "slight" and "marked" terminology. The eighth and ninth questions of the pre-survey were the same like in many studies (García et al., 2016; Sørensen et al., 2016; Svanberg et al., 2006; Vassard et al., 2016). They were asked the desired ages of first and last children. The last two questions were about measuring knowledge levels of participants and they were used to compare the

changing knowledge level of participants between pre- and post-surveys. One of these questions aimed to rank some key factors of women's fertility. Instead of ranking, some studies asked the importance of some fertility related factors with separate yes-no questions (Daniluk & Koert, 2013, 2015; Lampic et al., 2006). However, this study gathered all key factors of fertility in one ranking question, according to their importance on fertility. Another one measured the participants' knowledge level with true-false questions. In this question, given statements were selected and score calculation of it was adopted from literature (Daniluk & Koert, 2013; Maeda et al., 2015). For score calculation, their answer to each false statement selection was scored as "-1" point and their answer to each true statement was scored as "2" points. At the end of the pre-survey, they were asked to provide their e-mail information if they wanted to attend online post-survey. The pre-survey questions and structure can be found in Appendix A.

3.3.2 Post-survey

The post-survey is a tool for the assessment of the participants' perception, attitude, or behavior change through comparison with the pre-survey (Kanevsky, 2016). Therefore, firstly the participants who shared their e-mail addresses in pre-survey were randomly divided into two groups on Excel using the "RAND" function. By randomizing distribution, it was aimed that the designed material created in the co-design workshop would show more awareness of fertility compared to the underdesigned material. Designed and underdesigned terms represent difference of the approach to the creation of materials (Fischer et al., 2004). The post-survey was created and distributed with Google Forms like the pre-survey (Figure 3.3). However, 106 participants who shared their e-mail in the pre-survey received three reminder e-mails over the course of two weeks; 44 one of them responded to the post-survey. The randomly-assigned control group was informed with an underdesigned material that was a brief text and the experimental group was informed with a designed material at the beginning of the online post-survey. Then, both groups answered the same five questions which they had already been asked in the pre-survey. The voluntary participants were 44 in total, 20 of whom had been exposed to the designed material and 24 of whom had been informed with underdesigned material. The post-survey questions are enclosed in Appendix B and the designed material; the brief text is described in the following sub-sections.

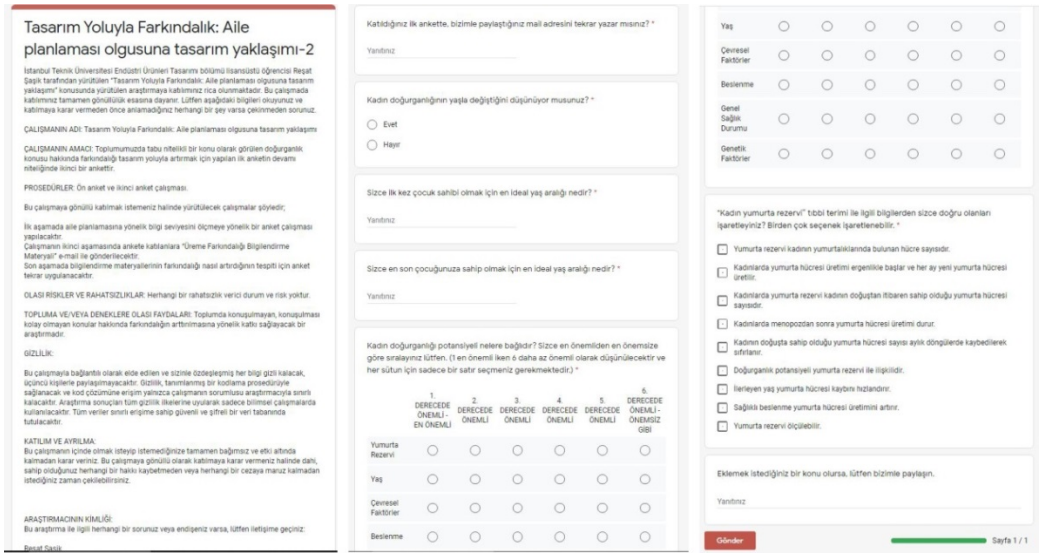


Figure 3.3 : The screenshots from the post-survey via Google Forms.

3.4 Expert Interviews

Literature research provided initial information about the notion of taboo and fertility issues. The expert interviews, which consisted of four online meetings with experts on fertility issues, were one of the important steps of the study. Expert interviews generally help to capture knowledge about related research areas and enable early exploration so these meetings bring new perspectives (IDEO, 2021a; Kumar, 2013). Therefore, three embryologists and a patient relationship manager of an IVF center in Istanbul volunteered to contribute to the study (Figure 3.4).

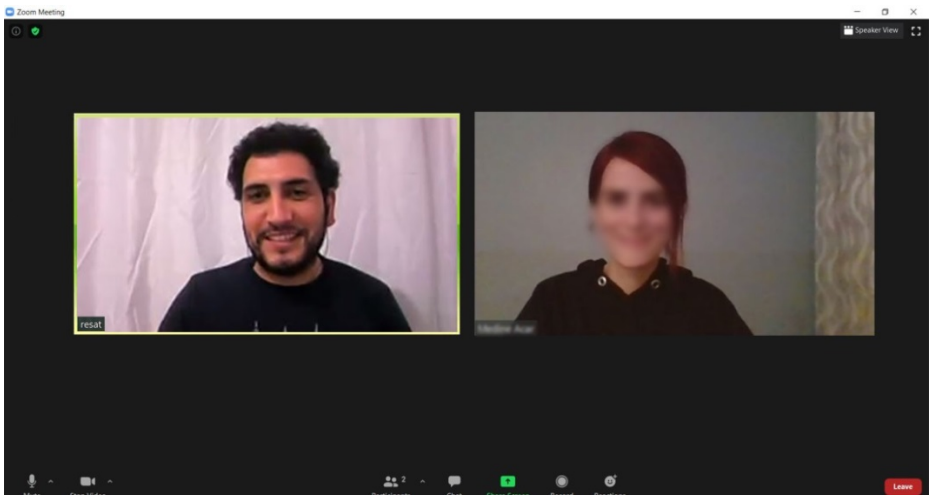


Figure 3.4 : A screenshot from one of expert interviews via Zoom.

Before planning a meeting, all experts were informed about the meeting and how long it would take. All meetings were conducted online because of Coronavirus precautions; these meetings were recorded. It was important to ensure both the

attendance and the safety of the experts. The first expert, an embryologist who is also the operations manager of the IVF laboratories, was invited to an online meeting. Then, two more embryologists and a patient relationship manager were interviewed. All experts received a brief introduction about the framework of the interview after greetings. Every expert answered semi-structured interview questions which were not only gender- and age-related but also aimed both to learn about the journey of the people who called or came to the clinic and to understand the psychological perspectives of people. Due to the semi-structured approach, some related and detailed questions were asked spontaneously during the interview.

- Can you explain your job at the clinic? (This was considered to be both a conversation starter and an opportunity to learn terminological information.)
- Which gender and age groups are the first to contact the IVF clinic?
- How / when do people who come or call your clinic decide to contact a clinic?
- How do they define their situations? Do they refer to their situations as a problem or a disease?
- When do they think that they have a problem or face an unknown issue?
- Do the people who come to the clinic come alone or with someone?
- What do they think and feel about being there?

This information guided the study to set a framework on focusing on a target group and their needs, moods, and attitudes.

3.5 Co-Design Workshop

After the online pre-survey, the co-design workshop was planned and it was executed between online pre- and post-surveys. In the social design and design thinking approaches, co-creation sessions are promoted. Providing multidisciplinary ideas and including the target group in the design process facilitate the construction of productive design sessions (Brown & Wyatt, 2016; Fine, 2017). Since fertility issues are one of the taboo topics, an accurate design suggestion has to be presented in a collaborative manner. Thus, a co-design approach and supporter tools were used in this study. A co-design workshop is an appropriate environment to reveal such co-

creation behaviors. When the co-design workshop was planned, it was considered to include not only the designer but also diverse participants and people who might be affected by the design. Therefore, three designers, an embryologist, a male gynecologist, a couple who were trying to have a baby, a woman who had gotten pregnant with IVF, two participants who were under 25 years old, an IVF coordinator, and a patient relationship manager at a clinic (Figure 3.5) were the participants of the co-design workshop. The co-design workshop was conducted online due to Coronavirus pandemic regulations like the expert interviews. During the workshop, Mural, an online platform that is a digital workspace for visual collaboration was used as a board and every participant attended the digital workspace to edit or create something simultaneously. Thus, both the active attendance of every participant was facilitated and a lack of communication was avoided as much as possible. At the same time, the digital workplace was shared on the screen of the host via screen sharing.

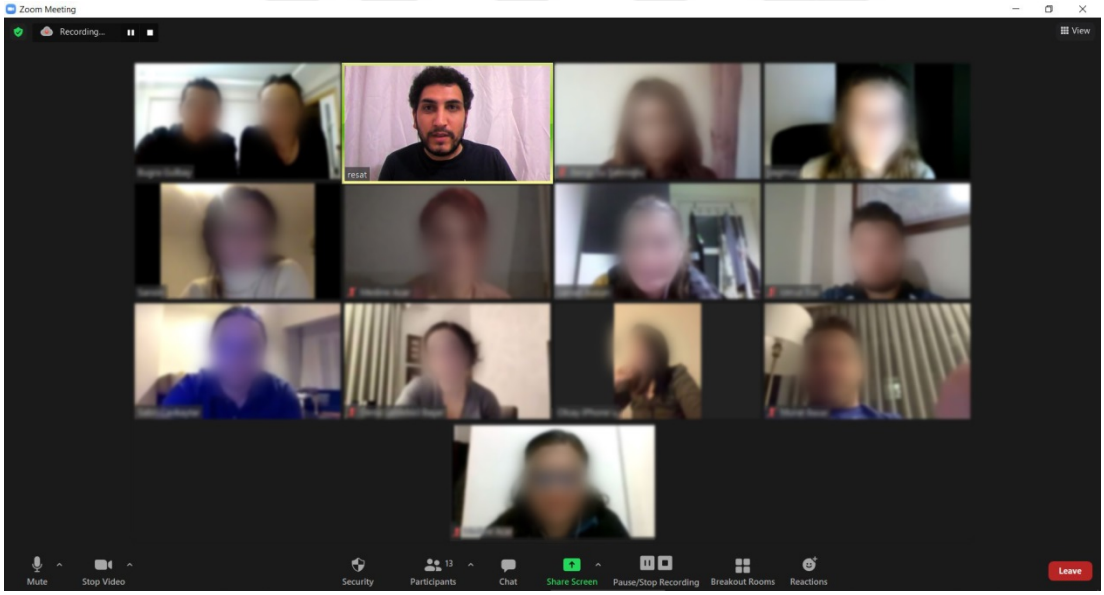


Figure 3.5 : Co-Design Workshop Participants.

The aim of the co-design workshop was to identify the target group in detail with their psychological situation. It also aimed to explore the key variants involved in raising fertility awareness in the targeted group and to understand what motivates and triggers people about fertility from the perspective of the behavior model. To uncover psychological circumstances and key factors for behavioral change, two sessions were conducted in the co-design workshop. Firstly, an empathy mapping session was performed to understand the target group. Afterwards, a brainstorming

session was conducted to generate ideas on key elements of the behavior change model. Although all sessions were performed in Turkish, Turkish written outputs were translated into English.

3.5.1 Empathy mapping

Different backgrounds and different goals in the lives of participants were expected to provide plenty of various ideas and perspectives. To trigger these ideas, a co-design workshop utilized empathy mapping because it described what the participants focused on and how they felt about the content of the study. Empathy mapping starts with an imaginary persona face who has a name. Then, the participants find out what this persona is thinking, seeing, hearing, feeling, and doing by asking what and how questions in 15 minutes (Gray et al., 2010). Therefore, the participants started with empathy mapping to clarify the framework of the persona (Figure 3.6).

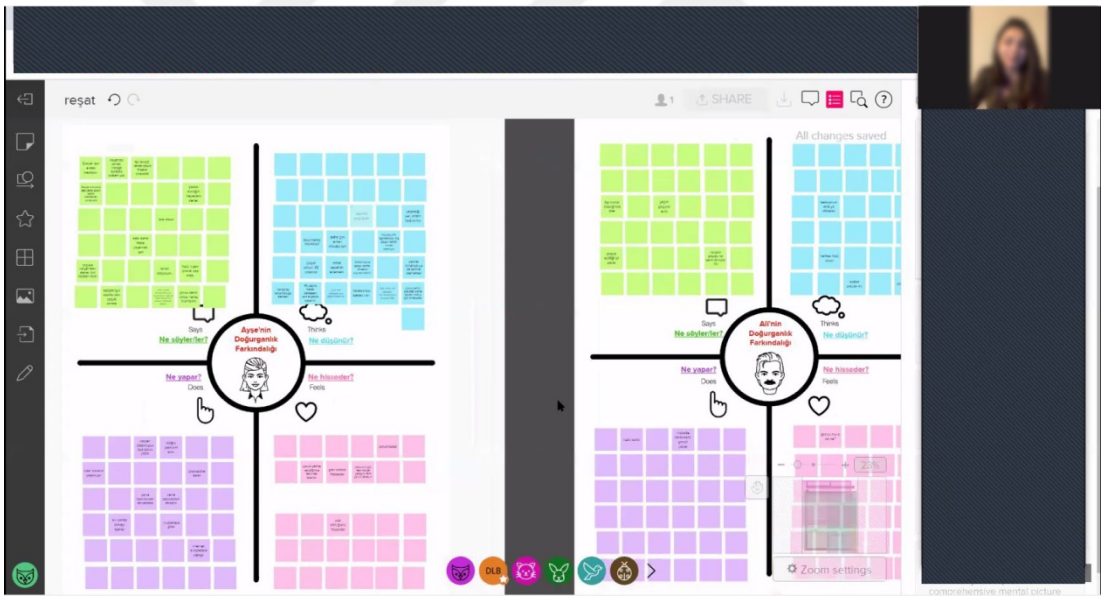


Figure 3.6 : Empathy Map in Co-design Workshop

As there are generally two main characters in fertility issues, one male and one female, the participants described both male and female personas in separate empathy maps. There were two persona templates on the workspace, one for women and one for men, and they filled necessary fields on the templates. Every field was represented with different color boxes; thus, the participants selected related field boxes and filled them with what they think from the perspective of personas. This session took around 30 minutes and during this session, describing the personas'

feeling, doing, hearing, saying, and thinking showed who these personas were and how they felt. A host was assigned to assist the researcher during the empathy mapping session, while helping the participants with the online interface.

3.5.2 Brainstorming

After the empathy mapping session was completed, the co-design workshop continued with a brainstorming session by considering the personas created from empathy maps. Before starting the session, the rules of the brainstorming explained that there was no judgment, hesitation, or "but sentences" here, and participants were encouraged to feel free and be bold (IDEOU, 2021; Kumar, 2013). After explaining the rules, a new digital workplace was provided for all participants. There was a ready-to-fill workplace that contained a triggering question for participants and six main categories around the questions. These six main categories were adapted from the theory of behavior change, according to which fear, threat, barriers, benefits, self-efficacy, and response efficacy are key elements of behavior change (CommGAP, 2010; Montaño & Kasprzyk, 2008). Each key element had its own color circles and the participants could select the relevant circle and write what they thought related to the key element. Thus, the motivation, prompts and the ability factors of FBM were examined in this session. From this perspective, participants answered the main question: "how can changes in the behavior or attitudes of men and women about their knowledge of their fertility potential be ensured?" Then, their answers were categorized according to their context. For example, if an answer was fear-based, it was written below the fear category by the participant (Figure 3.7). Thus, the motivations and the abilities of the target group were categorized through the brainstorming of participants. These outputs of co-design sessions were expected to form a designed material that was a visual information guide for the experiment group.

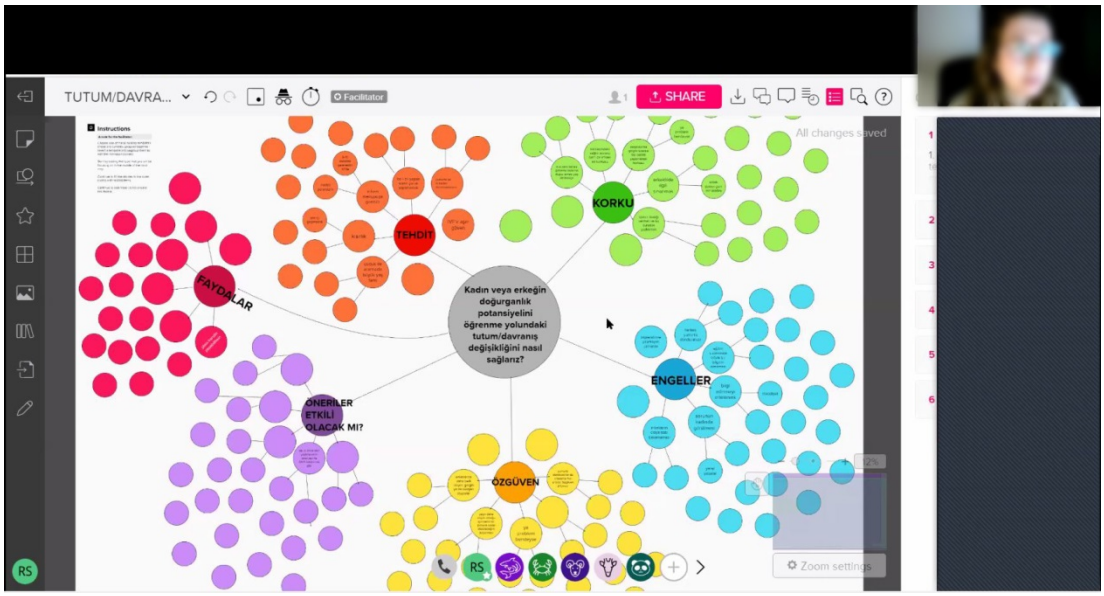


Figure 3.7 : Brainstorming in Co-design Workshop.

When they answered the question, the participants were reminded of the two personas from the empathy mapping because both their own opinions and the two empathy map personas' opinions were considered. Moreover, when some participants could not write on the circles due to any problem, a host helped the participants to fill the circles by writing what they thought about relevant key elements on their behalf.

3.6 Designed and Underdesigned Materials

As a result of the co-design workshop sessions, an analysis of the target group was defined, what they thought and felt, what kind of motivations they had about fertility issues and what their awareness of fertility potential was identified. After co-design sessions, the study was proceeded to the ideation step, in the light of the iteratively experienced design thinking steps (Figure 3.8) (Doorley et al., 2018).

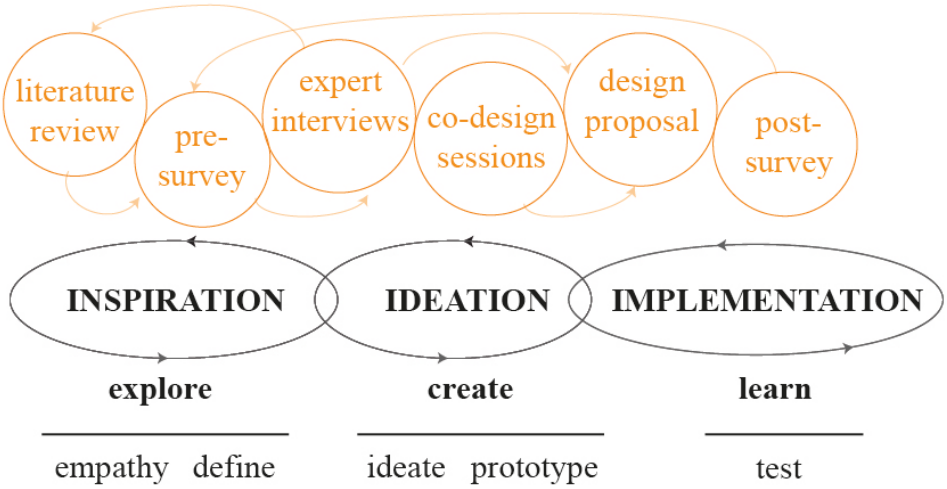


Figure 3.8 : The design thinking process of the study.

A couple online meetings were conducted with three designers, two UX/UI designers, and one industrial designer, all of whom had already been in the co-design sessions (Figure 3.9). In design thinking sessions, appropriate methods were used (Figure 3.10).

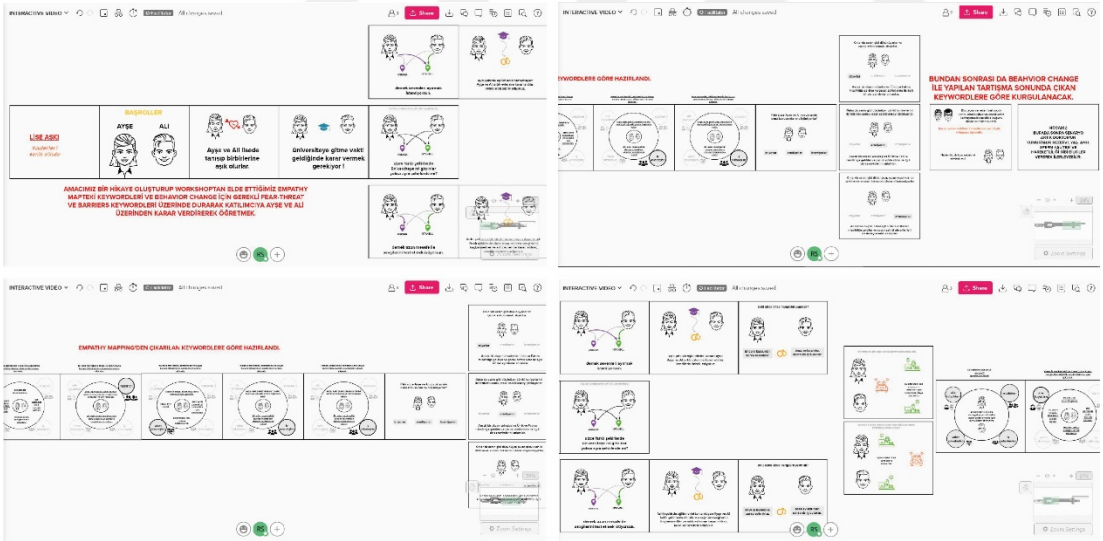


Figure 3.9 : Ideation process with designers.

When the findings of the co-design sessions merged with the behavior change model, designers made some mock-ups and afterwards tested them with users. After obtaining quick feedback by observing user experience, the final visual material was designed. The experimental group in the post-survey was informed with the designed material.

Figure 3.10 : Ideation process for design thinking.

However, the control group had to be informed as well so a brief text was written in Turkish from a fertility studies review (Cardiff Fertility Studies Research Group & Woods, 2016). Both the designed visual material and the underdesigned text contained the same information with different representations. With the structure of the Fogg Behavior Model, the aim of the designed material was to highlight the facts, stay brief, and also be sufficient. It was supposed to address both women and men to reach both of them and to keep them informed of each other. The design team decided to proceed with an interactive representation because interactive ads are more persuasive than the non-interactive ones (MAGNA, 2017). After few mock-ups, the level of the interactivity was decreased so that the motivation of the participants in the post-survey would not be diminished. The tiny hint of interactivity of the representation not only enhanced the participant focus but also kept their motivation up. The interactive visuals were designed with an online video creator platform, Eko Studio (Eko, 2021). The pre-prepared videos were uploaded to this online platform and these videos were edited in accordance with the order of the streaming video (Figure 3.11). The graphical representations were designed to avoid

distraction and to focus attention on highlighted information. Likewise, to contribute to the maintenance of motivation, a high volume sound effect was used because high volume sounds evoke negative emotions (Toprac & Abdel-Meguid, 2010).

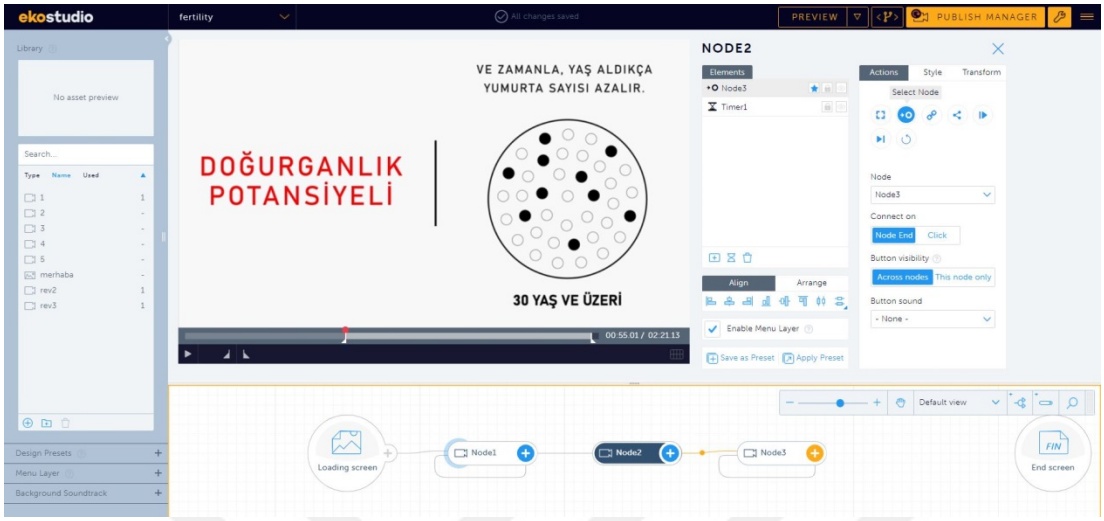


Figure 3.11 : Interactive video creator online platform.

3.7 The Analysis of the Study

The data derived from the literature search, expert interviews, pre-survey, post-surveys, and co-design sessions were analyzed with both quantitative and qualitative measures. First of all, the study gathered insights at almost every step of data collection. As the insights are based on the desires and needs of people, they guided the generated ideas that developed a value for the target group of the study which utilized a social-based design process. Being grounded in the needs and desires of people facilitated the comprehension of people's behaviors which were crucial for this study because it aimed raising awareness. Interpretative and critical approaches were chosen to analyze those insights to achieve qualitative data during the study. Furthermore, for the analysis of the recorded interviews, they were transcribed and some salient keywords emphasized by interviewees were highlighted. Therefore, some insights were gained from the expert interviews. Thus, the understanding of the target group was increased before co-design sessions were organized. In the co-design sessions, data was gathered from Mural. The opinions of every participant were written on Mural by themselves or with the assistance of the researcher. In both co-design sessions, the opinions of the participants could be seen on online stickers on Mural separately. Thus, at the end of the sessions, it was easy to determine which category was most emphasized and easy to transcribe the all written online stickers.

Also, observations of the researcher that were taken during the sessions of co-design were also included to the raw data. All the verbal data was transcribed and gathered with the written data into one text document for further analyses.

The quantitative data acquired from surveys was analyzed with comparative statistical analyses. The use of comparative tables, each answer of the participants can be seen easily, showing the alteration between their decisions. Since the ages of the participants did not fulfill the assumptions of parametric tests, a non-parametric Kruskal-Wallis test was used in the analysis of childbearing-related questions in the pre-survey (Chapter 4.1.2). Also, pairwise comparisons were performed with a Mann-Whitney U test to show childbearing behaviors compared to participants' ages in the pre-survey (Chapter 4.1.2). In order to compare pre- and post-survey findings, a paired t-test was utilized for the true-false question because the study was interested in the difference between the pre- and post-survey results of the same participants. Paired t-tests were performed for the experimental and control groups separately (Chapter 4.5). Wilcoxon matched-pairs signed ranks tests were used for the comparison between pre- and post-surveys in the case of the ranking of some of the key factors of women's fertility (Chapter 4.5). This statistical test is a non-parametric version of a paired t-test and is mostly used for ordinal data such as ranking-type questions. In all statistical analyses, the significant levels were set as $p<0.05$.

Some graphics were drawn with SPSS software and the some of them which were from Google Forms were redrawn. The quantitative data was represented with Pie-Chart and Bar-Graphs in order to show the percentage of the participants in each category and their mean ages, respectively. The main inference was obtained by a comparative approach both between the pre-survey and the post-survey results and between the video-informed and the text-informed participants' results because the study was aimed at exploring possible behavior change differences between the experimental and control groups.

4. RESULTS

This section presents the analysis and the results of the data findings. The data produced from the literature review, expert interviews, and surveys were analyzed and processed for the co-design workshop. The product of the co-design workshop was used as a primary input for the experimental process for this study. The aim of using the pre- and post-surveys was identifying whether there were any differences between the text input data and the designed video input data analysis in terms of raising awareness about fertility. The main goal of the pre-survey was to collect all demographic data of the participants and quantify their knowledge level on fertility issues. Then, the keywords of expert interviews that were emphasized by them were obtained from a transcription. According to highlighted keywords from expert interviews and the behavior change model, co-design sessions were organized and the output of them was collected from the online workplace, Mural. Therefore, a visual material was designed in the co-design sessions and, afterwards, a post-survey was performed to compare the effectiveness of the designed and underdesigned material in raising awareness. Also, the researcher's observation from the co-design sessions was considered while designing the visual material. The data of the post-survey was compared with the pre-survey data so this comparison guided the study to interpret post-survey data. The surveys' findings were analyzed with a Wilcoxon Signed Rank Test and a Paired T-Test to make a comparison between the pre-survey and the post-survey, while the expert interviews and the co-design sessions were analyzed with both interpretative and the critical approaches.

4.1 Findings From the Pre-Survey

4.1.1 Demographic information of the participants

In terms of demographics data, gender, marital status, age, and educational level were presented. Out of a total of 153 participants, 106 were female (69.28%) and 47 were male (30.72%). While the total mean age was 29.75±5.74, the mean age of the females was 29.11±5.48, and 31.17±6.11 was the mean age of the males (Figure 4.1).

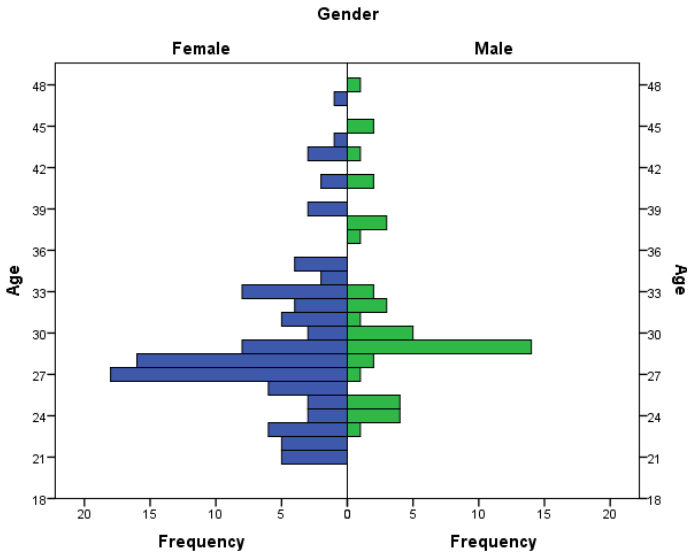


Figure 4.1 : The gender distribution of participants in terms of age.

More than half of the participants, i.e., 55.56% of them, had obtained bachelor's degrees (n=85) and the gender distribution was 55:30 female: male. Participants who had gotten their master's degree (n=57) were placed in the second rank with 37.25% and 44 of them were female. Whereas 9 of them had obtained Ph.D. degrees (5.88%), 2 participants chose the other option (1.3 %) (Figure 4.2).

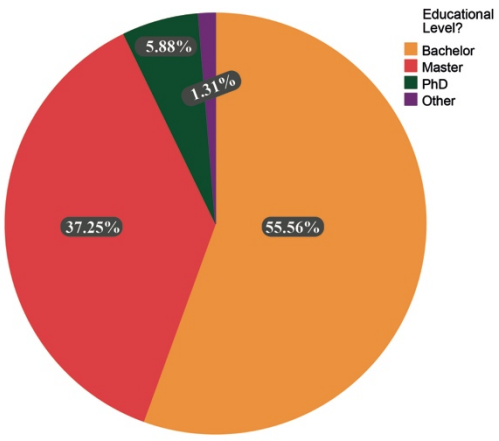


Figure 4.2 : Educational level distribution of participants.

Lastly, marital status was presented. The married participants (32.85±5.97, n=65) were older than single ones (27.44±4.39, n=86). Out of 65 married participants, 42 were female (mean age: 32.05±5.66) while 23 were male with a mean age of 34.30±6.36. Among the single ones, the mean ages of females and males were similar: 27.16±4.50 and 28.17±4.08, respectively (Figure 4.3).

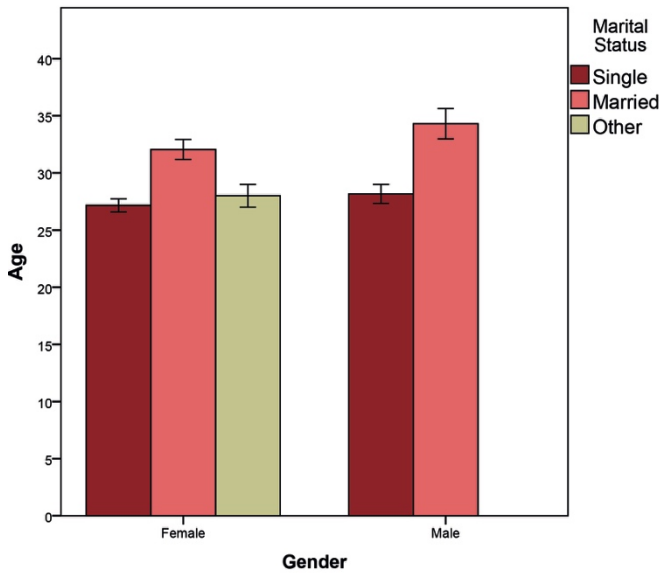


Figure 4.3 : Age distribution of participants based on marital status. Data represented as mean and standard error. The "other" group, shown in brown, represents engaged participants.

4.1.2 Childbearing-related question

After demographic-related questions, the pre-survey examined the fertility knowledge level of participants with the following questions. Participants were divided into two groups based on whether or not they had children. The study was concerned with whether participants who have not had children are aware of fertility issues and whether they have enough knowledge or not. Almost half of the participants, 50.33% (n=77), answered that they were not considering having children and their mean age was 27.75±4.91. The other 29.41% (n=45) delayed having a baby (mean age: 28.89±2.64). The mean age for the rest of them (20.26%) who had had children or were pregnant was 35.94±6.69 (Figure 4.4). The effects of childbearing behavior were statistically significant in terms of participants' ages ($\chi^2(2)=42.42$, $p<0.0005$). Pairwise comparisons indicated that the age of participants who did not consider having children and those who intended to delay childbearing was significantly different ($p=0.03$). Moreover, participants who had had children or were expecting babies were older on average than both those not considering and those delaying childbearing (both $p<0.0005$).

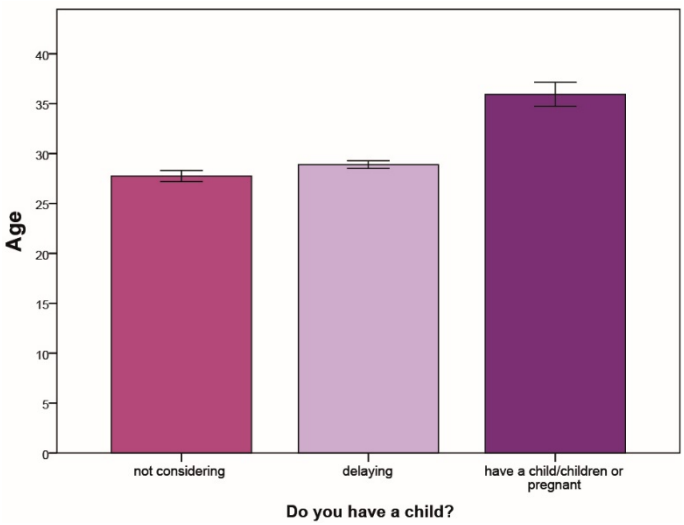


Figure 4.4 : Age-Related Childbearing Behaviors.

While 63 female participants out of 106 were not considering having children and 27 of them were delaying it; 14 male participants out of 47 were not considering and 18 were delaying having children. Lastly, the number of participants who had had children or were pregnant or had a pregnant wife totaled 16 females and 15 males (Figure 4.5).

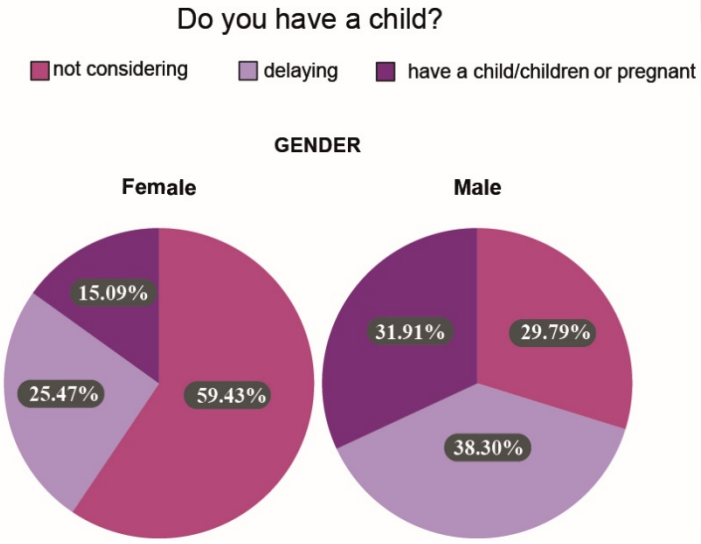


Figure 4.5 : Gender-Related Childbearing Behaviors.

4.1.3 Age-related questions

After the set of questions mentioned above, all participants answered the same questions with one exception. This exception question was related to the age at which those who had had children or were pregnant had had or were going to have their first child; on the other hand, the participants who had not had children were asked why they had delayed childbearing or were not considering having children.

Firstly, the reasons why participants were delaying or not considering having children were found: as for the 77 participants who were not planning to have a baby in the near future, the choices “career plans” and “not feeling responsible enough” were the most common reasons (26.3%). Next, the reasons “inability to find a proper spouse” (21.9%) and “economic issues” (14.6%) were chosen. The rest of the participants not considering having children chose “other” reasons and wrote their opinions about why they were not considering having a baby:

- “Having a baby is huge responsibility.”
- “Because of socio-cultural and educational problems.”
- “…The world we live is not proper for a baby…”
- “Because of global warming and other potential environmental disasters.”

As for the reasons of participants who were postponing having a baby, “career plans” was in the first place (31.7%). Other common reasons included “economic issues” (25%) “not feeling responsible enough” (16.7%), “inability to find proper partner” (8.3%) and “my spouse does not consider it yet” (6.7%). There were also some written reasons on the “other” selection (11.7 %):

- “Because of pandemic issues”
- “We are waiting for a stable marriage.”
- “We are not married yet.”

These answers were from the participants who were postponing or not planning on having a baby in near future.

Although some participants had had children or were expecting a baby, the pre-survey examined whether they were aware of fertility issues or not. This information was important because having a baby is not an indication of awareness of fertility issues per se. Moreover, even if parents are aware of fertility issues, they might overlook them and not act consciously. Therefore, the exception question for the participants who had had children or were expecting a baby was “at which age/s did you have a baby?” because the study compared this response to the of the question “which age/s are the optimum for having a first and last baby?” Most of them had had their first babies at 28 years old and the other frequent ages were between 30 to 35 years old. Only two participants who had had their first children at 28 years old believed that younger ages (around 20s) were optimum ages for having a first child;

the other three of them stated that 27 and 28 were ideal ages for having a first child. The participants who had had their first babies between the ages of 35-43 thought that under 30 is ideal to have first baby with one exception that thought that 35 was the optimum age. On the other hand, most of the participants who had had children or were expecting a child (n=31) considered over 35 to be an ideal age for having a last baby with three exceptions that indicated ages 30-32-33 (Table 4.1).

Table 4.1 : Optimum ages for having a first and last baby according to opinions of participants.

	The Age of Having a First Baby		The Age of Having a Last Baby	
	Female	Male	Female	Male
Minimum Age	22	18	32	30
Mean Age	27.87	27.81	38.72	38.21
Maximum Age	40	35	55	50
Standard Deviation	2.80	3.37	4.27	4.20

After these two group-specific questions, the pre-survey continued with the same questions for both groups. They answered the question “is women’s reproductive potential age-related or not?” Out of a total of 153 participants, 142 of them answered as “yes” while 11 participants answered “no.” While 7 of the latter were male (mean age: 33.7), 4 of them were female (mean age: 26.3). In the following two questions, all participants answered the question “which age/s are the optimum for having a first and last baby?”. While the mean age of female participants’ answers was 27.87 (the first one) and 38.72 (the last one), the mean age of men’s answers was 27.81 (the first one) and 38.21 (the last one).

4.1.4 Fertility-related questions

In the next two questions, the study examined all participants’ levels of knowledge of women’s fertility. One question was about ranking some key elements of women’s fertility including age, ovarian reserve, genetic factors, diet, environmental factors, and general state of health according to a system by which “1” represented the most important and “6” the least important. 68 participants thought that “ovarian reserve” was the most important, while only 8 participants ranked “age” as the most important. Also, while “environmental factors” found itself at the bottom of the

ranking with 61 participants, it was selected as the most important factor by 20 participants. The ranking of "general state of health" was generally in the middle (Table 4.2). The mean ranking of all factors are presented in Figure 4.6 in terms of females' and males' rankings. The general tendency of the participants was ranking "age," "ovarian reserve," "genetic factors," and "general state of health" at almost the same level of importance (around 2.5-3.5) and this ranking was not considered to be the most important.

Table 4.2 : Ranking level table of Female (F) and Male (M) participants on some key elements of women's fertility. The numbers indicate how many participants selected the relevant key elements in that ranking level.

Rank	Age		Ovarian Reserve		Genetic Factors		Diet		Environmental Factors		General State of Health	
	F	M	F	M	F	M	F	M	F	M	F	M
1st	8	0	44	24	18	7	3	3	16	4	17	9
2nd	25	16	17	4	28	10	14	3	3	4	19	10
3rd	29	12	14	5	14	5	16	10	7	5	26	10
4th	25	11	7	2	21	12	19	8	12	4	22	10
5th	18	6	5	4	17	5	32	15	27	10	13	7
6th	7	2	19	8	8	8	22	8	41	20	9	1

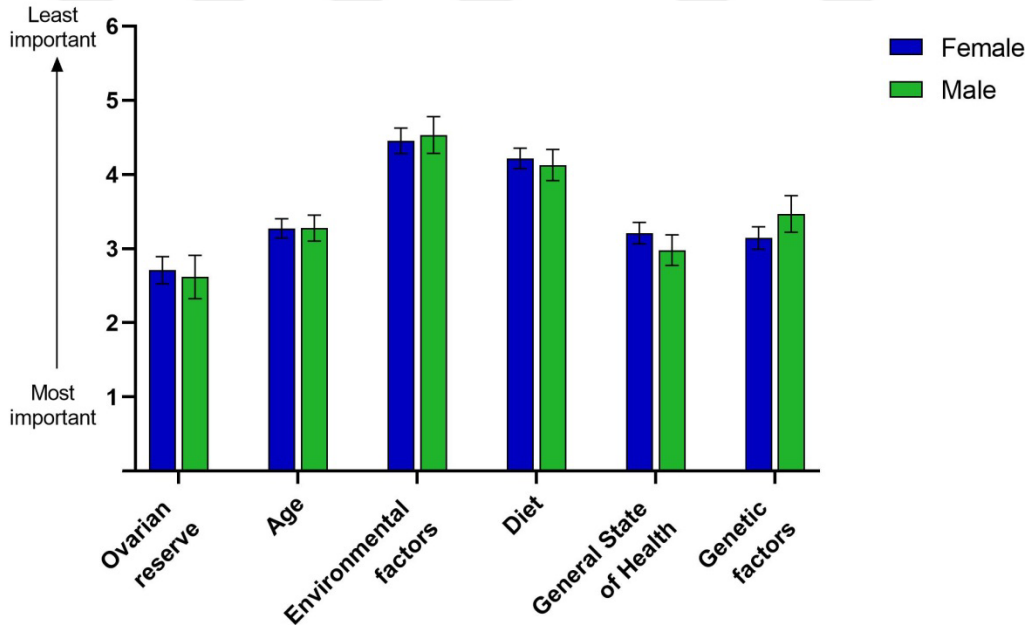


Figure 4.6 : The mean ranking of key factors of women's fertility.

The second question about testing women's fertility knowledge was a true-false exercise with four true and five false statements. Participants were given a list of statements containing true and false information and asked to identify which ones were true. While all four true statements were selected accurately with 48.75%, 46%,

64.15%, 56.9% accuracy ratios individually, only 21 participants selected all four true statements accurately. Thus, the ratio of the participants who selected all true statements was 13.73%. Although all four true statements were selected by these 21 participants, they also wrongly selected at least 1 false statement except one participant. Thus, only one participant accurately selected only all true answers. The participants (n=25/16.34%) who did not select any false statements selected at least one true statement.

To summarize the findings of the true-false related question, while the selection of false statements was scored as "-1" point each, the selection of true statements was scored as "2" points each. Therefore, total score of each participant was calculated according to their true and false selections. The maximum possible score was 8 while the minimum possible score was -5. This calculation quantifies the highest, lowest, and mean scores of both the male and female participants (Figure 4.7). The scores of the participants show that most of them were considered to lack sufficient knowledge about women's fertility.

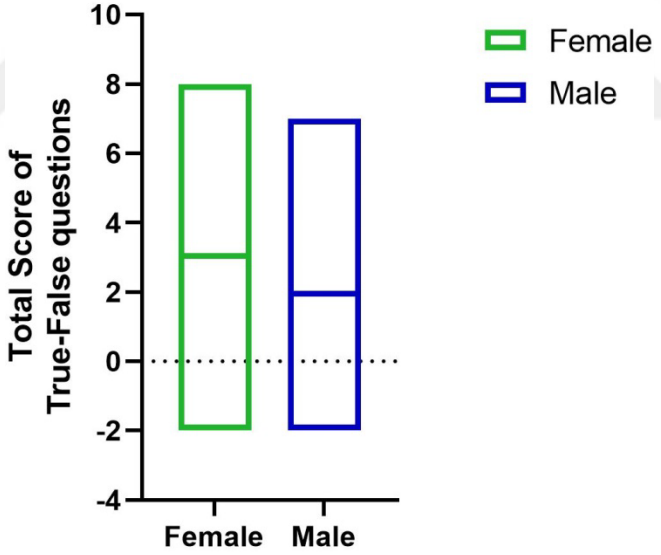


Figure 4.7 : The mean score of the participants on true-false questions.

The last three questions were kept open-ended to understand participants' intentions. The first one asked whether they were informed or not about fertility issues. While 83 participants mentioned that they had knowledge about women's fertility, the remaining 70 participants stated that they did not have any information about women's fertility. Some of participants expressed the reasons why they lacked sufficient knowledge about women's fertility:

- "…Unfortunately, I think that the necessary information is not given because these issues are still taboo in Turkey."
- "I do not have any information and also I do not know how I can get exact information."
- "I do not have much enough information; I have only hearsay."

The next question asked whether they were willing to share their opinions about fertility issues or not. The majority of the participants (n=102) answered "I cannot share my opinions without self-censorship." While the other 23 participants stated that they could share opinions freely, the remaining 28 participants were not sure about it:

- "I want to share but I cannot not because I am the only woman member on the board of management so I cannot say that I am thinking of pregnancy."
- "I am 35 years old and a divorced woman so I am worried about not being able to have a baby. Thinking of it makes me upset. Thus, I do not want to talk about it freely."

The last question of pre-survey asked whether participants would volunteer to participate in the post-survey or not. If they were willing to be a part of the continued survey, they shared their e-mail addresses. After pre-survey, 106 participants agreed to participate to the post-survey.

4.2 Findings of Expert Interviews

Initial qualitative findings were gained from expert interviews, which played an important role at the beginning of the study as they provided insights and understanding of the phenomena of fertility issues. In order to find unfiltered facts and discover the current status of the issue, the leading IVF center in Turkey, having the highest patient capacity was contacted. Specifically, three embryologists and a patient relationship manager were consulted. Therefore, they answered some semi-structured interview questions to understand psychologic perspectives and both the gender- and age-related behaviors of the people who come to the clinic. Some salient parts of the experts' answers are given below and some prominent quotations of them are shown in Figure 4.8.

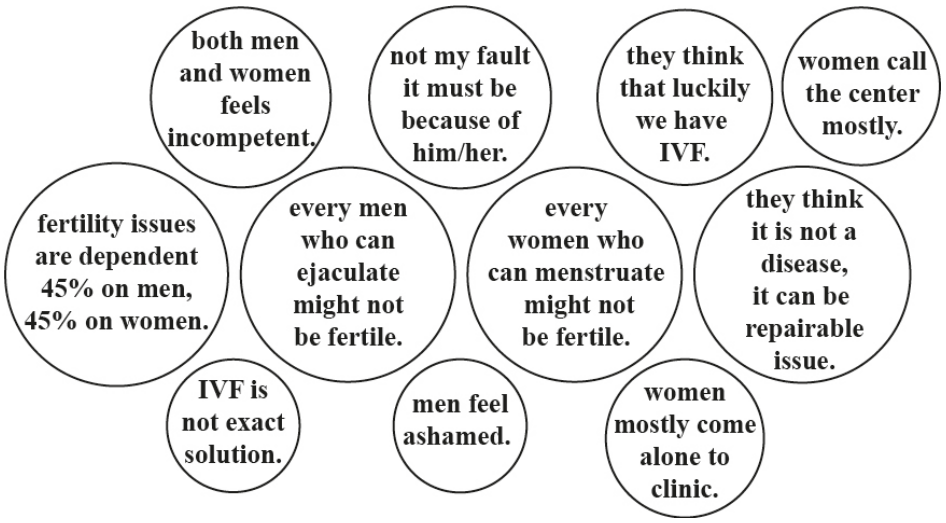


Figure 4.8 : Some prominent quotations of experts.

Which gender and age groups are the first to contact the IVF clinic?

- Generally, women are the first to make contact, because the common false belief is infertility is mostly the problem of women.
- Women who know about fertility potential consult to the clinics under 30s.
- Men do not directly consult alone or decide to see a doctor by themselves; they usually accompanied by their spouses to support them, not thinking of their infertility potential.
- Either the parents of the young women who have certain reproductive health disorders and who have cancer or informed women (aged 35-40) who receive a referral from a gynecologist, contact the center for “egg freezing” (oocyte cryopreservation).

How / when do people who come or call your clinic decide to contact a clinic?

- Mostly women patients visit our clinics with a referral from family, friends or experts such as their gynecologists.
- If they think that they have a problem, after trying to conceive for a while, they contact the centers or doctors without expert consultancy.

How do they define their situations: do they call it a disease or a problem?

- The people think that it is a repairable issue rather than a disease of reproductive health.

- Generally, men think or hope that they are healthy in terms of their reproductive systems and that if there is a "problem," it must be because of the women, not themselves.
- Most of them assume that IVF is a treatment or a certain answer to their desire to have baby, but IVF is not a solution for every case. It is a process for helping fertilization outside of human body with a %22 success rate for giving live births.

When do they think that there is a problem or unknown issue about themselves?

- They do not realize that until they try to have a baby and when they believe that they cannot have one.
- Usually, after 6 months to 1 year of trials they consult to an expert.

Do the people who come to the clinic come alone or with someone?

- Although mostly women come to the center without their partners but it is required both need to be tested for reproductive potentials.
- Women are accompanied by an elder family member/s, close friends or with their spouses.

What do they think and feel about being there?

- Every woman who menstruates regularly and every man who can ejaculate thinks that they are fertile but this is not necessarily the case.
- Most men who come to the center assume that they are fertile and that the reason for the problem is women's infertility. However, the fact is that fertility issues are 45% dependent on men, 45% on women, and the other 10% is unknown.
- Both women and men feel incompetent due to infertility.
- Most people believe that the problem arises due to their spouses.
- Men who have reproductive problems feel ashamed because of the common perception of the society.

These quotations from experts provided important insights for the study, it was necessary to gain immersive information before organizing the co-design workshop.

Therefore, the blurred and delicate phenomena of fertility issues and the moods and behaviors of shareholders were understood through expert interviews. Having obtained this knowledge, the next step was to organize a co-design workshop.

4.3 Findings of the Co-Design Workshop

In this co-design workshop, two sessions, empathy mapping and brainstorming, were organized. Firstly, an empathy map session was performed on Mural, a digital workplace, aiming to create a connection between all participants in the target group and their surrounding social environment. Also, this session kept every participant at the same feeling and thinking level and they understood the point of views of these personas. Moreover, the empathy mapping showed the attitudes and intentions of the target group, which represent two of the major factors of behavior change theory and also refer to the ability element of FBM (CommGAP, 2010; Fogg, 2009; Montaño & Kasprzyk, 2008). Therefore, embracing the attitudes and intentions of the target group shed light on fertility phenomena for every participant whether experts or unaware stakeholders. To achieve this, two ready-to-fill personas were shared on Mural and everyone could write what they thought in the related digital sticky notes. An overall view of these two personas and the opinions of the participants can be seen in the following sections.

4.3.1 Findings of the empathy mapping session

Empathy mapping was started with the persona who was named Ayşe who represented the women. The session findings defined Ayşe as follows, according to the participants. Ayşe thinks that it is too early to have a baby and she cannot take this responsibility. She also has hesitation about her daily routine and the opportunity to travel freely in the event of having a baby. She will wait until her 40s because she both imitates the career of her boss and relies on IVF treatment. She generally has a tendency to delay having a baby. Besides, she does not feel mature enough to take such a responsibility. She also wants a baby at age 35 but she might feel late to have a baby. Ayşe's persona also receives a lot of advice and shown many examples from family and friends. For instance, she hears that having baby is good both for marriage and career by parents and in-laws, who want grandchildren. On the other hand, she says that she lacks adequate financial resources for a baby. She thinks

medical treatments are improving so she is focusing on relationship with her spouse. In the last part of the Ayşe's persona, she goes to the hospital for routine medical controls. However, she is affected by her family and friends. She might not want to have a baby so she might avoid interrupting her career at the best moments. (Figure 4.9).

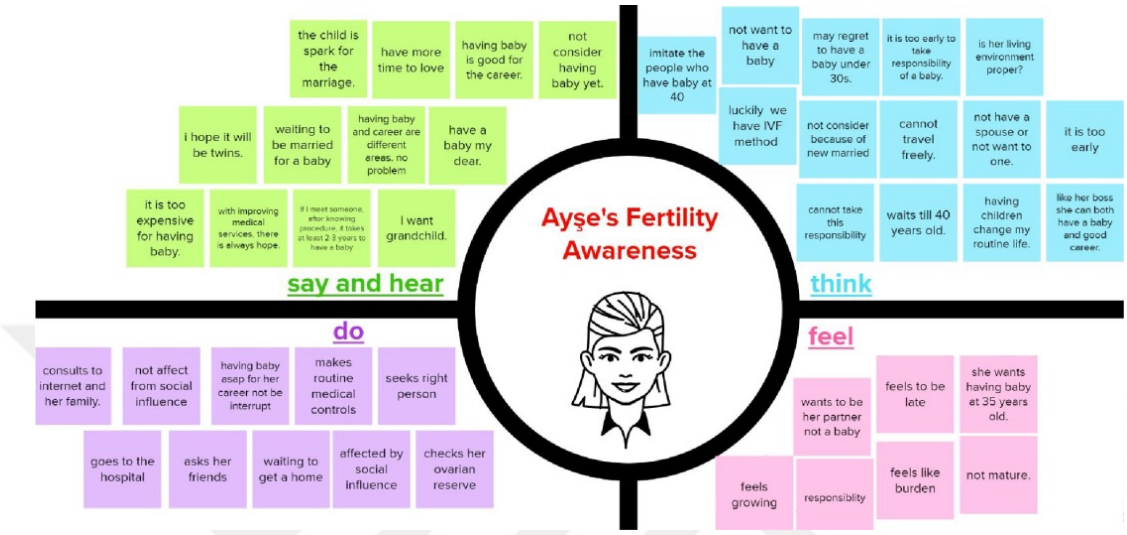


Figure 4.9 : The empathy Map of Ayşe who represents the target women group. This empathy map view was taken from the first session of the Co-Design workshop, translated into English.

Empathy mapping was continued with the persona named Ali who represented the target male group. The participants defined Ali from four perspectives which were what he thinks, feels, hears or says, and does about the context of his reproductive health. Firstly, Ali feels naive about fertility and he is also not even aware of it compared to Ayşe. He thinks that there is social dominance on him about having a baby. However, he wonders what if he cannot have a baby when he tries to have one. In the "says or hears" area, he hears that most friends have children; he is asked why he is delaying and is told that having a child is good for marriage. On the other hand, he says that it is up to his spouse to decide the right time to start a family. In the last area of the Ali persona, he might want to have a baby through social influence and before that, he might go to routine medical control (Figure 4.10).

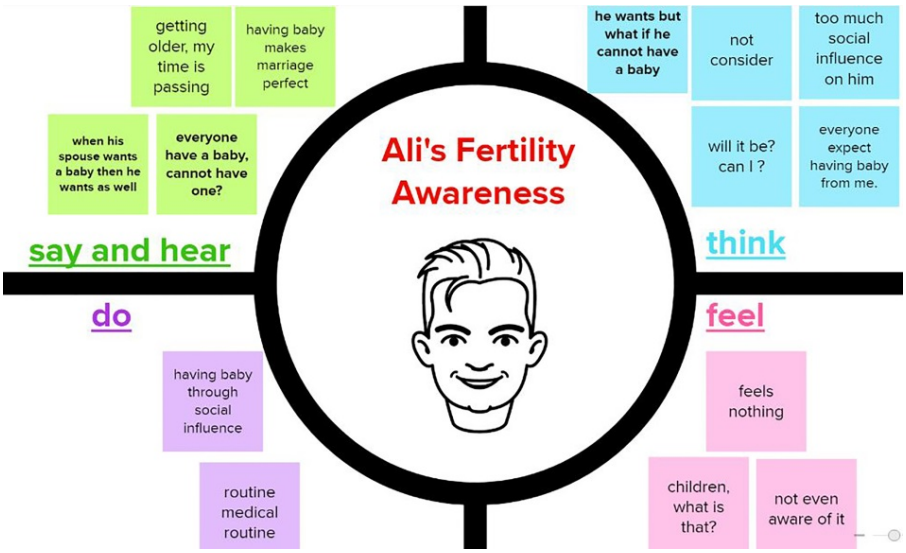


Figure 4.10 : The empathy Map of Ali who represents the men of the target group. This empathy map view was taken from the first session of the Co-Design workshop but Turkish written outputs were translated into English.

In the first 15 minutes, Ayşe's Empathy Map was developed and every participant was eager to write their opinion about her persona. However, in the following 15 minutes, the participants started to fill out the digital sticky notes for Ali's Empathy Map but not as much as they had for Ayşe's. This showed the participants' points of the view on fertility awareness in terms of gender. Nevertheless, these two empathy maps presented important data for the study. After the Empathy Map session, which lasted about 30 minutes, the co-design workshop continued with a brainstorming session.

4.3.2 Findings of the brainstorming session

The second session of the co-design workshop was brainstorming. A ready-to-fill template was presented on Mural with a question in the middle and some key factors around it. All participants could write their opinions on the sticky notes that had different colors and implied the belonging category (Figure 4.11). Since the study was interested in the motivation, ability, and prompt factors of Fogg's behavior model, the brainstorming session intended to guide the participants to generate many ideas for behavior change theory.

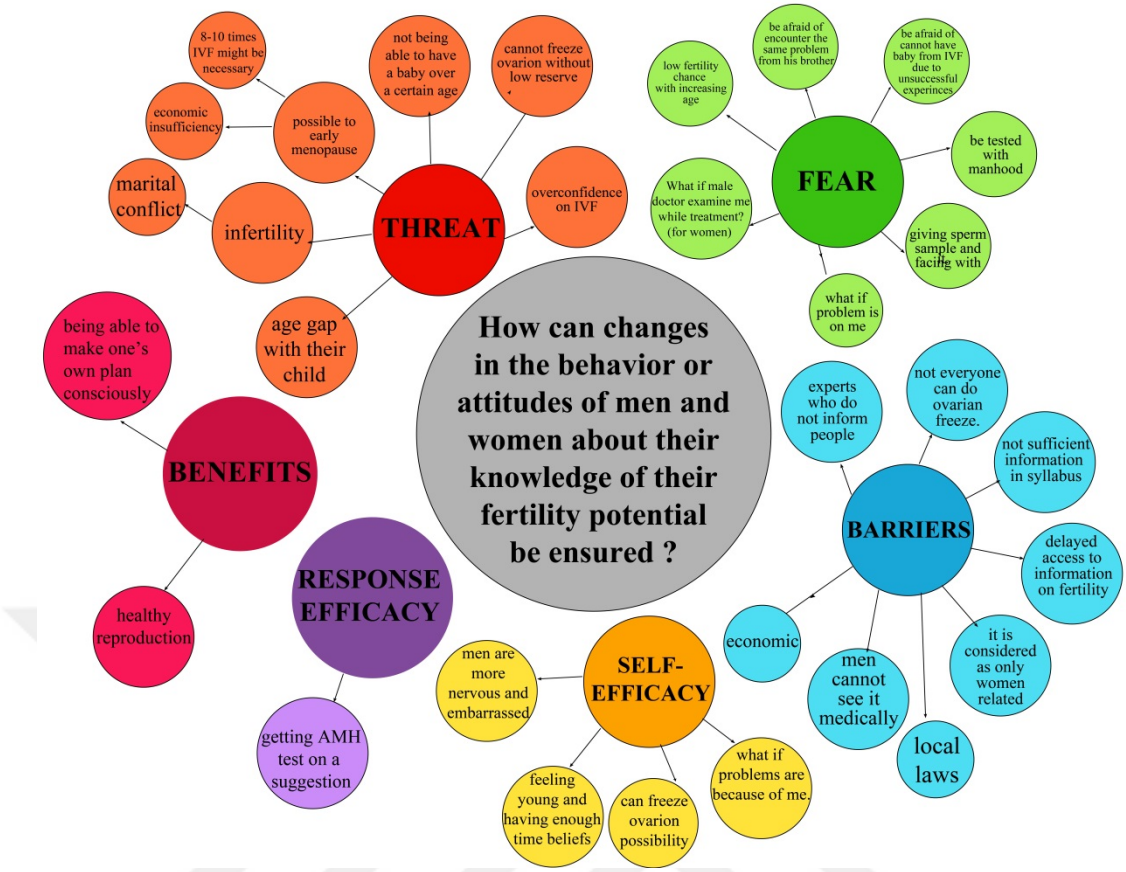


Figure 4.11 : Digital workspace screenshot of the brainstorming session of the Co-Design workshop.

The majority of generated ideas emphasized three factors: fear, threats, and barriers. The barriers and threat-related opinions contributed to the fear factor indirectly because the possible consequences of the barriers and threat issues triggered the negative emotions of the participants. In general, the participants thought that men are more nervous than women when reproductive health issues are mentioned. According to the written sticky notes of participants, the main reason of this attitude is that men cannot consider the reproductive health issues medically because they see it as an inability of their manhood, questioning of their self-efficacy. This particular attitude causes fear. This fear causes ignorance of the reproductive health issues. The other important opinion was related to not having sufficient information about fertility issues. The participants agreed that medical experts do not inform people in detail. Also, they thought that in the syllabus of any education level, the reproductive system is not covered adequately. They usually learn about their reproductive system only when they have a problem about it. In addition to insufficient knowledge, misinformation also causes a problem because people believe wrong or deficient information through non-expert websites, social media, and families. For example,

people rely excessively on IVF treatment but it is not always an exact solution to fertility problems. Furthermore, IVF might fail several times and even if it works, the body might not accept this treatment. Being an expensive treatment and attempting it may cause economic problems or the stressful situation can affect marriages negatively.

On the other hand, there were only two possible positive motivations, which are the feeling of freedom in making one's own plan consciously and attaining a healthy reproduction. Apart from these two positive approaches, the session was dominated with negative emotions according to the rest of these sticky notes which were written by people's opinions about how awareness can be created and how behavioral change toward fertility potential can be encouraged. Fear comes from unknown fertility facts, misinformation about fertility, increased age, and overreliance on one's own body and improving medical treatments.

4.3.3 Findings of researcher's observation during the co-design workshop

At the beginning of the first co-design session, all the participants introduced themselves and all of them, especially non-experts, were encouraged to share their opinions. This encouragement succeeded because it was observed that non-experts advocated their beliefs against the opinions of experts. For example, a fragment of a dialogue between a gynecologist and a female participant who was under 25 years old is shown below:

- The gynecologist: Ayşe, a persona who represents women in the empathy mapping, needs to try to have a baby as soon as possible.
- Female Participant 1: I think that Ayşe needs time; it is too early to have baby and she does not feel responsible enough.
- The gynecologist: There is no time. She might become unable to have a baby as she ages.
- Female Participant 1: She is not married and even if she is, she wants to delay her childbearing.
- The gynecologist: If she insists on delaying childbearing, she needs to know her fertility potential as soon as possible.
- Female Participant 1: What is fertility potential and how can she find it out?

This type of conversation was observed during the co-design workshop wherein both experts and non-experts had the opportunity to understand both each other's and Ayşe and Ali's needs and wants. In addition to empathy mapping, more realization occurred in the brainstorming session. When everyone filled the related sticky notes and talked about the key factors of behavior change theory, non-experts participants observed having shocking facial expressions as a result of exposing to previously unknown facts and a fear-intense environment occurred. A significant part of a conversation between a male embryologist, a male gynecologist, and a female participant who had an IVF treatment is given below.

- The embryologist: Excessive reliance on IVF treatment and its success is one of the most commonly-seen false beliefs among people. However, many people try it several times and sometimes they fail.
- Female Participant 2: Exactly, I married at the age of 40 and I am a 43-year-old pregnant woman. I am in the 27th month of my pregnancy. I wish that I had tried to get pregnant earlier because I thought that I would get pregnant in 3 months with IVF treatment but it took 3 years. I suggest younger attenders to check their fertility potential and make decisions according to it.
- The gynecologist: On the other hand, the live childbirth ratio is low. Getting pregnant does not mean that you may give live births at advanced ages.

This part of the whole dialogue affected the all group. The couple who were trying to have a baby, three female designers, and two participants under 25 years old seemed to be scared by what they had heard and learned. The mood of the young participants turned negative, being depressive and scared.

After co-design workshop, two participants, a female participant and a male participant contacted the researcher to share their opinion about the study.

- Female Participant 3: "Although I have never considered having a baby, I will check my fertility potential because it is better to know my situation rather than ignoring it."
- Male Participant 1: "We want to have a baby and we have been trying for a while, however, after this meeting, we think that we will check our fertility potential or consult an expert before losing more time."

4.3.4 Design and underdesigned materials as output of co-design workshop

Considering both the literature and findings of the expert interviews and co-design workshop, a few design thinking meetings were conducted with three designers. Since the study was both grounded in Fogg's Behavior Model and used Lockton's three categories of behavior change as a supporting approach from a design perspective, designing an interactive visual material was decided. For this consideration, a few mock-ups which contained interactivity were prepared and tested by several users (Figure 4.12).

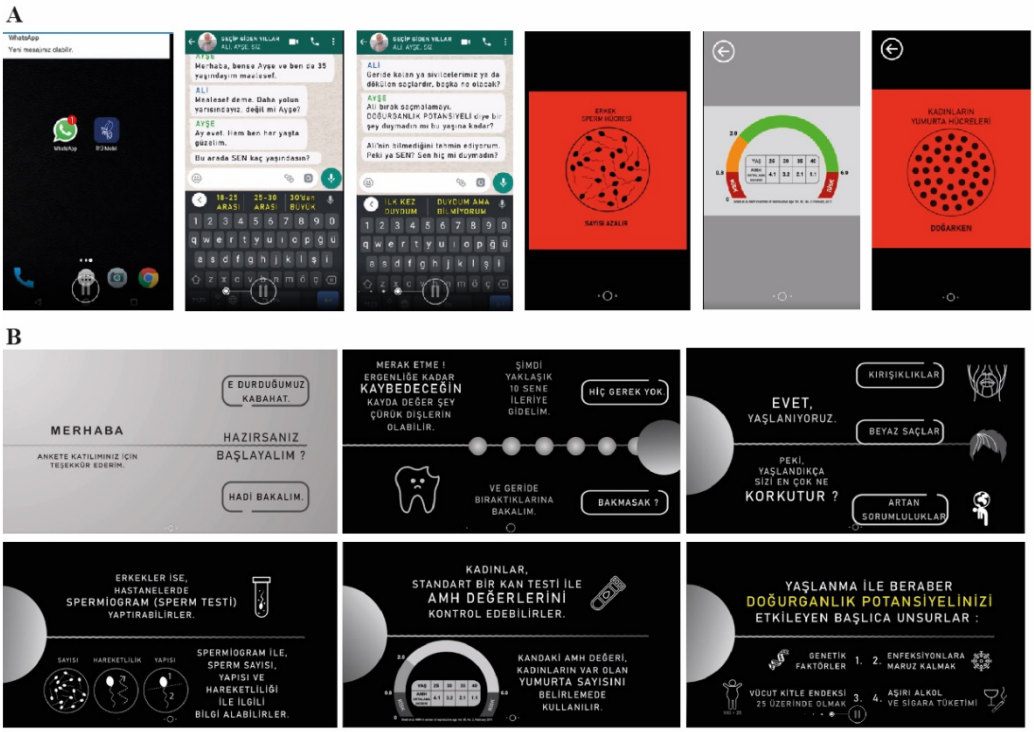


Figure 4.12 : Mock-ups for designed material.

In light of both the feedback of users, which suggested reducing the excessive interactivity usage, having a more refined interface, and adding more stressful sounds and the observation of user experiences, the final version of visual material was designed (Figure 4.13). In the designed visual material, fear was used as a motivation, aging as a prompt, and, finally, showing how easy it is to learn about fertility potential as an ability factor of behavior change. Based on these basic motivations, a brief and informative video was designed. The main theme was "are you aware?". It aimed to increase the comprehension of the subject by the viewers. Some interactive elements were also incorporated into this two-and-a-half-minute video. This visual material was designed to inform the experimental group in the

post-survey. They watched the designed video first and afterwards were directed to the post-survey.

Figure 4.13 : The screenshots of the designed video content. (https://video.eko.com/v/zD6oZ6?autoplay=true)

On the other hand, the control group has received the previously prepared underdesigned, brief text. The text was gathered using Cardiff University's brochure on fertility awareness. This text-based material was considered as underdesigned informative material (Figure 4.14). The control group read this text first and then proceeded to the post-survey.

DOĞURGANLIK FARKINDALIĞI BİLGİLENDİRME METNİ

Son 30 yılda, dünyanın, özellikle gelişmiş bölgelerinde yaşayan kadınlar, önceki yıllara kıyasla ilk çocuk doğurma yaşlarını geciktirmektedir. Doğurganlık hızının düşmesi olarak tanımlanan bu olgu sosyolojik bir trend olarak kabul edilmekle birlikte beraberinde kısırlık sorunlarını da getirmektedir (Chan, Chan, Peterson, Lampic, & Tam, 2015; Lampic, Svanberg, Karlström, & Tydén, 2006; Martin, Hamilton, Osterman, & Driscoll, 2019). Yaşam tarzlarının değişimine ek olarak, kadınların daha yüksek eğitim seviyelerine ulaşması, kariyer hedefleri ve üremeye yardımcı tedavi yöntemlerinin tanınırlığının da artmasıyla kadınların çocuk sahibi olma önceliklerı değiştirmektedir (Mills, Rindfuss, McDonald, & te Velde, 2011). Ayrıca ekonomik belirsizlik ve aile tarafından destek görememek de bahsedilen nedenler arasına eklenebilir (Mogilevkina, Stern, Melnik, Getsko, & Tydén, 2016). Türkiye'de ise doğurganlık hızı 1993'de kırsal kesimde 3.1 ve kentte 2.4 iken 2018'de bu oran kırsalda 2.8'e ve kentte 2.2'ye gerilemiştir. Toplamda ise 1993'de 2.7 iken 2018'de 2.3'e gerilemiştir (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019). Ayrıca 1993'te yaşa bağlı en yüksek doğurma hızı 20-24 yaş aralığı iken bu oran 2018'de değişerek 25-29 yaş aralığına çıkmaktadır. Veriler ilk çocuğa sahip olma yaşının arttığını göstermektedir (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019).

Çocuk sahibi olmayı ertelemek bireysel bir tercih olmak ile beraber çocuk sahibi olmayı ertelemenin doğal sonuçları olacağını da bilinmesi üreme farkındalığı konusu bağlamında önem taşımaktadır. Avrupa ve Amerikada üreme farkındalığı üzerine yapılan araştırmalar, özellikle de yaşa bağlı doğurganlık konusunda toplum bilincinin, eğitim seviyesi yüksek kesimde dahi yetersiz olduğunu göstermektedir. (Kudesia, Chernyak, & McAvey, 2017).

İlerleyen yaş her iki cinste de kısırlık sorunlarını beraberinde getirebilir (Maheshwari, Porter, Shetty, & Bhattacharya, 2008). Çiftlerin yaklaşık % 9 - 15'i doğurganlık sorunları yaşayabilmektedir ve kısırlık hem erkekleri hem de kadınları etkilemektedir. Kadınlarda kısırlık, yumurtalama sorunları, enfeksiyon hastalıkları, rahim fizyolojisi gibi sebeplerden kaynaklanabilir. Erkeklerde ise kısırlık genellikle üreme hücresi kalitesine bağlıdır. Genel olarak doğurganlık sorunlarının yaklaşık %30'u kadına,%30'u erkeğe ve %30-40'ı her ikisine veya bilinmeyen nedenlere bağlıdır (Cardiff Fertility Studies Research Group & Woods, 2018).

Kadınlar yumurtalıklarında belirli sayıda olgunlaşmamış yumurta ile doğarlar ve yaşlandıkça yumurta sayısıları azalır. Kadınların her adet döngüsünde, olgunlaşmamış yumurtalardan biri olgunlaşır ve yumurtlama sırasında salınır. Serbest bırakılmayan yumurtalar ölür ve vücutta yeniden emilir. Diğer her değişkenin eşit olduğu kabul edilince

1

kadınların yumurtalarının sayısı ve kalitesi doğurganlık için belirleyicidir. Çoğu kadın doğduğunda yaklaşık 2 milyon yumurtaya sahip iken ergenlik çağında bu sayı yaklaşık 400.000'e düşer ve 37 yaşında yaklaşık olarak 25.000 adet kalır. Ortalama 50'li yaşlara gelindiğinde ise kadınlar menopoza girdiğinde yaklaşık 1000 tane olgunlaşmamış yumurtaya sahip olurlar ancak bunlar doğurgan değildir. Kadınlar yaşlandıkça yumurtaların kalitesi de düşer. Yaşlı kadınlarda yaşanılan gebeliklerin çok az kiloya sahip bebek doğurma, erken doğum, düşük yapma, Down sendromu ve diğer kromozomal bozukluklar açısından da yüksek risk altında çocuk sahibi olma ihtimallerinin çok yüksek olduğu görülmektedir (Tough et al., 2002). Çocuk sahibi olma veya erteleme kararını verme sürecinde, insan vücudunu bilimsel olarak tanıyıp alacakları kararların sonuçlarının farkında olmak kişiye bilinçli tercih yapma olanağı verecektir.

Yumurtalık rezervi azalan kadınlarda çocuk sahibi olma oranı azalmış ve düşük oranları artmıştır (Pfeifer et al., 2015). Bu yumurta rezervi hakkında bilgi sahibi olmak insanların çocuk sahibi olma kararlarını bilinçli almaya yardımcı olabilir. Kadınlarda yaşlanmaya yönelik oosit (yumurta hücresi) sayısını belirlemek için, Anti-Müllerian hormonu (AMH) yumurtalık yaşlanmasında belirteç olarak kullanılır (Durlinger, Visser, & Themmen, 2002). Klinik uygulama ile kadınlarda kan dolaşımındaki AMH tespitinin kısırlık, erken yumurtalık yetmezliği tanısında bilgi verebildiği belirtilmiştir (Kruszynska & Slowinska-Srzednicka, 2017).

Erkek yaşının doğurganlık üzerindeki etkisinin anlaşılması, halk sağlığında giderek daha önemli hale gelmiştir çünkü daha büyük yaşlarda çocuk sahibi olmayı tercih eden erkek sayısı artmaktadır (Ventura, Martin, Curtin, & Mathews, 1998). Örneğin Amerika Birleşik Devletlerinde, 1980'den bu yana 35 ila 54 yaş arasındaki babaların çocuk sahibi olma oranında% 24'lük bir artış olmuştur. Bununla birlikte, ilerleyen erkek yaşı, gebelik oranlarında önemli düşüşler ve kısırlık ile ilişkilendirilmiştir (Kidd, Eskenazi, & Wyrobek, 2001). 8515 planlı gebelikle ilgili yakın zamanda yapılan bir çalışmada, 35 yaşından büyük erkekler, kadınların yaşı ve diğer faktörler kontrol edildikten sonra, 25 yaşın altındaki erkeklere kıyasla 12 ay içinde çocuk sahibi olma şansının yarısına sahip olduğu görülmüştür (Ford et al., 2000).

Genel olarak doğurganlığın yaşla birlikte azaldığı görülmektedir. Doğurganlığı azaltabilecek başlıca etmenler, 35 yaş üzerinde olmak, vücut kitle indeksi 25'in üzerinde aşırı kilolu olmak, sigara içmek, enfeksiyonlara maruz kalmak ve aşırı alkol tüketimidir.

ANKET LINK:

https://forms.gle/KMbWHbfFZiKDfUeB7

2

REFERANSLAR

Cardiff Fertility Studies Research Group, & Woods, L. (2016). A Guide to Fertility.

Chan, C. H. Y., Chan, T. H. Y., Peterson, B. D., Lampic, C., & Tam, M. Y. J. (2015). Intentions and attitudes towards parenthood and fertility awareness among Chinese university students in Hong Kong: A comparison with Western samples. *Human Reproduction*, *30*(2), 364–372. https://doi.org/10.1093/humrep/deu324

Durlinger, A. L. L., Visser, J. A., & Themmen, A. P. N. (2002). Regulation of ovarian function: the role of anti-Müllerian hormone. 601–609.

Ford, W. C. L., North, K., Taylor, H., Farrow, A., Hull, M. G. R., & Golding, J. (2000). Increasing paternal age is associated with delayed conception in a large population of fertile couples: Evidence for declining fecundity in older men. *Human Reproduction*. https://doi.org/10.1093/humrep/15.8.1703

Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü. (2019). *Türkiye Nüfus ve Sağlık Araştırması*. *Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü*.

Kidd, S. A., Eskenazi, B., & Wyrobek, A. J. (2001). Effects of male age on semen quality

parenthood? Reasons and social policy incentives. *Human Reproduction Update*, *17*(6), 848–860. https://doi.org/10.1093/humupd/dmr026

Mogilevkina, I., Stern, J., Melnik, D., Getsko, E., & Tydén, T. (2016). Ukrainian medical students attitudes to parenthood and knowledge of fertility. *European Journal of Contraception and Reproductive Health Care*, *21*(2), 189–194. https://doi.org/10.3109/13625187.2015.1130221

Pfeifer, S., Butts, S., Dumesic, D., Fossum, G., Giudice, L., Gracia, C., … Widra, E. (2015). Testing and interpreting measures of ovarian reserve: A committee opinion. *Fertility and Sterility*. https://doi.org/10.1016/j.fertnstert.2014.12.093

Tough, S. C., Newburn-Cook, C., Johnston, D. W., Svenson, L. W., Rose, S., & Belik, J. (2002). Delayed childbearing and its impact on population rate changes in lower birth weight, multiple birth, and preterm delivery. *Pediatrics*.

Ventura, S. J., Martin, J. A., Curtin, S. C., & Mathews, T. J. (1998). Report of final natality statistics, 1996. *Monthly Vital Statistics Report*.

Figure 4.14 : The screenshots of the underdesigned, text-based material.

4.4 Findings of the Post-Survey

In the analysis of the post-survey, a comparison-based analysis was performed. The data of the pre and the post-survey were compared in accordance with the participants' answers gathered from both surveys. In the pre-survey, 106 participants shared their e-mail addresses so the post-survey link was sent to these 106 volunteers. The five shared questions were asked in both the pre-survey and the post-survey to evaluate the change between the initial and the second answers of the participants. However, before answering these questions, half of the participants were informed with a brief text and the other half of them were exposed to a video which had been designed through the co-design sessions. This experimental process showed which material was more effective in raising awareness about a taboo topic. Moreover, comparisons were made between both the answers of the pre- and post-surveys and also between the answers of the participants who were informed via the brief text and the designed video. Nevertheless, only 44 participants attended the post-survey. The equal distribution of participants was broken; 20 participants

represented the video-informed group and 24 of them gave their answers after being informed via a brief text.

The answers of these same five questions showed how a designed visual material affected the awareness of the participants on fertility issues as compared to verbal, text-based material. The data gathered from the post-survey was divided into two groups based on the way that participants had received the information, i.e., a text vs. video.

4.4.1 The first three age-related questions

- Do you think female fertility potential changes with age?

Although both the video-informed and the text-informed participants answered the first question "yes" in the post-survey, two males who were below age 30 had answered "no" in the pre-survey.

- What do you think is the ideal age to have a child for the first time?
- What do you think is the ideal age to have your last child?

For both questions, the stated mean age of having the first and last child, the mean ages decreased in both the video-informed and the text-informed groups compared to their pre-survey answers. However, there was no significant difference between the two groups. The only salient data about these two age-related questions were about one of the female participants who did not state an exact number or age range for having a last child, although she specified an age (30) for having a first child:

- "If a woman is physically able, she can have a baby as long as she wants and whenever she is mentally ready."

Instead of stating an age or range on this question, she expressed her opinion with that sentence. However, after she was informed through a designed video, she changed her answers about the ideal age of having both a first and last child. She decreased the age of the having a first baby from 30 to 25 and, contrary to her first answer, stated the age of 35 as ideal for having a last child.

4.4.2 The ranking question

- Which factors do you think are important for female fertility potential?

While the video-informed participants' choices are given in Table 4.3, the text-informed participants' preferences can be seen in Table 4.4. Almost all of the video-informed participants (n=17) changed their rankings to mark "ovarian reserve" as the

most important except 3 participants who was ranking it as 2nd or 3rd. In addition, "age" and "genetic factors" were generally ranked 2nd and 3rd, respectively. On the other hand, the half of the text-informed participants thought that "ovarian reserve" was the most important factor about women's infertility while the other half of them thought differently. For second place preference, although "age" was the most chosen one, only half of the text-informed participants ranked it in the second place; the rest of them thought it had less importance, ranking it 3rd or 4th. Also, a Wilcoxon matched-pair signed ranks test demonstrated that in the case of experimental group that had been informed with designed material, the ranking of the "ovarian reserve" and "age" factors were re-ranked significantly to most important ranks (i.e. 1st and 2nd) in the post-survey compared to the pre-survey (Z= -2.200, p= 0.028 and Z= -2.292, p= 0.022, respectively). However, the control group, which was informed with the underdesigned material, changed only the rankings of the "age" factor significantly to the most important rankings compared to the pre-survey (Z= -1.983, p= 0.047). Also, the "ovarian reserve" factor ranking rose but this was not statistically significant between the pre- and post-surveys (Z= -1.555, p=0.120) (Figure 4.15).

Table 4.3 : The comparison table between the answers of the pre-survey and the post-survey. The participants who were informed by a designed video ranked some key elements of women's fertility.

PRE-SURVEY – POST-SURVEY (VIDEO INFORMED)						
P	Ovarian Reserve	Age	Genetic Factors	General State of Health	Diet	Environmental Factors
	PRE-POST	PRE-POST	PRE-POST	PRE-POST	PRE-POST	PRE-POST
P1	1-1	4-4	2-3	3-2	5-5	6-6
P2	2-2	1-1	3-3	4-4	5-5	6-6
P3	2-1	3-3	4-2	1-4	6-6	5-5
P4	5-1	4-2	1-3	2-5	6-6	3-4
P5	2-1	4-2	3-3	1-5	5-4	6-6
P6	1-1	3-2	4-3	2-4	5-5	6-6
P7	1-1	5-2	2-3	3-4	4-5	6-6
P8	1-1	3-2	2-4	5-5	4-3	6-6
P9	3-1	5-3	2-2	1-4	6-5	4-6
P10	2-1	3-2	6-3	4-5	5-4	1-6
P11	1-1	2-2	6-5	4-3	3-4	5-6
P12	1-1	2-2	6-6	5-5	4-4	3-3
P13	1-1	2-3	4-2	3-4	5-5	6-6
P14	1-1	3-3	2-2	4-4	6-5	5-6
P15	1-2	2-3	4-1	5-4	3-5	6-6
P16	1-1	2-2	3-3	5-6	6-4	4-5
P17	1-1	3-2	2-3	4-4	6-6	5-5
P18	1-1	6-6	2-2	3-3	4-4	5-5
P19	4-1	3-2	1-3	2-6	6-5	5-4
P20	5-3	6-6	4-4	1-2	2-1	3-5

Table 4.4 : The comparison table between the answers of the pre-survey and the post-survey. The participants who were informed by a brief text ranked some key elements of women's fertility.

Participants	PRE-SURVEY – POST-SURVEY (TEXT INFORMED)					
	Ovarian Reserve	Age	Genetic Factors	General State of Health	Diet	Environmental Factors
	PRE-POST	PRE-POST	PRE-POST	PRE-POST	PRE-POST	PRE-POST
P1	3-3	4-4	2-2	1-1	6-5	5-6
P2	2-1	6-3	1-2	3-4	4-5	5-6
P3	1-3	4-2	2-1	3-4	6-6	5-5
P4	1-1	3-4	5-2	2-3	4-5	6-6
P5	2-2	1-3	4-5	3-1	5-6	6-4
P6	1-3	6-2	4-6	2-5	3-1	5-4
P7	1-1	4-2	5-5	2-3	3-6	6-4
P8	6-2	2-6	1-3	5-4	3-1	4-5
P9	1-1	6-3	5-6	2-5	4-4	3-2
P10	6-2	4-5	1-4	2-1	3-6	5-3
P11	6-3	5-1	4-5	3-4	2-6	1-2
P12	1-1	4-3	2-4	3-2	5-5	6-6
P13	4-2	2-1	5-6	6-3	1-4	3-5
P14	3-2	1-1	2-3	4-4	5-6	6-5
P15	6-1	3-5	2-2	5-3	4-4	1-6
P16	1-1	6-2	2-3	3-4	4-5	5-6
P17	1-5	2-3	3-4	4-1	5-6	6-2
P18	3-2	4-1	2-3	1-4	6-6	5-5
P19	2-1	3-2	5-6	6-4	4-5	1-3
P20	2-1	3-2	1-6	6-4	4-5	5-3
P21	2-2	3-1	1-3	1-4	5-5	4-6
P22	2-1	6-2	1-3	4-4	3-5	5-6
P23	1-1	4-5	2-2	6-3	5-6	3-4
P24	1-1	2-2	4-5	3-3	5-4	6-6

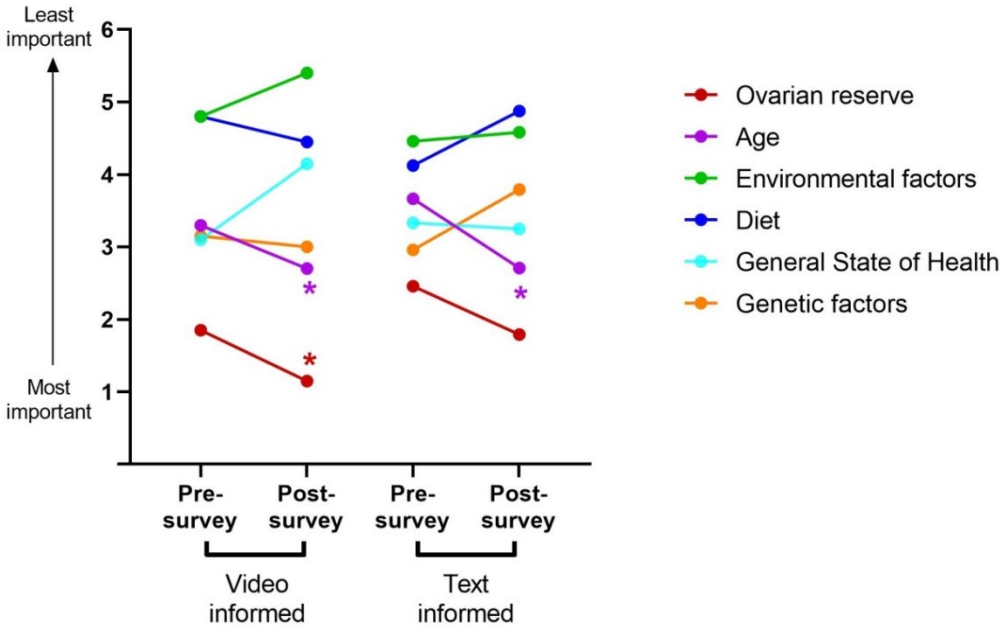


Figure 4.15 : Before-after graphic of the participants' ranking of some key elements of women's fertility. * Indicates a significance level of $p<0.05$.

4.4.3 The true-false question

- Please select the correct statements among the given information about the medical term “female ovarian reserve”.

The last question of the post-survey examined the knowledge level of the participants through true-false questions. The participants were scored according to their selections. All scores were calculated as done before in the pre-survey analysis of the true-false question. In the case of the experimental group that had been informed by designed material, a paired t-test indicated that total score of the participants increased significantly in the post-survey compared to the pre-survey ($t(19)= -3.269$, $p= 0.004$). However, the control group, which had been informed by the underdesigned material, a brief text, did not change their total score significantly between the pre- and post-surveys ($t(23)= -1.336$, $p= 0.195$) (Figure 4.16). After watching the designed video, while the true selections of the video-informed participants increased by about 70%, the false answers of them decreased by about 45% compared to the true-false selections of the pre-survey. Also, 58.33% of the participants raised their true selection after reading the informative text. However, 45.83% of them increased their false selection as well. All changing selections between the pre-survey and the post-survey can be seen in the table below (Table 4.5).

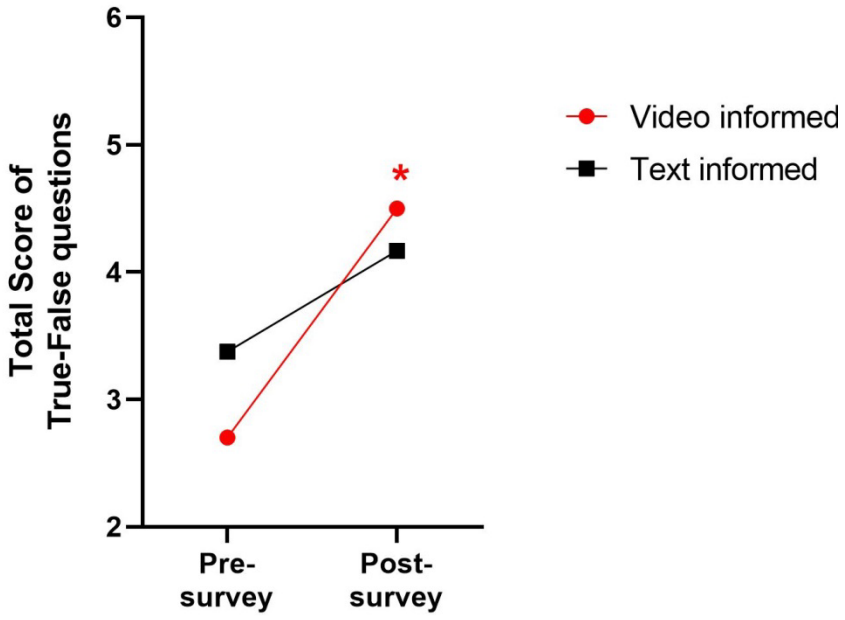


Figure 4.16 : Before-after graphic of the participants’ true-false statements selection. * Indicates a significance level of $p<0.05$.

Table 4.5 : The comparison table between the true-false answers of the participants who were informed by a designed video versus those informed by a brief text. Data includes both the pre-survey and the post-survey.

TRUE – FALSE QUESTIONS					
VIDEO – INFORMED			TEXT – INFORMED		
PV	TRUE	FALSE	PT	TRUE	FALSE
	PRE-POST	PRE-POST		PRE-POST	PRE-POST
PV1	4-4	2-2	PT1	3-2	0-2
PV2	4-1	4-1	PT2	3-4	1-2
PV3	1-3	1-2	PT3	1-2	2-0
PV4	2-3	0-2	PT4	3-4	1-1
PV5	2-3	4-1	PT5	4-4	2-5
PV6	3-3	4-3	PT6	2-3	1-0
PV7	3-4	4-3	PT7	3-2	2-3
PV8	3-4	4-2	PT8	3-4	1-1
PV9	1-3	0-4	PT9	1-1	2-3
PV10	1-3	3-1	PT10	2-3	1-0
PV11	3-4	0-2	PT11	3-4	2-2
PV12	1-3	0-2	PT12	3-3	1-4
PV13	2-4	3-3	PT13	3-2	3-3
PV14	3-3	1-1	PT14	1-3	2-3
PV15	2-2	2-0	PT15	3-3	4-3
PV16	2-4	1-1	PT16	2-4	2-0
PV17	3-4	1-2	PT17	3-3	1-0
PV18	3-4	3-1	PT18	3-4	2-3
PV19	3-4	3-2	PT19	2-4	2-2
PV20	1-1	0-3	PT20	0-3	1-3
			PT21	3-4	2-1
			PT22	3-2	1-4
			PT23	2-3	0-2
			PT24	4-4	3-3

- At the end of the post-survey, an open-ended space was reserved for the participants to share their comments voluntarily in addition to the other questions.

Only 7 participants wrote their comments, which were mostly “thank you” except two specific comments. Two video-informed participants wanted to share their opinions about this study. The following comments were given:

- “I want to give my blood and learn about my ovarian reserve as soon as possible. I feel stressed-out because of this information because I am 28 years old and single.”
- “It was an informative study for me; thus, I will probably go to the health center soon.”

The study was interested in whether the participants’ attitudes towards a behavior change would change or not, thus these two participants’ comments were important for the study to examine the overall results.

5. CONCLUSION

Since the notion of taboo has interfused into most societies, people do not want many taboo-related issues to be mentioned, heard, or thought of due to the proscriptive and "judgy" features of the taboo topics (Douglas, 1979; Evans et al., 1999; Lambek, 2001). This hidden proscriptive circumstance restricts the attitude and behavior of people so a lack of communication and misinformation between people occurs instead of talking about them (Chrisler, 2013; Vance, 1984). While one of the most-encountered taboo-related topics is fertility issues in many societies, nowadays fertility issues are a hot topic as they have become one of the increasingly prominent health issues and leading to a rapidly aging population in several countries (Baylis, 2012; Chan et al., 2015; Goldstein, 2009; R. Lee & Mason, 2010; Svanberg et al., 2006; United Nations, 2013, 2019). Although the fertility of women and men depend on many variables that can be genetic, mental, and age-related, aging is the most effective factor among them (Prior et al., 2018; Vander Borght & Wyns, 2018). Fertility has drawn the attention of governments and organizations due to increased postponed childbearing in several societies. However, there is a lack of knowledge about it while most people delay childbirth. Therefore, postponed childbearing has become a social issue for societies and people should be informed about their reproductive health (Almeida-Santos et al., 2017; García et al., 2016; Mills et al., 2011). Although various studies have been conducted, fertility issues believed to be studied more in the framework of design by considering the increasing role of design in social issues. Also, the design approaches that are design for social innovation, co-design, design for behavior change, and inclusive design have been used for social issues in past few decades (Brown & Wyatt, 2016; Chick, 2012; Mulgan, 2014; Niedderer et al., 2016). The current study took women's fertility as a case and aimed to explore how a designed material can create awareness and encourage change in behavior compared to underdesigned material on a taboo topic. It was grounded in a design for social innovation approach and it was conducted from the perspective of co-design.

5.1 Discussion

The study started with a pre-survey to determine the initial knowledge level and then expert interviews were performed with four members of an IVF center. After gaining hidden insights from expert interviews, the next step was organizing a co-design workshop. Eventually, a fear-inducing video was designed according to co-design findings to create awareness and acquire behavioral change. This video and a brief text were used at the beginning of the post-survey to inform participants. According to these activities, a tendency to postpone childbearing because of the career and economic concerns of the people who were in the pre-survey was observed. Nonetheless, the participants had insufficient knowledge about fertility and age-related infertility. Furthermore, most of the participants stated that they do not want to talk about their fertility problems with others. A common misconception that, the fertility issues are considered to be only women-related, was emphasized by experts but it is one of false beliefs among people. This particular issue is even a taboo topic between couples. The second stage of the study, co-design workshop, was focused on attitudes, emotions, desires, expectations and motivations of the participants. Considering this major focus, a designed video was proposed to increase awareness and encourage behavior change. To test this, in the final part of the experiment, the designed video was sent to half of the participants while the other half received only a brief text at the beginning of the post-survey. Therefore, the post-survey determined whether there was a knowledge difference between the video-informed and the text-informed participants or not. The results showed that there is a positive difference on the side of the video-informed participants.

This study aimed to deal with a taboo that is one of the delicate social issues of the societies, to intervene in the lives of people and collaborate with them while searching for a solution for their problems through design. For this purpose, firstly, a pre-survey was performed with 153 participants ranging in age from 18 to 45. The first remarkable result supported the literature about postponed childbearing in many countries because the pre-survey's results showed that there is a tendency to postpone having a baby in Turkey as well (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2019; Kühnert & Nieschlag, 2004; Sørensen et al., 2016; Vassard et al., 2016). According to the pre-survey results, while 29.4 % of the participants wanted to delay having a baby (the mean age was 28.89), the other 50.33% of them did not

consider having a baby (the mean age was 27.75). The mean age of participants who had had children was statistically older than both those not considering and those delaying childbearing so this indicated that the childbearing behavior of people may change with age, as already determined in the literature review (Daniluk et al., 2012). Furthermore, the career goals, economic expectations, and inability to find a proper spouse were the reasons behind this postponed tendency according to the participants' answers, similar to previous research found in literature (Mills et al., 2011; Sørensen et al., 2016; Stentz et al., 2016). While those reasons were similar to those found in the existing literature, the prominence of the answer "not feeling responsible enough" might find a new place in the literature. It might be considered because of economic insecurity however participants who felt insecure economically already chose economic issues as a reason. The participants who were "not feeling responsible enough" might not want to deal with the routine child care. This attitude might be overlapped with women's stories in "We are Childfree" movement (Noble, 2021). A woman stated that if she was a mother, she could not live all the adventures that she desires. Another woman mentioned about her childfree decision that enables freedom for her. When people think that having a baby is a barrier for their future life expectations they might not feel to take the responsibility of a child's life. Apart from individual and economic readiness, most of the participants wanted to delay starting a family due to insufficient knowledge about the relationship between age and fertility potential. The participants delaying and not considering childbearing had a mean age of 28.32 but stated that the mean age of 27.84 was ideal for having a first child and a mean age of 38.46 was optimal for having a last child. Although the participants of the study were recruited from the undergraduates, graduate students, and academic staff members of ITU, they had barely adequate fertility-related knowledge in accordance with literature (Daniluk & Koert, 2015; M. Lee, 2019; Mac Dougall et al., 2013b; Mogilevkina et al., 2016; Stentz et al., 2016). The reasons for the ignorance could be taboo-related self-censorship because they stated they are not comfortable sharing their opinions about their fertility issues. From this perspective, the pre-study had parallel findings regarding the relation between taboo and fertility issues (Bertarelli Foundation Scientific Board, 2000; Chrisler, 2011; Pashigian, 2002). Moreover, the study indicated that the participants did not realize that ovarian reserve, aging, and genetic factors are crucial elements because these elements were not ranked in the first three places by the majority of the participants in the pre-

survey. They also showed their lack of fertility knowledge in the true-false question; only 21 of them selected all true statements as well as at least one false statement. The pre-survey indicated that even the people who were educated had inadequate knowledge about fertility issues and most of them were not disposed to talk about fertility issues with someone else. This unwillingness and ignorance of the educated participants about fertility issues showed consistency between the pre-survey and literature (Hampton et al., 2016; M. Lee, 2019; Sørensen et al., 2016). Most people do not aware their reproductive health until having a disease or trying to conceive. This awareness occurs in later ages for highly educated individuals because highly educated individuals tend to delay starting a family due to career goals. If this issue still will be considered as taboo, no one can talk about it freely even among experts in accordance with expert interviews and co-design sessions. The main reason of sufficient knowledge is that every woman who can menstruate and every man who can ejaculate think that they are fertile; however, it should be understand that fertility is related with reproductive health of people. Everyone should check their reproductive health for their own good. No one can take decision on someone else's body and if people want to take own decisions consciously then they need to know more about their reproductive health. Breaking taboo on fertility issue can be initial step for awareness.

Since fertility issues are accepted as social issues, collaboration with shareholders and experts was considered a crucial characteristics of the social design (Fine, 2017; Mortati & Villari, 2014; Ombelet et al., 2008; Peterson et al., 2012; Szebeko et al., 2010; Wiersema et al., 2006). In the second step of the study, expert interviews were performed because the inclusion of the other in the design process was indispensable in that period. Also, meeting with experts was the first step to tackle fertility issues through a design approach so the study gained importance for the literature from the perspective of design. The findings of the expert interviews also showed high consistency with the previous literature. For example, their patients did not know or realize their fertility potentials until they figured out a problem and come to consultation (Boivin et al., 2019; M. Lee, 2019; Shreffler et al., 2017). In addition to lack of knowledge, the disappointment can be seen both in the literature and the expert interviews due to overconfidence in one's fertility potential and in the current assisted reproductive treatments (Daniluk & Koert, 2015; M. Lee, 2019; Mac

Dougall et al., 2013a). Considering women as being infertile is also a common misconception (Daniluk et al., 2012; Kühnert & Nieschlag, 2004). However, not only women but also men have equal chances of having infertility problems. As there are taboos about women's fertility, there is a crucial taboo on men's fertility as well. The reason behind this is that many people cannot see fertility related topics in the framework of their health. Even most women do not visit gynecologist for routine controls. If there is a problem about their fertility, they would not know until they actually had the problem. The expert interviews both affirmed the literature in the scope of Turkey and also provided insights about the target group of the study from experts who were shareholders.

The study embraced Manzini's design understanding as "design, when everybody designs". Involvement in the lives of people and coping with social issues were required to be collaborative and participatory (Bruce & Randall, 2019; Manzini, 2015a; Markussen, 2011). Therefore, a multidisciplinary team was gathered to understand, think, and design together. This multidisciplinary approach provided different points of view. Thus, every shareholder was able to adapt various insights and then everyone was able to be a part of the design thinking process (Kleinsmann & Valkenburg, 2008; Lesh et al., 2008). It was a "designerly way" of inclusion in social issues (Cross, 2006; Markussen, 2013). The co-design workshop started with two different empathy mapping sessions to integrate and explore each other's knowledge for 30 minutes (Gray et al., 2010). While the first empathy map was to focus on creating a female persona named Ayşe and the second one was for a male persona named Ali, the shareholders were more interested in the first empathy map, Ayşe, than the second one, Ali. This attitude might be the first finding of the co-design workshop because there is a belief that fertility issues are more linked with women as mentioned in the literature (Kühnert & Nieschlag, 2004). On the one hand, shareholders defined Ayşe as a woman who feels responsible, under social pressure, and immature; who relies on IVF or her own youthfulness; and who thinks of delaying childbirth. On the other hand, they defined Ali as a man who is ignorant about fertility issues, does not have any expectation of starting a family until his spouse suggests, and is scared about whether he may have a fertility problem. When all these findings integrate, the data indicates that men direct the social pressure on the women by avoiding responsibilities and facts about their potential fertility issues.

Talking about fertility issues and considering it as a health issue might prevent this type of avoidance behavior. While Ayşe had her own expectations and concerns and faced social pressures, Ali had fewer concerns and less exposure about fertility issues. However, he was frightened and had a lack of self-confidence when his fertility or possible infertility is mentioned. Therefore, shareholders explored what their target group was afraid of and what they feel, think, and do. Thus, they were ready to start the brainstorming session. Many ideas were generated through one triggering question with six main categories without judging each other's opinions. This brainstorming session was grounded on Fogg's Behavior Model (FBM) and was supported by Lockton's approach from a design perspective (Fogg, 2020, 2009; Lockton, 2017; Montaño & Kasprzyk, 2008; Niedderer, 2013). Thus, the study firstly aimed to find a motivation by generating ideas on this ready-to-fill digital workplace. In regards to the written answers, the lack of self-confidence consideration, the possibility of failure, and the possibility of meeting fertility-related barriers and threats caused fear. Almost all the filled digital sticky notes of the shareholders on Mural showed that fear could be use as motivation for behavior change. The usage of negative emotions like fear has been seen in the literature so fear-inducing images and texts were used in commercials or campaigns (de Vries, 2020). Although fear-related messages can focus negative emotion, they can encourage behavior change in a positive perspective (de Vries, 2017). In accordance with this literature, the study relied on its findings from the brainstorming session so fear was preferred to motivate the target group to change their fertility behaviors. After finding the motivating element for the attitude change, the next step was showing ability of the desired behavior. It was critical to explain how easy it is to learn one's fertility potential because the motivation element is not enough to change behavior as Fogg emphasized in the case of his ukulele (Fogg, 2009). Therefore, fear-motivated people should be supported with ability elements of behavior change, which, in this study, was accomplished by informing participants about the ease of finding out one's fertility potential. Not only the literature knowledge that the study collected but also the findings that were discovered during the expert interviews and co-design sessions indicated that both women and men could learn their fertility potential easily. While women can find out about their fertility potential with a quick blood test which is called an AMH Test, men can check their sperm quality, volume, and motility with the Spermiogram Test (Fong et al., 2008; Ilhan et al., 2018; Kiran et al., 2012;

Kruszynska & Slowinska-Srzednicka, 2017). If the study could show how easy it is to have one's fertility checked rather than a complex and painful medical procedure, then the target group could desire to do it. Thus, the study found a way to show the ability of the learning process so it could encourage the desired behavior. Although the study found the motivation element with fear and could show the ease of the AMH and Spermiogram tests, it needed to trigger the target group with something that could convince them. Both in the literature and in this study, the important role of aging on fertility was emphasized several times, especially during the expert interviews and empathy mapping sessions (Hassan & Killick, 2003; Kudesia et al., 2017; Kühnert & Nieschlag, 2004; Mac Dougall et al., 2013b). Thus, it was known that women's ovarian reserves decrease and the quality or motility of the sperm can be affected by increased age. Therefore, aging was selected to prompt the people to take action (Figure 5.1).

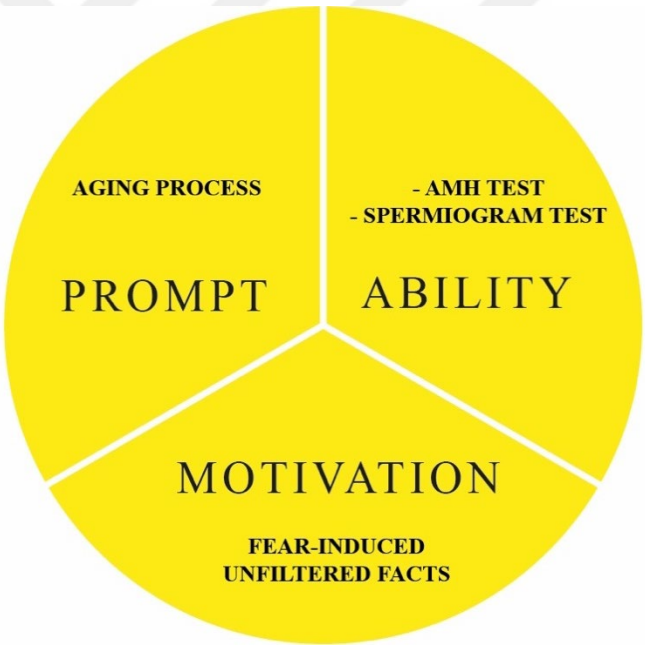


Figure 5.1 : The structure of the fear-inducing design video.

Collectively, a video that was designed based on the findings of the co-design session in accordance with FBM and Lockton's behavioral change theory. It aimed to create awareness and eventually change the behavior of the target group by informing them with three main considerations. As opposed to the literature, the study used lesser-known, unfiltered facts in the video instead of using fear-inducing visuals. By asking the questions; "have you heard these?," "what about your condition?," and "are you aware of your fertility potential?," the video created a fear-

based mood on the target group. By providing the truth and prompting self-interrogation, it kept the aging factor in sight. The video also explained how participants could learn information about themselves easily. Supporting FBM and Lockton's theory, a loud sound was played during the video to support the fear emotion (Toprac & Abdel-Meguid, 2010). Finally, interactivity was added in the video at three separate times to keep the interest of target group alive (MAGNA, 2017; Parra et al., 2014).

Although there are many examples of increasing fertility awareness with text based brochures, web sites, booklets already exist in the literature, this study designed an awareness video in accordance with behavior change theories and its co-design sessions (Boivin et al., 2019; Cardiff Fertility Studies Research Group & Woods, 2016). The validation of the video was tested with a post-survey. This study included the people who could be affected by the design in the design process instead of presenting an already-designed product or service to them. Furthermore, in this co-design approach, the way behavior change can be encouraged through design for a delicate social issue, in this case, fertility, was explored with the shareholders. From this perspective, this study has contributed to the design literature in terms of the consideration of both increasing awareness and encouraging behavior change for an avoided social issue through design.

The last step of this study was testing the designed video and checking whether awareness has been raised or not. For this purpose, a post-survey was performed with the participants who had given their e-mail addresses in the pre-survey. Before they started the post-survey, while the half of them had been informed with a brief text, the rest of them had been informed with the aforementioned designed video. According to findings from the post-survey, it was observed that the participants who had been informed with the designed material were more aware and had more tendencies to change their behavior about their fertility potential. It was supported by statistical analyses. As shown in the previous chapter, three factors, aging, ovarian reserve, and genetic factors were ranked as most important factors in the ranking question. The video-informed participants ranked these three factors higher than the text-informed ones and also this change was a statistically significant difference. Since the visual representation of the ovarian reserve was diminished gradually in the video, the participants might be affected to see ovarian decrease visually. The,

importance of the relation between age and ovarian reserve has also been represented in the video. In addition, the video highlighted whether they know about their fertility potential or not, so positively increased ranking on aging and ovarian reserve factors might be related informing approach of the designed material. In the true-false statement questions, while the video-informed participants increased their true statements selections, they decreased their false statements selection compared to the text-informed ones. Moreover, the text-informed participants increased their false statements selection. The change of true statement selections was statistically significant positively in the case of the video-informed participants because this video was not only informed them like underdesigned text but also provided a connection between the fertility information and themselves. The participants' comments on the post-survey confirmed that the video content made them think of their fertility potential, how to learn more about their fertility or even if they were running late to discover. One of the important findings determined from the comments of the video-informed participant was, before the informative video she believed a woman can have a baby at every age, after the video intervention she has changed her statement as "age of 35" an optimum age to get pregnant". Two different comments from two female participants showed that they had experienced fear and declared that they would learn their fertility potentials as soon as possible. These comparative data indicate that designed material not only provided information but also gave a motivation and triggered participants to take action. While underdesigned text aimed to create awareness by informing people, designed material informed them by triggering fear emotion, highlighting aging process, enabling self-questioning in the perspective of co-design sessions' findings. These findings and comments of participants support the belief that design-driven approach can encourage behavior change and create awareness on taboo-related issues more effectively compared to non-design approaches. In accordance with the study's purpose, increased awareness and, afterwards, behavioral change by the designed material, in this case, a video, was expected. The overall findings showed that this study was able to achieve its purpose. This thesis presented a method of getting involved in the lives of people about a taboo topic and showed how awareness can be created and behavioral change can be encouraged through a design approach compared to a non-design approach. To the best of our knowledge, the recent study, with its approaches of co-design and designing for social innovation, is one of the

supporting studies in the design literature in terms of creating awareness and afterwards changing behavior through design.

5.2 Limitation of This Study and Further Research

The major limitation of this study was the Coronavirus pandemic, which, first of all, affected in-person meetings like expert interviews and the co-design workshop. Due to the pandemic restrictions and participants' safety, all meetings were performed online via Zoom. The online meeting seemed to increase participation; however, neither following the digital workplace nor observing the other participants were easy for the participants. This might have caused participants to have adaptation issues and miss interaction with others, so the creative thinking process might have been affected by online participation. Also, sample size of study focused on only educated people from ITU, for further research sample size can be increased by including same target group from other communities. Another issue that might have influenced the data is the experiment itself could have raised awareness on the topic and participants could get information from the other sources without the researchers' control between the pre-survey and the post-survey. However, the study has already presented the methods and differences between designed material compared to underdesigned material in terms of how to create awareness on taboo topics and how behavioral change can be encouraged through design. Larger sample size would create more precise results on the other hand; a larger scale study on fertility awareness with the involvement of policy makers has being developed grounded by the current study, following from its findings. In addition, when the researchers determine participants' behavioral change end of the design intervention, they can organize interviews with participants after design intervention besides pre- and post-survey methods. Lastly, this study can be used as preliminary research for a long-term doctoral study and nationwide project.

REFERENCES

Adam, M. (2017). *Health Across the Gender Spectrum*. https://online.stanford.edu/courses/som-y0003-health-across-gender-spectrum

Adam, M., McMahon, S. A., Prober, C., & Bärnighausen, T. (2019). *Human-Centered Design of Video-Based Health Education : An Iterative, Collaborative, Community-Based Approach*. *21*, 157–181. https://doi.org/10.2196/12128

Almeida-Santos, T., Melo, C., Macedo, A., & Moura-Ramos, M. (2017). Are women and men well informed about fertility? Childbearing intentions, fertility knowledge and information-gathering sources in Portugal. *Reproductive Health*, *14*(1), 1–9. https://doi.org/10.1186/s12978-017-0352-z

Andersen, L. B., Danholt, P., Halskov, K., Hansen, N. B., & Lauritsen, P. (2015). Participation as a matter of concern in participatory design. *CoDesign*, *11*(3–4), 250–261. https://doi.org/10.1080/15710882.2015.1081246

Arnold, L., Lee, K. J., & Yip, J. C. (2016). Co-designing with children : An approach to social robot design. *2nd Workshop on Evaluating Child Robot Interaction- HRI2016*, *March*.

Baylis, F. (2012). Infertility. *Encyclopedia of Applied Ethics*, 712–720. https://doi.org/10.1016/B978-0-12-373932-2.00148-4

Bean, T. (2020). *Yes, Netflix Is The #1 Streaming Platform—But That Is Changing Quickly Thanks To This New Player*. FORBES. https://www.forbes.com/sites/travisbean/2020/10/16/yes-netflix-is-the-1-streaming-platform-but-that-is-changing-quickly-thanks-to-this-new-player/?sh=55ca2f4c6a7b

Beaudoin, C. E., Chen, H., Agha, S., Beaudoin, C. E., Chen, H., & Agha, S. (2016). Estimating Causal Effects With Propensity Score Models : An Evaluation of the Touch Condom Media Campaign in Pakistan Estimating Causal Effects With Propensity Score Models : An Evaluation of the Touch Condom Media Campaign in Pakistan. *Journal of Health Communication*, *21*(4), 415–423. https://doi.org/10.1080/10810730.2015.1095818

Bertarelli Foundation Scientific Board, T. (2000). Public perception on infertility and its treatment: an international survey. *Human Reproduction*, *15*(2), 330–334. https://doi.org/10.1093/humrep/15.2.330

Boivin, J., Sandhu, A., Brian, K., & Harrison, C. (2019). Fertility-related knowledge and perceptions of fertility education among adolescents

and emerging adults: a qualitative study. *Human Fertility*, *22*(4), 291–299. https://doi.org/10.1080/14647273.2018.1486514

Boncompagni, T. (2011). *Are You as Fertile as You Look?* The New York Times.

Britannica, T. E. of E. (2020). *Taboo*. Encyclopaedia Britannica, Inc. https://www.britannica.com/topic/taboo-sociology

Brown, T. (2008). Design thinking. *Harvard Business Review*, *86*(6), 84–92. https://doi.org/10.1002/med

Brown, T. (2021). *Design Thinking Defined.* https://designthinking.ideo.com/#designers-mindset

Brown, T., & Wyatt, J. (2010). Design Thinking for Social Innovation IDEO. *Development Outreach*, *12*(1), 29–43. http://elibrary.worldbank.org/doi/pdf/10.1596/1020-797X_12_1_29

Brown, T., & Wyatt, J. (2016). Design thinking for social innovation. *Social Entrepreneurship: A Skills Approach: Second Edition*, 65–70. https://doi.org/10.2307/j.ctt1t8917t.13

Bruce, J., & Randall, M. (2019). Design + Social Impact. *Conference Proceedings of the Academy for Design Innovation Management*, *2*(1). https://doi.org/10.33114/adim.2019.c02.121

Burns, C., Cottam, H., Vanstone, C., & Winhall, J. (2006). Transformations by design. *Design Council*, *2*(RED Paper). https://doi.org/10.4324/9781315105000-5

Cardiff Fertility Studies Research Group, & Woods, L. (2016). *A Guide to Fertility*.

Case, K. A. (2007). Raising male privilege awareness and reducing sexism: An evaluation of diversity courses. *Psychology of Women Quarterly*, *31*(4), 426–435. https://doi.org/10.1111/j.1471-6402.2007.00391.x

Cash, P., Hartlev, C. G., & Durazo, C. B. (2017). Behavioural design : A process for integrating behaviour change and design. *Design Studies*, *48*, 96–128. https://doi.org/10.1016/j.destud.2016.10.001

Cash, P., Khadilkar, P., Jensen, J., Dusterdich, C., & Mugge, R. (2020). Designing Behaviour Change : A Behavioural Problem / Solution (BPS) Matrix. *International Journal of Design*, *14*(2), 65–83.

Catherine, L. (2020). *Vaginal warts and all: Singapore's taboo-breaking podcaster*. France 24. https://www.france24.com/en/live-news/20201219-vaginal-warts-and-all-singapore-s-taboo-breaking-podcaster

Chan, C. H. Y., Chan, T. H. Y., Peterson, B. D., Lampic, C., & Tam, M. Y. J. (2015). Intentions and attitudes towards parenthood and fertility awareness among Chinese university students in Hong Kong: A comparison with Western samples. *Human Reproduction*, *30*(2), 364–372. https://doi.org/10.1093/humrep/deu324

Chen, Z., Lu, Y., Nieminen, M. P., & Lucero, A. (2020). Creating a chatbot for and with migrants: Chatbot personality drives co-design activities. *DIS 2020 - Proceedings of the 2020 ACM Designing Interactive*

Systems Conference, 219–230. https://doi.org/10.1145/3357236.3395495

Chick, A. (2012). Design for Social Innovation: Emerging Principles and Approaches. *Iridescent*, *2*(1), 78–90. https://doi.org/10.1080/19235003.2012.11428505

Choahan, N. (2018). *Update graphic images on cigarette packages to remind of health risks, experts say*. https://www1.racgp.org.au/newsgp/clinical/update-graphic-images-on-cigarette-packages-to-rem

Chrisler, J. C. (2011). Leaks, lumps, and lines: Stigma and women's bodies. *Psychology of Women Quarterly*, *35*(2), 202–214. https://doi.org/10.1177/0361684310397698

Chrisler, J. C. (2013). Teaching Taboo Topics: Menstruation, Menopause, and the Psychology of Women. *Psychology of Women Quarterly*, *37*(1), 128–132. https://doi.org/10.1177/0361684312471326

Claes, S., & Vande Moere, A. (2013). Street infographics: Raising awareness of local issues through a situated urban visualization. *PerDis 2013 - Proceedings: 2nd ACM International Symposium on Pervasive Displays 2013*, 133–138. https://doi.org/10.1145/2491568.2491597

CommGAP. (2010). *Theories of Behavior Change*. https://doi.org/10.5040/9781492595502.ch-014

Corbin, J., & Strauss, A. (2014). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory* (Fourth Edi). SAGE Publications, Inc.

Creswell, J. (2006). Five qualitative approaches to inquiry. In *Qualitative inquiry and research design*.

Creswell, J., & Poth, C. N. (2018). Data Analysis and Representation. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 181–223. https://doi.org/10.1091/mbc.E08-07-0716

Cross, N. (2006). Designerly Ways of Knowing. In *Sereal Untuk* (Vol. 51, Issue 1).

Culpepper, E. E. (2006). Positively Breaking Taboos: Why and How I Made the Film PERIOD PIECE. *Feminist Studies in Religion*, *22*(2), 125–153.

Daniluk, J. C., & Koert, E. (2012). Childless Canadian men's and women's childbearing intentions, attitudes towards and willingness to use assisted human reproduction. *Human Reproduction*, *27*(8), 2405–2412. https://doi.org/10.1093/humrep/des190

Daniluk, J. C., & Koert, E. (2013). The other side of the fertility coin: A comparison of childless men's and women's knowledge of fertility and assisted reproductive technology. *Fertility and Sterility*, *99*(3), 839–846. https://doi.org/10.1016/j.fertnstert.2012.10.033

Daniluk, J. C., & Koert, E. (2015). Fertility awareness online: The efficacy of a fertility education website in increasing knowledge and changing fertility beliefs. *Human Reproduction*, *30*(2), 353–363. https://doi.org/10.1093/humrep/deu328

Daniluk, J. C., Koert, E., & Cheung, A. (2012). Childless women's knowledge of fertility and assisted human reproduction: Identifying the gaps. *Fertility and Sterility*, *97*(2), 420–426. https://doi.org/10.1016/j.fertnstert.2011.11.046

Davis, G. C., Baral, R., Strayer, T., & Serrano, E. L. (2018). Using pre-and post-survey instruments in interventions: Determining the random response benchmark and its implications for measuring effectiveness. *Public Health Nutrition*, *21*(6), 1043–1047. https://doi.org/10.1017/S1368980017003639

de Vries, G. (2017). How Positive Framing May Fuel Opposition to Low-Carbon Technologies: The Boomerang Model. *Journal of Language and Social Psychology*, *36*(1), 28–44. https://doi.org/10.1177/0261927X16663590

de Vries, G. (2020). Public Communication as a Tool to Implement Environmental Policies. *Social Issues and Policy Review*, *14*(1), 244–272. https://doi.org/10.1111/sipr.12061

Deserti, A., Rizzo, F., & Cobalini, O. (2018). From Social Design To Design for Social Innovation the Evolution of Social Design. *Atlas of Social Innovation – New Practices for a Better Future*. https://www.socialinnovationatlas.net/fileadmin/PDF/einzeln/01_SI-Landscape_Global_Trends/01_14_From-Social-Design_Deserti-Rizzo-Cobanli.pdf

Design Council. (2020). *What is the framework for innovation? Design Council's evolved Double Diamond*. https://www.designcouncil.org.uk/news-opinion/what-framework-innovation-design-councils-evolved-double-diamond

Design Kit. (2021). *Co-Creation Session*. IDEO. https://www.designkit.org/methods/co-creation-session

Doğadan. (2021). *Regl Dönemine Özel Çay*. https://www.dogadan.com.tr/tr/urun-detay/regl-donemine-ozel-cay/158

Doorley, S., Holcomb, S., Klebahn, P., Segovia, K., & Utley, J. (2018). Design Thinking Bootleg. *Design Thinking Bootleg*, 90. https://dschool.stanford.edu/resources/design-thinking-bootleg

Douglas, M. (1979). *Taboo*. *20*. http://anth198.pbworks.com/f/Douglas+-+Taboo.pdf

Durlinger, A. L. L., Visser, J. A., & Themmen, A. P. N. (2002). *Regulation of ovarian function: the role of anti-Müllerian hormone*. 601–609.

Eko. (2021). *Expand your creative toolbox: Create your own interactive films.* https://studio.eko.com/tool

European Commission. (2020). *Social innovation*. https://ec.europa.eu/social/main.jsp?catId=1022

Eurostat. (2020). *Mean age of women at childbirth and at birth of first child*. https://ec.europa.eu/eurostat/databrowser/view/tps00017/default/line?lang=en

Evans, R. W., Avery, P. G., & Pederson, P. V. (1999). Taboo Topics: Cultural Restraint on Teaching Social Issues. *The Social Studies*, *90*(5), 218–224. https://doi.org/10.1080/00377999909602419

Face Aging MN. (2021). *What is Face Aging MN? Why is this campaign needed now?* https://faceagingmn.org/issues-facts/faq/

Fajardo, G., Rehm, J., & Joffres, K. (2012). *Turning Design Thinking to Design Doing*. Stanford Social Innovation Review (SSIR). https://ssir.org/articles/entry/turning_design_thinking_to_design_doing#

Fanchin, R. (2018). In vitro fertilization (IVF). *Encyclopedia of Endocrine Diseases*, *2*(April), 595–598. https://doi.org/10.1016/B978-0-12-801238-3.95849-5

Fine, P. C. (2017). Social Design. *Sustainable Graphic Design*, 1–8. https://doi.org/10.5040/9781474277648.ch-005

Finn, H. (2011). *My Fertility Crisis*. The Wall Street Journal. https://www.wsj.com/articles/SB10001424053111903461104576458134196248312

Fischer, G., Giaccardi, E., Ye, Y., Sutcliffe, A. G., & Mehandjiev, N. (2004). Meta-design. *Communications of the ACM*, *47*(9), 33–37. https://doi.org/10.1145/1015864.1015884

Fogg, B. J. (2020). *Prompts tell people to "do it now!"* https://behaviormodel.org/prompts/

Fogg, B. J. (2009). *A Behavior Model for Persuasive Design*. 1–7. https://doi.org/10.1145/1541948.1541999

Fong, S. L., Baart, E. B., Martini, E., Schipper, I., Visser, J. A., Themmen, A. P. N., de Jong, F. H., Fauser, B. J. C. M., & Laven, J. S. E. (2008). Anti-Müllerian hormone: A marker for oocyte quantity, oocyte quality and embryo quality? *Reproductive BioMedicine Online*, *16*(5), 664–670. https://doi.org/10.1016/S1472-6483(10)60480-4

Freud. (1955). Totem and Taboo (1913). In *The Standard Edition of the Complete Psychological Works of Sigmund Freud* (Vol. 13).

García, D., Vassena, R., Prat, A., & Vernaeve, V. (2016). Increasing fertility knowledge and awareness by tailored education: A randomized controlled trial. *Reproductive BioMedicine Online*, *32*(1), 113–120. https://doi.org/10.1016/j.rbmo.2015.10.008

Gazan, O. (2019). *Orkid'in Ödül Kazanan Utanç Paketleri Kampanyası Tartışma Yarattı*. Bigumigu. https://bigumigu.com/haber/orkidin-odul-kazanan-utanc-paketleri-kampanyasi-tartisma-yaratti/

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). The Scope Of Health Behavior And Health Education. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health Behavior And Health Education : Theory, Research, and Practice* (Fourth Edi, pp. 3–18). John Wiley & Sons, Inc.

Goldstein, J. R. (2009). How Populations Age. *International Handbook of Population Aging*, 7–18. https://doi.org/10.1007/978-1-4020-8356-3_1

Gray, D., Brown, S., & Macanufo, J. (2010). *Gamestorming* (C. Wheeler (ed.)). O'Reilly Media, Inc.

Grizzell, J. (2021). *Behavior Change Theories and Models*. https://www.cpp.edu/~jvgrizzell/best_practices/bctheory.html#Learning Theories

Groat, L., & Wang, D. (2004). Architectural Research Methods. In *Nexus Network Journal*.

Guardian, T. (2017). *"We're having a menstrual liberation": how periods got woke*. https://www.theguardian.com/society/2017/nov/11/periods-menstruation-liberation-women-activists-abigail-radnor?CMP=Share_iOSApp_Other

Guidotti, R. (2021). *Positive Exposure*. https://positiveexposure.org/

Gunn, H. (2002). Web-based surveys: Changing the survey process. In *First Monday*. https://doi.org/10.5210/fm.v7i12.1014

Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü. (2019). Türkiye Nüfus ve Sağlık Araştırması. In *Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü*.

Hammarberg, K. (2005). Reasons for delaying childbearing. *Australian Family Physician*, *3*, 2003–2005.

Hammarberg, K., Norman, R. J., Robertson, S., McLachlan, R., Michelmore, J., & Johnson, L. (2017). Development of a health promotion programme to improve awareness of factors that affect fertility, and evaluation of its reach in the first 5 years. *Reproductive Biomedicine and Society Online*, *4*, 33–40. https://doi.org/10.1016/j.rbms.2017.06.002

Hampton, K. D., Newton, J. M., Parker, R., & Mazza, D. (2016). A qualitative study of the barriers and enablers to fertility-awareness education in general practice. *Journal of Advanced Nursing*, *72*(7), 1541–1551. https://doi.org/10.1111/jan.12931

Harper, J., Boivin, J., O'Neill, H. C., Brian, K., Dhingra, J., Dugdale, G., Edwards, G., Emmerson, L., Grace, B., Hadley, A., Hamzic, L., Heathcote, J., Hepburn, J., Hoggart, L., Kisby, F., Mann, S., Norcross, S., Regan, L., Seenan, S., … Balen, A. (2017). The need to improve fertility awareness. *Reproductive Biomedicine and Society Online*, *4*, 18–20. https://doi.org/10.1016/j.rbms.2017.03.002

Hassan, M. A. M., & Killick, S. R. (2003). Effect of male age on fertility: Evidence for the decline in male fertility with increasing age. *Fertility and Sterility*, *79*(SUPPL. 3), 1520–1527. https://doi.org/10.1016/S0015-0282(03)00366-2

Hensoldt-Fyda, M. (2018). Cultural Taboo in Advertising. Differences in the Transmissions of Audiovisual Advertising in American and Hindu Market. *Social Communication*, *4*(1), 88–100. https://doi.org/10.2478/sc-2018-0010

Hertenstein, J. H., Platt, M. B., & Veryzer, R. W. (2005). The impact of industrial design effectiveness on corporate financial performance. *Journal of Product Innovation Management*, *22*(1), 3–21. https://doi.org/10.1111/j.0737-6782.2005.00100.x

Hughes, R. (2008). Encyclopedia Of The Neurological Sciences. In *Journal of Chemical Information and Modeling* (Vol. 53, Issue 9). https://doi.org/10.1017/CBO9781107415324.004

IDEO. (2008). *Shimano's Coasting Project*. https://www.ideo.com/news/shimanos-coasting-project-wins-gold-idea-award-for-design-excellence

IDEO. (2012). *Redesigning How Ethiopian Farmers Plant Their Most Important Crop*. https://www.ideo.org/project/new-life-for-an-ancient-grain

IDEO. (2021a). *Expert Interview*. https://www.designkit.org/methods/expert-interview

IDEO. (2021b). *Reimagining How Families Access Social Benefits*. https://www.ideo.org/project/wic-benefits

IDEOU. (2020a). *Design Thinking*. Https://Www.Ideou.Com/Pages/Design-Thinking. https://www.ideou.com/pages/design-thinking

IDEOU. (2020b). *What is Design Thinking?* Https://Www.Ideou.Com/Blogs/Inspiration/What-Is-Design-Thinking. https://www.ideou.com/blogs/inspiration/what-is-design-thinking

IDEOU. (2021). *Brainstorming*. https://www.ideou.com/pages/brainstorming

IKEA. (2020). *Eliminating single-use plastics and keeping plastic waste out of our oceans*. https://about.ikea.com/en/sustainability/healthy-and-sustainable-living/eliminating-single-use-plastics

Ilhan, H. O., Serbes, G., & Aydin, N. (2018). The Effects of the Modified Overlapping Group Shrinkage Technique on the Sperm Segmentation in the Stained Images. *2018 41st International Conference on Telecommunications and Signal Processing, TSP 2018*, 598–601. https://doi.org/10.1109/TSP.2018.8441271

Industrial Designers Society of America. (2020). *What Is Industrial Design?* https://www.idsa.org/what-industrial-design

Janzer, C. L., & Weinstein, L. s. (2014). Social Design and Neocolonialism. *Art in Translation*, *6*(4), 437–448. https://doi.org/10.2752/175613114X14105155617429

Johnson, S. L., Dunleavy, J., Gemmell, N. J., & Nakagawa, S. (2015). Consistent age-dependent declines in human semen quality: A systematic review and meta-analysis. *Ageing Research Reviews*, *19*, 22–33. https://doi.org/10.1016/j.arr.2014.10.007

Johnston-Robledo, I., Wares, S., Fricker, J., & Pasek, L. (2007). Indecent exposure: Self-objectification and young women's attitudes toward breastfeeding. *Sex Roles*, *56*(7–8), 429–437. https://doi.org/10.1007/s11199-007-9194-4

Jurewicz, J., Radwan, M., Sobala, W., Ligocka, D., Radwan, P., Bochenek, M., & Hanke, W. (2014). Lifestyle and semen quality: Role of modifiable

risk factors. *Systems Biology in Reproductive Medicine*, *60*(1), 43–51. https://doi.org/10.3109/19396368.2013.840687

Kanevsky, L. (2016). *Assessing Students ' Perceptions of the Effectiveness of Instructional Interventions with Post-Pre Surveys*. 1–14.

Kelsey, T. W., Wright, P., Nelson, S. M., Anderson, R. A., & Wallace, W. H. B. (2011). A validated model of serum Anti-Müllerian hormone from conception to menopause. *PLoS ONE*, *6*(7). https://doi.org/10.1371/journal.pone.0022024

Kentsel Strateji. (2015). *Social Impact Design SID Toolkit*.

Ketchum. (2017). *Essity Libresse: #BloodNormal*. https://www.ketchum.com/work/libresse-case-study-blood-normal-period-taboos-ketchum/

Kim, M., & Hunter, J. (1993). Relationships Among Attitudes, Behavioral Intentions, and Behavior. *Communication Research*, *20*, 331–364.

Kiran, H., Arikan, D. C., Coskun, A., Kaplanoglu, M., Kiran, G., Ozdemir, O., & Cetin, M. T. (2012). Family planning choices in couples using contraception without knowing they are infertile: Should newly-wed men undergo a routine spermiogram? *Urologia Internationalis*, *88*(2), 183–186. https://doi.org/10.1159/000333116

Kız Kardeşim. (2021). *Kız Kardeşim Projesi Hakkında*. https://kizkardesim.net/hakkimizda/

Kleinsmann, M., & Valkenburg, R. (2008). Barriers and enablers for creating shared understanding in co-design projects. *Design Studies*, *29*(4), 369–386. https://doi.org/10.1016/j.destud.2008.03.003

Korp, P. (2006). Health on the Internet: Implications for health promotion. *Health Education Research*, *21*(1), 78–86. https://doi.org/10.1093/her/cyh043

Kruszynska, A., & Slowinska-Srzednicka, J. (2017). Anti-Müllerian hormone (AMH) as a good predictor of time of menopause. *Przeglad Menopauzalny*, *16*(2), 47–50. https://doi.org/10.5114/pm.2017.68591

Kudesia, R., Chernyak, E., & McAvey, B. (2017). Low fertility awareness in United States reproductive-aged women and medical trainees: creation and validation of the Fertility & Infertility Treatment Knowledge Score (FIT-KS). *Fertility and Sterility*, *108*(4), 711–717. https://doi.org/10.1016/j.fertnstert.2017.07.1158

Kühnert, B., & Nieschlag, E. (2004). Reproductive functions of the ageing male. *Human Reproduction Update*, *10*(4), 327–339. https://doi.org/10.1093/humupd/dmh030

Kumar, V. (2013). *101 Design Methods: a structured approach for driving innovation in your organization*. John Wiley & Sons, Inc.

Kumru, R. (2020). *Kamusal Alanda Tabusal Konular*. Spotify. https://www.kamusalalandatabusalkonular.com/

Lamastro, V. (2001). Childless by choice? Attributions and attitudes concerning family size. *Social Behavior and Personality*. https://doi.org/10.2224/sbp.2001.29.3.231

Lambek, M. (2001). Taboo. *International Encyclopedia of the Social & Behavioral Sciences: Second Edition*, *23*, 1–3. https://doi.org/10.1016/B978-0-08-097086-8.12152-X

Lampic, C., Svanberg, A. S., Karlström, P., & Tydén, T. (2006). Fertility awareness, intentions concerning childbearing, and attitudes towards parenthood among female and male academics. *Human Reproduction*, *21*(2), 558–564. https://doi.org/10.1093/humrep/dei367

Lapan, S. D., Quartaroli, M. T., & Riemer, F. J. (2012). Introduction to Qualitative Research. In *Qualitative research : an introduction to methods and designs* (First Edit, pp. 1–18).

Lapointe, L., Ramaprasad, J., & Vedel, I. (2014). Creating health awareness: A social media enabled collaboration. *Health and Technology*, *4*(1), 43–57. https://doi.org/10.1007/s12553-013-0068-1

Lee, M. (2019). I wish I had known sooner: stratified reproduction as a consequence of disparities in infertility awareness, diagnosis, and management. *Women and Health*, *59*(10), 1185–1198. https://doi.org/10.1080/03630242.2019.1593283

Lee, R., & Mason, A. (2010). Fertility, Human Capital, and Economic Growth over the Demographic Transition. *European Journal of Population*, *26*(2), 159–182. https://doi.org/10.1007/s10680-009-9186-x

Lee, T. Y., Sun, G. H., & Chao, S. C. (2001). The effect of an infertility diagnosis on the distress, marital and sexual satisfaction between husbands and wives in Taiwan. *Human Reproduction*, *16*(8), 1762–1767. https://doi.org/10.1093/humrep/16.8.1762

Leech, N. L., & Onwuegbuzie, A. J. (2009). A typology of mixed methods research designs. *Quality and Quantity*, *43*(2), 265–275. https://doi.org/10.1007/s11135-007-9105-3

Lesh, R. A., Kelly, A. E., & Yoon, C. (2008). Multitiered Design Experiments in Mathematics, Science, and Technology Education. In *Handbook of Design Research Methods in Education: Innovations in Science, Technology, Engineering, and Mathematics Learning and Teaching*.

Lockton, D. (2017). Design , behaviour change , and the Design with Intent toolkit :Theories and Practices of Designing for Change. In *Design for Behaviour Change* (pp. 58–73). https://doi.org/10.4324/9781315576602-6

Mac Dougall, K., Beyene, Y., & Nachtigall, R. D. (2013a). Age shock: Misperceptions of the impact of age on fertility before and after IVF in women who conceived after age 40. *Human Reproduction*, *28*(2), 350–356. https://doi.org/10.1093/humrep/des409

Mac Dougall, K., Beyene, Y., & Nachtigall, R. D. (2013b). Age shock: Misperceptions of the impact of age on fertility before and after IVF in women who conceived after age 40. *Human Reproduction*, *28*(2), 350–356. https://doi.org/10.1093/humrep/des409

Maeda, E., Sugimori, H., Nakamura, F., Kobayashi, Y., Green, J., Suka, M., Okamoto, M., Boivin, J., & Saito, H. (2015). A cross sectional study

on fertility knowledge in Japan, measured with the Japanese version of Cardiff Fertility Knowledge Scale (CFKS-J) General. *Reproductive Health*, *12*(1). https://doi.org/10.1186/1742-4755-12-10

MAGNA. (2017). *New Research Identifies Effective Lever For Consumer Attention In The Mobile Era.* https://www.magnaglobal.com/wp-content/uploads/2017/10/Tremor-IPG-Media-Trial.pdf

Maheshwari, A., Porter, M., Shetty, A., & Bhattacharya, S. (2008). Women's awareness and perceptions of delay in childbearing. *Fertility and Sterility*, *90*(4), 1036–1042. https://doi.org/10.1016/j.fertnstert.2007.07.1338

Manzini, E. (2014). *Making Things Happen: Social Innovation and Design*. *30*(1), 57–66. https://doi.org/10.1162/DESI

Manzini, E. (2015a). Design, When Everybody Designs: An Introduction to Design for Social Innovation. In *MIT Press*.

Manzini, E. (2015b). *Design for Social Innovation* (pp. 102–112). https://doi.org/10.7551/mitpress/9873.003.0007

Markussen, T. (2011). *The Disruptive Aesthetics Of Design Activism: Enacting Design Between Art And Politics.*

Markussen, T. (2013). The disruptive aesthetics of design activism: Enacting design between art and politics. *Design Issues*. https://doi.org/10.1162/DESI_a_00195

Martin, J. A., Hamilton, B. E., Osterman, M. J. K., & Driscoll, A. K. (2019). Births: Final data for 2018. *National Vital Statistics Reports*, *68*(13), 1980–2018.

Mastercard. (2021). *Help build a future we can all live in*. https://www.mastercard.us/en-us/personal/find-a-card/wildlife-impact-gift-card.html

Meroni, A., Fassi, D., & Simeone, G. (2013). Design for social innovation as a form of designing activism. An action format. *Nesta*, *November*, 1–15.

Mills, M., Rindfuss, R. R., McDonald, P., & te Velde, E. (2011). Why do people postpone parenthood? Reasons and social policy incentives. *Human Reproduction Update*, *17*(6), 848–860. https://doi.org/10.1093/humupd/dmr026

Mogilevkina, I., Stern, J., Melnik, D., Getsko, E., & Tydén, T. (2016). Ukrainian medical students attitudes to parenthood and knowledge of fertility. *European Journal of Contraception and Reproductive Health Care*, *21*(2), 189–194. https://doi.org/10.3109/13625187.2015.1130221

Montaño, D. E., & Kasprzyk, D. (2008). Theory Of Reasoned Action, Theory Of Planned Behavior, And The Integrated Behavioral Model. In K. Glanz, B. k. Rimer, & K. Viswanath (Eds.), *Health Behavior And Health Education : Theory, Research, and Practice* (4th ed., pp. 67–96).

Montero, C. (2020). *Netflix And Un Women Launch Special Collection Curated By 55 Groundbreaking Women In Entertainment*. Netflix.

https://about.netflix.com/en/news/netflix-un-women-launch-special-collection-curated-by-55-groundbreaking-women-in-entertainment

Moody, S. (1980). The role of industrial design in technological innovation. *Design Studies*, *1*(6), 329–339. https://doi.org/10.1016/0142-694X(80)90039-3

Mortati, M., & Villari, B. (2014). Design for Social Innovation. Building a framework of connection between Design and Social Innovation. *Design for Social Innovation. Building a Framework of Connection between Design and Social Innovation*, 79–89. www.sfmade.org

Mukhopadhyay, C. C., Blumenfield, T., Harper, S., & Gondek, A. (2019). Gender and Sexuality. *Teaching and Learning Anthropology*, *2*(1). https://doi.org/10.5070/t30041211

Mulgan, G. (2006). The Process of Social Innovation. *Innovations: Technology, Governance, Globalization*, *1*(2), 145–162. https://doi.org/10.1162/itgg.2006.1.2.145

Mulgan, G. (2014). Design in public and social innovation, what works and what could work better. *Nesta Publications*, 1–7. http://www.nesta.org.uk/sites/default/files/design_in_public_and_social_innovation.pdf

Mulgan, G., Tucker, S., Ali, R., & Sanders, B. (2008). social innovation What it is, Why it matters and hoW it can be accelerated. In *Biological Control* (Vol. 44, Issue 2). https://doi.org/10.1016/j.biocontrol.2007.10.015

Nichols, B. (2013). Valuing the art of Industrial Design: A Profile of the Sector and its Importance to Manufacturing, Technology, and Innovation. In *Design Management Review* (Vol. 56). https://doi.org/10.1111/drev.10262

Niedderer, K. (2013). *Mindful Design as a Driver for Social Behaviour Change*. 4561–4571. https://iasdr.net/

Niedderer, K., Ludden, G., Clune, S., Lockton, D., Mackrill, J., Morris, A., Cain, R., Gardiner, E., Evans, M., Gutteridge, R., & Hekkert, P. (2016). Design for Behaviour Change as a Driver for Sustainable Innovation Challenges and Opportunities for Implementation in the Private and Public Sectors. *International Journal of Design*, *10*(2), 67–85.

Noble, Z. (2021). *We Are Childfree*. https://wearechildfree.com/about

Nussbaum, M. (2002). Capabilities and social justice. *International Studies Review*, *4*(2), 123–135. https://doi.org/10.1111/1521-9488.00258

Ombelet, W., Cooke, I., Dyer, S., Serour, G., & Devroey, P. (2008). Infertility and the provision of infertility medical services in developing countries. *Human Reproduction Update*, *14*(6), 605–621. https://doi.org/10.1093/humupd/dmn042

Papanek, V. (1972). *Design for the Real World by Victor Papanek*. https://monoskop.org/images/f/f8/Papanek_Victor_Design_for_the_Real_World.pdf

Parra, G., Klerkx, J., & Duval, E. (2014). Understanding engagement with interactive public displays: An awareness campaign in the wild. *PerDis 2014 - Proceedings: 3rd ACM International Symposium on Pervasive Displays 2014*, 180–185. https://doi.org/10.1145/2611009.2611020

Pashigian, M. J. (2002). Conceiving the happy family: Infertility and marital politics in Northern Vietnam. *Infertility Around the Globe: New Thinking on Childlessness, Gender and Reproductive Technologies*, 134–151.

Pedro, J., Brandão, T., Schmidt, L., Costa, M. E., & Martins, M. V. (2018). What do people know about fertility? A systematic review on fertility awareness and its associated factors. *Upsala Journal of Medical Sciences*, *123*(2), 71–81. https://doi.org/10.1080/03009734.2018.1480186

Perks, H., Cooper, R., & Jones, C. (2005). Characterizing the role of design in new product development: An empirically derived taxonomy. *Journal of Product Innovation Management*, *22*(2), 111–127. https://doi.org/10.1111/j.0737-6782.2005.00109.x

Peterson, B. D., Pirritano, M., Tucker, L., & Lampic, C. (2012). Fertility awareness and parenting attitudes among American male and female undergraduate university students. *Human Reproduction*, *27*(5), 1375–1382. https://doi.org/10.1093/humrep/des011

Pham, T. N., & Vo, D. H. (2020). *Ageing Population and Economic Growth in Developing Countries A Quantile Regression Approach*. *103279*.

Press, C. (2010). *Sexual Taboos and Social Boundaries Author (s): Christie Davies Source : The American Journal of Sociology , Vol . 87 , No . 5 (Mar ., 1982), pp . 1032-1063 Published by : The University of Chicago Press Stable URL : http://www.jstor.org/stable/277841*. *87*(5), 1032–1063.

Prior, E., Lew, R., Hammarberg, K., & Johnson, L. (2018). Fertility facts, figures and future plans: an online survey of university students. *Human Fertility*, *0*(0), 1–8. https://doi.org/10.1080/14647273.2018.1482569

Prochaska, J., Johnson, S., & Lee, P. (1998). The transtheoretical model of behavior change. In S. Schumaker, E. Schron, J. Ockene, & W. McBee (Eds.), *The Handbook of Health Behavior Change* (2nd ed.).

Ramazanzadeh, F., Noorbala, A. A., Abedinia, N., & Naghizadeh, M. M. (2009). Emotional adjustment in infertile couples. *Iranian Journal of Reproductive Medicine*, *7*(3), 97–103.

Ramirez, M. (2012). *The role of industrial design consultancies in diffusing the concept of ecodesign Design Society Bangkok*. *July 2012*, 90–101.

Readex Research. (2020). *Notes on the Pre- and Post-Survey*. *March*.

Retegi, A., Sauvage, B., Predan, B., Tomás, E., Schosswohl, G., Kaltenbrunner, M., & Draganovská, D. (2019). *The Co-Create Handbook for Creative*. 48. http://www.cocreate.training/wp-content/uploads/2019/03/co-design_handbook_FINAL.pdf

Reynaud, C., & Miccoli, S. (2018). Depopulation and the aging population: The relationship in Italian municipalities. *Sustainability (Switzerland)*, *10*(4). https://doi.org/10.3390/su10041004

Rodríguez-Ferradas, M. I., Morer, P., & Cazón, A. (2016). The social role of design. Industrial Design is a holistic approach for problem solving. *Temes de Disseny*, *32*, 98–109. https://www.raco.cat/index.php/Temes/article/view/310583

Roser, M. (2017). *Fertility Rate*. https://ourworldindata.org/fertility-rate

Sabancı Vakfı. (2021). *Turkey's Changemakers*. https://www.farkyaratanlar.org/

Salama, S., & Aboukoura, K. (2018). Role of Emotions in Climate Change Communication. In *Handbook of Climate Change Communication: Vol. 1 Theory of Climate Change Communication* (Vol. 1, pp. 137–149).

Sanders, E. B.-N. (2000). Generative Tools for Co-designing. In *Collaborative Design*. https://doi.org/10.1007/978-1-4471-0779-8_1

Sanders, E. B.-N. (2020). *Generative Design Research For Social Innovation*. https://current.ecuad.ca/generative-design-research-for-social-innovation

Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, *4*(1), 5–18. https://doi.org/https://doi.org/10.1080/15710880701875068

Schmidt, K. (2002). The Problem with 'Awareness.' *Entomologia Experimentalis et Applicata*, *103*(3), 239–248. https://doi.org/10.1023/A

Schoonenboom, J., & Johnson, R. B. (2017). How to Construct a Mixed Methods Research Design. *Kolner Zeitschrift Fur Soziologie Und Sozialpsychologie*, *69*, 107–131. https://doi.org/10.1007/s11577-017-0454-1

Schrage, M. (2000). *Serious play: how the world's best companies simulate to innovate* (pp. 1–264).

Scrivener, S. A. R., Ball, L. J., & Andrée, W. (2000). Collaborative Design: Proceedings of CoDesigning 2000. In *Journal of Chemical Information and Modeling*.

Serin, A., Aldanmaz, B., Tunaboylu, G., İleri, G., Eskitaşçıoğlu, İ., Özırmak, İ., & Eskitaşçıoğlu, P. (2020). *Regl Olmayanlar İçin Regl Kılavuzu*. https://konusmamizgerek.org/regl-kilavuzu/

Shahzadi, S., Chaudhry, A. G., & Irfan, M. (2007). Socio Psychological Issues Faced By Women: a Case Study of Infertility. *The Explorer Islamabad: Journal of Social Sciences ISSN (E*, *1*(6), 2411–132. www.theexplorerpak.org

Sherring, P. (2021). Using Co-Design to Create Community Advocacy for Biosecurity Behavior Change. *Social Marketing Quarterly*, *27*(2), 67–81. https://doi.org/10.1177/15245004211003111

Shimray, S. R. (2019). Ways to create awareness on cultural heritage: An overview. *Library Philosophy and Practice*, *2019*.

Shreffler, K. M., Greil, A. L., & McQuillan, J. (2017). Responding to Infertility: Lessons from a Growing Body of Research and Suggested Guidelines for Practice. *Family Relations*, *66*(4), 644–658. https://doi.org/10.1111/fare.12281

Shrubsole, P., Lavrysen, T., Janse, M. D., & Weda, H. (2011). Flo: Raising family awareness about electricity use. *Conference on Human Factors in Computing Systems - Proceedings*, 669–672. https://doi.org/10.1145/1979742.1979665

Slater, M. D. (2002). Entertainment education and the persuasive impact of narratives. In M. C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative Impact Social and Cognitive Foundations*. Lawrence Erlbaum Associates Publishers.

Sørensen, N. O., Marcussen, S., Backhausen, M. G., Juhl, M., Schmidt, L., Tydén, T., & Hegaard, H. K. (2016). Fertility awareness and attitudes towards parenthood among Danish university college students. *Reproductive Health*, *13*(1), 1–10. https://doi.org/10.1186/s12978-016-0258-1

Steen, M. (2013). Co-design as a process of joint inquiry and imagination. *Design Issues*, *29*(2), 16–28. https://doi.org/10.1162/DESI_a_00207

Stentz, N. C., Griffith, K. A., Perkins, E., Jones, R. D., & Jagsi, R. (2016). Fertility and Childbearing among American Female Physicians. *Journal of Women's Health*, *25*(10), 1059–1065. https://doi.org/10.1089/jwh.2015.5638

Svanberg, A. S., Lampic, C., Karlström, P. O., & Tydén, T. (2006). Attitudes toward parenthood and awareness of fertility among postgraduate students in Sweden. *Gender Medicine*, *3*(3), 187–195. https://doi.org/10.1016/S1550-8579(06)80207-X

Szebeko, D., Tan, L., & Szebeko, D. (2010). *Co-designing for Society*. 580–587.

The Digital Medic. (2015). *Foundations Of Maternal And Child Health*. https://digitalmedic.stanford.edu/our-work/maternal-child-health/

The Digital Medic. (2018). *100% Breastfed*. https://digitalmedic.stanford.edu/our-work/100-breastfed/#:~:text=The 100%25 Breastfed Initiative is,including%3A The Western Cape Dept.&text=In South Africa%2C rates of,the lowest in the world.

The Flying Broom. (2013). *Çocuk Gelinler Projesi*. https://ucansupurge.org.tr/cocuk-gelinler-sabanci-projesi-2011-2013/

This Girl Can. (2021). *No one gets to choose how you exercise other than you.* https://www.thisgirlcan.co.uk/

Toprac, P., & Abdel-Meguid, A. (2010). Causing fear, suspense, and anxiety using sound design in computer games. *Game Sound Technology and Player Interaction: Concepts and Developments*, *September 2010*, 176–191. https://doi.org/10.4018/978-1-61692-828-5.ch009

Tough, S. C., Newburn-Cook, C., Johnston, D. W., Svenson, L. W., Rose, S., & Belik, J. (2002). Delayed childbearing and its impact on population

rate changes in lower birth weight, multiple birth, and preterm delivery. *Pediatrics*.

Tramontana, M. K. (2021). *Women Who Said No to Motherhood*. The New York Times. https://www.nytimes.com/2021/05/03/style/childfree-women.html

Tromp, N., & Hekkert, P. (2014). Social Implication Design (SID) - A design method to exploit the unique value of the artefact to counteract social problems. *Design Research Society*, *Figure 1*, 15.

UN WOMEN. (2020). Gender Equality: Women's Rights in Review 2020. In *Gender Equality: Women's Rights in Review 2020*. https://doi.org/10.18356/90ff6c86-en

United Nations. (2013). World Population Policies 2013. In *Population and Development Review* (Vol. 5, Issue 4). https://doi.org/10.2307/1971985

United Nations. (2019). World population prospects 2019. In *Department of Economic and Social Affairs. World Population Prospects 2019.* (Issue 141). http://www.ncbi.nlm.nih.gov/pubmed/12283219

United Nations Population Fund. (2016). *Sexual & reproductive health*. https://www.unfpa.org/sexual-reproductive-health

Valentine, L., Kroll, T., Bruce, F., Lim, C., & Mountain, R. (2017). Design Thinking for Social Innovation in Health Care. *Design Journal*, *20*(6), 755–774. https://doi.org/10.1080/14606925.2017.1372926

Van Gurp, M. (2008). *Torture this goose*. https://osocio.org/message/torture-this-goose/

Van Mechelen, M., Laenen, A., Zaman, B., Willems, B., & Abeele, V. Vanden. (2019). Collaborative Design Thinking (CoDeT): A co-design approach for high child-to-adult ratios. *International Journal of Human Computer Studies*, *130*(June), 179–195. https://doi.org/10.1016/j.ijhcs.2019.06.013

Vance, C. S. (1984). Pleasure and Danger: Toward a Politics of Sexuality. *Pleasure and Danger: Exploring Female Sexuality*, 1–27.

Vander Borght, M., & Wyns, C. (2018). Fertility and infertility: Definition and epidemiology. *Clinical Biochemistry*, *62*(March), 2–10. https://doi.org/10.1016/j.clinbiochem.2018.03.012

Vassard, D., Lallemant, C., Andersen, A. N., Macklon, N., & Schmidt, L. (2016). A population-based survey on family intentions and fertility awareness in women and men in the United Kingdom and Denmark. *Upsala Journal of Medical Sciences*, *121*(4), 244–251. https://doi.org/10.1080/03009734.2016.1194503

Vautier, G., & Hepburn, J. (n.d.). *Fertility Fest*. Retrieved June 28, 2020, from https://www.fertilityfest.com/our-mission

Verplanken, B., & Roy, D. (2015). Consumer habits and sustainable consumption. In L. Reisch & J. Thogersen (Eds.), *Handbook of Research on*

Sustainable Consumption (pp. 243–253). Edward Elgar Publishing Ltd.

Wang, J. (2013). The importance of aristotle to design thinking. *Design Issues*, *29*(2), 4–15. https://doi.org/10.1162/DESI_a_00206

WDO. (2020). *Definition of Industrial Design*. https://wdo.org/about/definition/

WHO. (2018). *ICD-11 for Mortality and Morbidity Statistics*. https://icd.who.int/browse11/l-m/en

WHO. (2020). *Multiple definitions of infertility*. https://www.who.int/reproductivehealth/topics/infertility/multiple-definitions/en/

Wiersema, N. J., Drukker, A. J., Dung, M. B. T., Nhu, G. H., Nhu, N. T., & Lambalk, C. B. (2006). Consequences of infertility in developing countries: Results of a questionnaire and interview survey in the South of Vietnam. *Journal of Translational Medicine*, *4*, 1–8. https://doi.org/10.1186/1479-5876-4-54

Wisdom, J., & Creswell, J. W. (2013). Integrating quantitative and qualitative data collection and analysis while studying patient-centered medical home models. *Agency for Healthcare Reseach and Quality*, *13-0028-EF*, 1–5. https://doi.org/No. 13-0028-EF.

WWF. (2013). *Ad campaign aims to reduce Vietnamese demand for rhino horn*. https://wwf.panda.org/wwf_news/?208289/Ad-campaign-aims-to-reduce-Vietnamese-demand-for-rhino-horn

Young, G. B. (2014). Awareness. *Encyclopedia of the Neurological Sciences*, *1*(2010), 358–358. https://doi.org/10.1016/B978-0-12-385157-4.00312-2

Yusuf, M. M., Mohamed, S., & Basah, M. Y. A. (2020). The impact of ageing population on Malaysian economic growth. *ASM Science Journal*, *13*(2018). https://doi.org/10.32802/asmscj.2020.sm26(1.24)

Zamenopoulos, T., & Alexiou, K. (2019). *Co-design As Collaborative Research* (Issue January 2018).

Zanna, M. P., & Rempel, J. K. (1988). Attitudes: A New Look at an Old Concept. In D. Bar-Tal & A. W. Kruglanski (Eds.), *The Social Psychology of Knowledge* (pp. 315–334). Cambridge University Press.

Zegers-Hochschild, F., Adamson, G. D., Dyer, S., Racowsky, C., de Mouzon, J., Sokol, R., Rienzi, L., Sunde, A., Schmidt, L., Cooke, I. D., Simpson, J. L., & van der Poel, S. (2017). The International Glossary on Infertility and Fertility Care, 2017. *Fertility and Sterility*, *108*(3), 393–406. https://doi.org/10.1016/j.fertnstert.2017.06.005

Zhang, N. J., Guo, M., & Zheng, X. (2012). China: Awakening giant developing solutions to population aging. *Gerontologist*, *52*(5), 589–596. https://doi.org/10.1093/geront/gns105

APPENDICES

APPENDIX A: Pre-Survey Questions

APPENDIX B: Post-Survey Questions

APPENDIX A

"İstanbul Teknik Üniversitesi Endüstri Ürünleri Tasarımı bölümü öğretim üyesi Dr. Deniz Leblebici Başar ve lisansüstü öğrencisi Reşat Şaşik tarafından yürütülen "Kariyer Hedefleri Doğrultusunda Ebeveynlik Planları Araştırması" konusunda yürütülen araştırmaya katılımınız rica olunmaktadır. Bu çalışmada katılımınız tamamen gönüllülük esasına dayanır. Lütfen aşağıdaki bilgileri okuyunuz ve katılmaya karar vermeden önce anlamadığınız herhangi bir şey varsa çekinmeden sorunuz.

Bu çalışmayla bağlantılı olarak elde edilen ve sizinle özdeşleşmiş her bilgi gizli kalacak, üçüncü kişilerle paylaşılmayacaktır. Gizlilik, tanımlanmış bir kodlama prosedürüyle sağlanacak ve kod çözümüne erişim yalnızca çalışmanın sorumlusu araştırmacıyla sınırlı kalacaktır. Araştırma sonuçları tüm gizlilik ilkelerine uyularak sadece bilimsel çalışmalarda kullanılacaktır. Tüm veriler sınırlı erişime sahip güvenli ve şifreli bir veri tabanında tutulacaktır.

Bu çalışmanın içinde olmak isteyip istemediğinize tamamen bağımsız ve etki altında kalmadan karar veriniz. Bu çalışmaya gönüllü olarak katılmaya karar vermeniz halinde dahi herhangi bir aşamada çekilebilirsiniz.

ARAŞTIRMACININ KİMLİĞİ:

Bu araştırma ile ilgili herhangi bir sorunuz veya endişeniz varsa, lütfen iletişime geçiniz:

Reşat Şaşik
İstanbul Teknik Üniversitesi
Endüstri Ürünleri Tasarımı Yüksek Lisans Öğrencisi
E: sasik18@itu.edu.tr – resatsasik@gmail.com

PROJE YÜRÜTÜCÜSÜ KİMLİĞİ:

Dr. Öğr. Üyesi Deniz Leblebici Başar
İstanbul Teknik Üniversitesi
Endüstri Ürünleri Tasarımı
T: +90 212 285 7016 Dahili: 319
E: denizleblebici@itu.edu.tr

Kariyer Hedefleri Doğrultusunda Ebeveynlik Planları Araştırması

1- Cinsiyetiniz?
   a. Kadın
   b. Erkek
2- Yaşınız? _____
3- Eğitim Durumunuz?
   a. Lisans
   b. Yüksek Lisans
   c. Doktora
   d. Diğer _____
4- Medeni Durumunuz?
   a. Bekar
   b. Evli
   c. Diğer_____
5- Çocuğunuz var mı?
   a. Var
   b. Yok ama hamileyim / eşim hamile.

c. Yok, şimdilik erteliyoruz.
d. Yok, düşünmüyoruz.

Katılımcıların 5. soruya vereceği yanıta göre soru akışı değişecektir.
5. soruda a ya da b şıkkını tercih edenlerin soru akışı:

6- İlk çocuğunuza ve varsa diğer çocuklarınıza hangi yaş(lar)ta sahip oldunuz/ olacaksınız? _____

7- Kadın doğurganlığının yaşla değiştiğini düşünüyor musunuz?
   a. Evet
   b. Hayır

8- Sizce ilk kez çocuk sahibi olmak için en ideal yaş aralığı nedir? _____

9- Sizce en son çocuğunuzu doğurmak için en ideal yaş aralığı nedir? _____

10- Kadın doğurganlığı potansiyeli nelere bağlıdır? Sizce en önemliden en önemsize göre sıralayınız lütfen. (1 en önemli iken 6 daha az önemli olarak düşünülecektir ve her sütun için sadece bir satır seçmeniz gerekmektedir.)
   a. Yumurta rezervi
   b. Yaş
   c. Çevresel Faktörler
   d. Beslenme
   e. Genel Sağlık Durumu
   f. Genetik Faktörler

11- "Kadın yumurta rezervi" tıbbi terimi ile ilgili bilgilerden sizce doğru olanları işaretleyiniz? Birden çok seçenek işaretlenebilir.
   - Yumurta rezervi kadının yumurtalıklarında bulunan hücre sayısıdır.
   - Kadınlarda yumurta hücresi üretimi ergenlikle başlar ve her ay yeni yumurta hücresi üretilir.
   - Kadınlarda yumurta rezervi kadının doğuştan itibaren sahip olduğu yumurta hücresi sayısıdır.
   - Kadınlarda menopozdan sonra yumurta hücresi üretimi durur.
   - Kadının doğuşta sahip olduğu yumurta hücresi sayısı aylık döngülerde kaybedilerek sıfırlanır.
   - Doğurganlık potansiyeli yumurta rezervi ile ilişkilidir.
   - İlerleyen yaş yumurta hücresi kaybını hızlandırır.
   - Sağlıklı beslenme yumurta hücresi üretimini artırır.
   - Yumurta rezervi ölçülebilir.

12- Daha önce aile planlaması ve doğurganlık potansiyeli hakkında herhangi bir bilginiz var mıydı, nereden bilgi edindiniz? Lütfen açıklayınız.

_____

13- Çocuk sahibi olma konusunda düşüncelerinizi rahatça başkasıyla paylaşır mısınız yoksa ifade ederken otosansür uygular mısınız, lütfen açıklayınız?

_____

Çalışmamızın sonraki aşamalarında yapılacak olan farkındalık çalıştaylarına katkı sağlamak isterseniz size ulaşabileceğimiz e-mail adresinizi bizimle paylaşır mısınız? (Tüm bilgileriniz gizlilik çerçevesinde korunacaktır.)

E-mail adresiniz: _____

ÇOCUĞU OLAN VE HAMİLE / EŞİ HAMİLE OLAN KATILIMCILARIN ANKETİ BURADA SONA ERMEKTEDİR.

5. soruda c ya da d şıkkını tercih edenlerin soru akışı:

6- Çocuk sahibi olmayı düşünmemenizin veya ertelemenizin sebepleri aşağıdakilerden hangisi veya hangileridir?
   a. Kariyer hedefleri
   b. Ekonomik Güçlükler
   c. Çocuk sahibi olabilecek olgunlukta olduğumu düşünmüyorum.
   d. Kendime uygun bir eş bulamadım.
   e. Eşim çocuk sahibi olmayı henüz istemiyor.
   f. Diğer (lütfen belirtiniz.)

7- Kadın doğurganlığının yaşla değiştiğini düşünüyor musunuz?
   a. Evet
   b. Hayır

8- Sizce ilk kez çocuk sahibi olmak için en ideal yaş aralığı nedir? _____

9- Sizce en son çocuğu doğurmak için en ideal yaş aralığı nedir? _____

10- Kadın doğurganlığı potansiyeli nelere bağlıdır? Sizce en önemliden en önemsize göre sıralayınız lütfen. (1 en önemli iken 6 daha az önemli olarak düşünülecektir ve her sütun için sadece bir satır seçmeniz gerekmektedir.)
   a.Yumurta Rezervi
   b. Yaş
   c. Çevresel Faktörler
   d. Beslenme
   e. Genel Sağlık Durumu
   f. Genetik Faktörler

11- "Kadın yumurta rezervi" tıbbi terimi ile ilgili bilgilerden sizce doğru olanları işaretleyiniz? Birden çok seçenek işaretlenebilir.
- Yumurta rezervi kadının yumurtalıklarında bulunan hücre sayısıdır.
- Kadınlarda yumurta hücresi üretimi ergenlikle başlar ve her ay yeni yumurta hücresi üretilir.
- Kadınlarda yumurta rezervi kadının doğuştan itibaren sahip olduğu yumurta hücresi sayısıdır.
- Kadınlarda menopozdan sonra yumurta hücresi üretimi durur.
- Kadının doğuşta sahip olduğu yumurta hücresi sayısı aylık döngülerde kaybedilerek sıfırlanır.
- Doğurganlık potansiyeli yumurta rezervi ile ilişkilidir.
- İlerleyen yaş yumurta hücresi kaybını hızlandırır.
- Sağlıklı beslenme yumurta hücresi üretimini artırır.
- Yumurta rezervi ölçülebilir.

12- Daha önce aile planlaması ve doğurganlık potansiyeli hakkında herhangi bir bilginiz var mıydı, nereden bilgi edindiniz? Lütfen açıklayınız. _____

13- Çocuk sahibi olma konusunda düşüncelerinizi rahatça başkasıyla paylaşır mısınız yoksa ifade ederken otosansür uygular mısınız, lütfen açıklayınız?

Çalışmamızın sonraki aşamalarında yapılacak olan farkındalık çalıştaylarına katkı sağlamak isterseniz size ulaşabileceğimiz e-mail adresinizi bizimle paylaşır mısınız? (Tüm bilgileriniz gizlilik çerçevesinde korunacaktır.)
E-mail adresiniz: _____

ÇOCUĞU OLMAYIP ERTELEYEN VE HENÜZ DÜŞÜNMEYEN KATILIMCILARIN SORULARIYLA BERABER KATILIMCILARIN ANKETİ SONA ERMEKTEDİR.

APPENDIX B

"İstanbul Teknik Üniversitesi Endüstri Ürünleri Tasarımı bölümü öğretim üyesi Dr. Deniz Leblebici Başar ve lisansüstü öğrencisi Reşat Şaşik tarafından yürütülen "Kariyer Hedefleri Doğrultusunda Ebeveynlik Planları Araştırması" konusunda yürütülen araştırmaya katılımınız rica olunmaktadır. Bu çalışmada katılımınız tamamen gönüllülük esasına dayanır. Lütfen aşağıdaki bilgileri okuyunuz ve katılmaya karar vermeden önce anlamadığınız herhangi bir şey varsa çekinmeden sorunuz.

Bu çalışmayla bağlantılı olarak elde edilen ve sizinle özdeşleşmiş her bilgi gizli kalacak, üçüncü kişilerle paylaşılmayacaktır. Gizlilik, tanımlanmış bir kodlama prosedürüyle sağlanacak ve kod çözümüne erişim yalnızca çalışmanın sorumlusu araştırmacıyla sınırlı kalacaktır. Araştırma sonuçları tüm gizlilik ilkelerine uyularak sadece bilimsel çalışmalarda kullanılacaktır. Tüm veriler sınırlı erişime sahip güvenli ve şifreli bir veri tabanında tutulacaktır.

Bu çalışmanın içinde olmak isteyip istemediğinize tamamen bağımsız ve etki altında kalmadan karar veriniz. Bu çalışmaya gönüllü olarak katılmaya karar vermeniz halinde dahi herhangi bir aşamada çekilebilirsiniz.

ARAŞTIRMACININ KİMLİĞİ:

Bu araştırma ile ilgili herhangi bir sorunuz veya endişeniz varsa, lütfen iletişime geçiniz:

Reşat Şaşik
İstanbul Teknik Üniversitesi
Endüstri Ürünleri Tasarımı Yüksek Lisans Öğrencisi
E: sasik18@itu.edu.tr – resatsasik@gmail.com

PROJE YÜRÜTÜCÜSÜ KİMLİĞİ:

Dr. Öğr. Üyesi Deniz Leblebici Başar
İstanbul Teknik Üniversitesi
Endüstri Ürünleri Tasarımı
T: +90 212 285 7016 Dahili: 319
E: denizleblebici@itu.edu.tr

Kariyer Hedefleri Doğrultusunda Ebeveynlik Planları Araştırması – 2

1- Katıldığınız ilk ankette, bizimle paylaştığınız mail adresini tekrar yazar mısınız?

_____

2- Kadın doğurganlığının yaşla değiştiğini düşünüyor musunuz?
   a. Evet
   b. Hayır
3- Sizce ilk kez çocuk sahibi olmak için en ideal yaş aralığı nedir?

_____

4- Sizce en son çocuğunuzu doğurmak için en ideal yaş aralığı nedir?

_____

5- Kadın doğurganlığı potansiyeli nelere bağlıdır? Sizce en önemliden en önemsize göre sıralayınız lütfen. (1 en önemli iken 6 daha az önemli olarak düşünülecektir ve her sütun için sadece bir satır seçmeniz gerekmektedir.)
   a.Yumurta rezervi
   b. Yaş
   c. Çevresel Faktörler

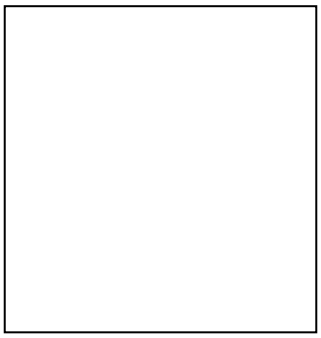
d. Beslenme
e. Genel Sağlık Durumu
f. Genetik Faktörler

6- “Kadın yumurta rezervi” tıbbi terimi ile ilgili bilgilerden sizce doğru olanları işaretleyiniz? Birden çok seçenek işaretlenebilir.
   - Yumurta rezervi kadının yumurtalıklarında bulunan hücre sayısıdır.
   - Kadınlarda yumurta hücresi üretimi ergenlikle başlar ve her ay yeni yumurta hücresi üretilir.
   - Kadınlarda yumurta rezervi kadının doğuştan itibaren sahip olduğu yumurta hücresi sayısıdır.
   - Kadınlarda menopozdan sonra yumurta hücresi üretimi durur.
   - Kadının doğuşta sahip olduğu yumurta hücresi sayısı aylık döngülerde kaybedilerek sıfırlanır.
   - Doğurganlık potansiyeli yumurta rezervi ile ilişkilidir.
   - İlerleyen yaş yumurta hücresi kaybını hızlandırır.
   - Sağlıklı beslenme yumurta hücresi üretimini artırır.
   - Yumurta rezervi ölçülebilir.

7- Eklemek istediğiniz bir konu olursa, lütfen bizimle paylaşın.

ANKET SONA ERMEKTEDİR.

CURRICULUM VITAE



Name Surname **:** Reşat Şaşik

EDUCATION **:**

- **B.Sc.** **:** 2016, Anadolu University, School of Industrial Arts, Department of Industrial Design

PROFESSIONAL EXPERIENCE:

- 2019-2021 Tepe Home Furniture, Industrial Designer
- 2016-2018 Teknodizayn 3D, Industrial Designer