

**Building Trust and Preserving Privacy for Marital
Matchmaking Technologies in Saudi Arabia**

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Dedication

This thesis is dedicated to my wife: Mona, kids: Malek, Abdulrahman, and Julanar, parents: Abdulrahman and Fatimah, siblings: Eman, Somaia, Saad, Amal, Mohammed, Abdullah, and Ibrahim, many friends and acquaintances, and all Saudi Arabians, especially those struggling to find a life partner or spouse in Saudi Arabia.

Abstract

Finding a life partner is a complicated process. While traditional methods such as arranged marriages were perceived to be successful in the past, many life aspects have changed that have made finding a life partner a messy and complicated process. The introduction of technology was meant to improve the process and unfortunately has made it more complicated. This is further complicated by the diversity of humans across the globe with different values that guide the design of technological systems. While online matchmaking platforms have offered more options for users, the transition from online to offline is rarely accounted for and left as a burden on the user. This is critical for a conservative culture such as Saudi Arabia where the transition can be very tricky. While Saudi Arabians have found ways to circumvent and appropriate current technologies, better design can make the process more suitable for Saudi Arabians. Through my qualitative and quantitative studies, I was able to define the requirements for a high-fidelity marital matchmaking prototype, TBYAAN (Trust-Building for Young Adults in an Anonymous Network), which was utilized to understand how trust can be built while preserving privacy during seeking a potential spouse online. While I found that different phone authentication and partial parental involvement were the most associated with higher levels of trust, participants expressed that the content generated by other participants was considered a good indicator of trust. Also, I have found that participants consider TBYAAN to be more trustworthy than Twitter (a familiar social media platform where recruiting occurred) and were less concerned about their privacy being compromised overall. Future work on TBYAAN will help understand how trust building and privacy preservation can be improved for users of online platforms.

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Chapter 1

Introduction

Even though matchmaking technologies have been around for more than 2 decades [60], they are mostly developed in western countries (North America, Europe) or adopt western design principles that are not relevant for non-western populations¹. This creates a gap for non-western populations that usually try to circumvent or adapt to current technologies. This does not mean that western and non-western populations do not have any overlap in their values or needs. Trust, privacy and sometimes anonymity are shared values to some extent, which are perceived differently for these populations. I investigate these differences with the Saudi Arabian population to better understand how to improve the design of matchmaking technologies and make them more inclusive for non-western populations while also addressing concerns that may be relevant for western populations.

Traditional marriages are the norm in Saudi Arabia as they are familiar and reliable. Saudi Arabians prefer traditional marriages as they are familiar with the process. At the same time, Saudi Arabians are concerned that the traditional process limits their options to potential spouses that have previous connections with their families. These previous connections increase trust in potential spouses for both young adults and their parents. Unfortunately, this makes the potential spouses pool limited for many people, especially those with limited social connections. Even with the traditional process being limited, it is still perceived as safe and maintains privacy.

¹ The exception would be Shaadi.com in india that has governmental support and backing, which to my knowledge is not found in western technologies.

Marriage via technology in Saudi Arabia is stigmatized as it does not take into account traditional values. Technology is perceived to lack the trust that is present in the traditional process. In addition, those who utilize technology may be perceived as desperate or not suitable enough to find a spouse traditionally. Previous work has shown that Saudi Arabians are considering technology because the traditional method is limited and they did not find a suitable spouse [23]. My participants believed that while technology is stigmatized, it does provide them with more visibility and increases their chances of finding a suitable spouse.

Building trust and preserving privacy online is a constant struggle. Building trust online helps users navigate finding accommodations [174, 57], finding partners or dates [41, 96, 80, 173] and purchasing goods [116, 38]. Most relevant to my dissertation is a study that explored how Saudi Arabians mistrust Muslim matrimonial sites[145] and how impression management, remaining safe and the evaluation of potential dates in the western context remains to be a concern [179, 175, 183, 185, 186, 65, 184, 35]. Building trust is linked to preserving privacy as people are less likely to share personal information with those who they do not trust. At the same time, sharing private information helps with building trust since being completely anonymous can lead to misuse. Privacy is especially important when it comes to online matchmaking systems and dating platforms[47, 132]. Privacy is also relevant to social media use as previous work has explored how residents of the Arab Gulf manage their privacy online [5, 6] and in the Arab world generally [147]. My work aims to find a balance between building trust and preserving privacy when searching for a spouse online in the Saudi Arabia.

1.1 Research Questions

My My dissertation is aimed at investigating the following overarching research questions.

RQ1. How do Saudi Arabians perceive the use of marital matchmaking technologies?

RQ1. is aimed at understanding what aspects of the traditional process are affected and which ones are important to maintain when technology is utilized. This was

achieved through a combination of a qualitative interview study and a quantitative questionnaire study that I discuss in detail in chapter 4. While the stigma around marital matchmaking technologies was present, participants were interested in utilizing technology for marriage within their religious and cultural context. My participants' concerns about how to balance the involvement of their parents in marital matchmaking technologies lead to investigating **RQ2**.

RQ2. How can secondary stakeholders (e.g., parents) be integrated into sociotechnical systems of matchmaking technologies?

Chapter 5 covers a qualitative interview study that was conducted with Saudi Arabian parents to get their perspective on their young adults using marital matchmaking technology and their role as secondary stakeholders. While most parents were open to utilizing technology, they were concerned about how it would be implemented to ensure privacy and build trust online while also preserving their religious and cultural values. From these design implications, I was to lead to addressing **RQ3**.

RQ3. How can building trust and preserving privacy through anonymity be operationalized within matchmaking technologies?

Based on my findings in chapters 4 and 5, I designed and development a high-fidelity prototype named TBYAAN² (Trust-Building for Young Adults in an Anonymous Network). TBYAAN is an asynchronous platform built around questions and answers for young adults to find potential spouses while preserving their privacy and involving their parents as secondary stakeholders. In chapter 6, I conducted a prototype deployment study to investigate the feasibility, acceptability, and usability of TBYAAN as a platform to build trust between young adults seeking a potential spouse while preserving their privacy.

² See meanings for تبيان in English at <https://z.umn.edu/TBYAAN>

Chapter 2

Background

While Saudi Arabians have been using technology for many years and have a high penetration rate on social media, very few studies have explored how the use of technology is perceived, especially when it comes to sensitive topics like marriage. The traditional marriage process is usually very secretive and selective, which makes the topic of marriage in Saudi Arabia generally sensitive. The traditional process usually starts with families of potential spouses evaluating each other before potential spouses decide if they are suitable. In addition, families want to keep the process known to only those who are involved to avoid embarrassment and save face if it is not successful or avoid the evil eye that may lead a successful attempted to fail. My dissertation is meant to explore how technology might enhance the traditional process to allow young adults to evaluate each other while families verify familial compatibility without intervening with young adults exploring their options. This might actually disrupt the traditional process rather than enhance it, which is another expected outcome. In addition, this enhancement may lead to excluding or minimizing secondary stakeholders' role that had more control over the process traditionally, which might lead secondary stakeholders' to justify their rejection of the use of technology to enhance the traditional process. This dissertation is aimed at finding out how to minimize the disruption and maximize the enhancement of the traditional process.

To understand the context presented in this dissertation, it is important to explain some of the dominant cultural aspects of Saudi Arabia that are related to marriage and matchmaking. We highlight the following aspects: the current traditional marriage

process, stakeholders that are involved, influence of gender-segregation and how it has changed over time, family values, and the acceptability of technology use for marriage, and a research statement about the first author.

2.1 The Traditional Marriage Process in Saudi Arabia

To date, in Saudi Arabia, traditional matchmaking, or arranged marriage, is considered the most common way for finding a life partner [129, 109]. Accordingly, males rely on the guidance of their female mahram to find and recommend suitable females for marriage. Females, on the other hand, are on the receiving side, as they await to be recommended or seen by other females who are looking for potential brides. Wedding parties and social gatherings are considered a great place to be seen and sought after and for other females to find a bride for their male relatives. In an arranged marriage, there are a few steps that need to be fulfilled before the marriage occurs. In the following we highlight the most important and common steps:

- 1. Initial Proposal and Negotiation:**A female relative of the prospective groom approaches a female relative of the prospective bride with the intention to propose. The female relative for both sides could be mothers, sisters or aunts. Their goal is to confirm that the families are suitable for each other and to reach an initial agreement. After the initial agreement is reached between the two families, the prospective groom and bride enter the Social engagement (“kh’otobah,”) step.
- 2. Social Engagement Between Prospective Groom and Bride:**This step is similar to “dating” in the Western context, but with the family aware of the couple’s interactions and having relative control over them. During this time the couple gets to know each other by talking on the phone and through chaperoned face-to-face meetings. The prospective groom is not yet considered a mahram and the prospective bride must maintain the Islamic headscarf or “hijab” during their meetings.

3. The Wedding ceremony:After the contract is drafted, the couple and their families start to arrange for the wedding ceremony ('irs or zaffaf), which is the last step in the marriage process. The goal of the ceremony is to serve as a public announcement of the marriage. After it is when the couple are considered socially married and start to live together.

These steps can vary depending on what parents, as secondary stakeholders mentioned in 2.2, find acceptable. For example, some parents believe direct interactions between potential spouses is limited or non-existent before the contract is drafted or the wedding night is over. On the other hand, other parents might allow direct interactions to start during or before the proposal. Breaking the contract before the wedding is considered a divorce. This means the relationship is considered to be "serious" once a contract is signed. A divorce enacted by breaking a contract affects future marriage prospects, however, it may still be viewed as more favorable than a divorce after the wedding. Divorce after a wedding may be even more problematic for the woman due to a premium on women's virginity in conservative cultures. Divorces are generally stigmatized in Saudi Arabia and avoided, similar to other countries [97, 45, 115].

It is also worth mentioning that the process mentioned above becomes secretive after trust is established between the families to maintain privacy and prevent unwanted interference. The traditional process usually approaches people with mutual connections who are perceived to be considered more trustworthy. When in doubt, the traditional process questions the source that leads a prospective groom to the prospective bride's family. When it comes to maintaining privacy, the purpose of building these connections is not revealed until they reach the relevant parties. For example, a female relative might ask if a family has any prospective brides without revealing who is the prospective groom. It may also be viewed that the female relative is helping the bride's family reach more prospective grooms. The identity of the prospective bride and groom is usually not revealed until both parties reach some form of consensus that paves the way for the traditional process to officially start while still minimizing the people who are aware of it. It might be limited to only potential spouses and their parents and even siblings of potential spouses are not aware of it at all until it is finalized and usually ends with a positive outcome.

My dissertation focuses on the potential role of technology in the first two steps:

Initial Proposal and Negotiation and Social Engagement Between Prospective Groom and Bride. Parental involvement and the exchange of information are the main factors in these steps that are related to my research questions.

2.2 Stakeholders

The marriage process involves a number of stakeholders¹ :

1. **Parents:** They have the most influence over the process. Issues may arise if parents of the bride and groom have conflicting opinions. Parents might insist that they choose who their adult children marry or allow their adult children to marry whoever they wish. In some cases, the parents of the bride and groom may negotiate conditions about the marriage without consulting the bride and groom, such as the dowry and wedding arrangements.
2. **Groom:** He usually chooses who to marry based on his parent's recommendations. He could also suggest certain women for his parents to consider. Even though he may sever ties with his parents if he goes against their desires, he does not need their approval to marry legally.
3. **Bride:** She usually waits for the groom's family to propose to her family and has the option to accept or reject the proposal. However, women in Saudi Arabia need the approval of their guardian (i.e. a direct male relative, e.g. a father) to marry legally [124]. This means that a guardian's disapproval of a groom may hinder the marriage process. At the same time, the bride may view the approval of her guardian as protection, i.e. part of the vetting process.
4. **Public notaries:** It is common for Saudi Arabians to draft the contract with a public notary rather than in a courtroom. They usually serve as a mediator between the families and the courts and judges.
5. **Courts and Judges:** They usually handle the documentation and legal processes of the marriage. They may intervene when violations occur, such

¹ Saudi Arabia follows Sharia law and marriage can only be between a man and a woman.

as 'adhl² but are otherwise not involved. For example, a court may transfer the approval of the father to a judge if a case is made that the father is preventing his daughter(s) from marriage, also known as 'adhl.

2.3 Gender Segregation and Recent Changes

As my dissertation work has spanned over the years where laws and norms have changed in Saudi Arabia, I will talk about Gender Segregation when I first started my work (2.3.1) and how it has changed over the years(2.3.2) in the following subsections.

2.3.1 Gender Segregation in Saudi Arabia

The segregation of opposite genders in Saudi Arabia is an important aspect. Males and females who are not mahrams (unmarriageable kin e.g., mothers, sisters, and aunts)–are not permitted to mix or be together alone [12] for non-professional purposes. Schools, hospitals, banks and other public spaces are designed with gender segregation in mind [12, 5]. This general rule influences what is considered appropriate and dictates the public and the private sphere. Moreover, wedding ceremonies in Saudi Arabia are segregated, where the males and females will have their own independent ceremonies. Occasionally, unrelated males and females can mix for professional purposes, such as, conducting a business or seeing a doctor of the opposite gender. However, even within these interactions certain norms are enacted and no physical contact takes place. As a result, gender-segregation is one of the primary societal aspects that influences the conduct of marriage, as males and females have limited opportunities to meet before they are officially engaged [15]. Dating, thus, is also forbidden.

2.3.2 Contemporary Gender Norms, Roles and Expectaons in Saudi Arabia

In the last couple of years, Saudi Arabia has made major law reforms affecting gender equality and norms. Saudi women were granted the right to drive on June 24th, 2018

² **عضل** When a father or a male guardian prevents a Muslim woman from marriage for no valid reason.

[121]. In 2019, guardianship laws were changed to allow women to travel, marry, divorce, be a guardian for minor children, and represent themselves in court without the cooperation of a male guardian [98]. Gender segregation laws were also overturned in late 2019, allowing women and men to interact in public settings [149]. While laws have changed, cultural norms still persist for some Saudi Arabians.

Even though Saudi Arabian women have gained more rights, they need to adhere to cultural and religious values that have been ingrained within Saudi Arabia. For example, registering a marriage or a divorce requires proving that a male guardian is abusing their authority in the case of 'adhl or paying the dowry back in the case of khul'³

. In addition, following through with 'adhl or khul comes at the cost of possible family ties being severed as a result. In other cases, extended family members could intervene to annul a marriage based on tribal incompatibility. This decision is usually made to avoid violence that may occur against the potential spouses or between their families if the marriage is not annulled.

These changes in Saudi Arabian laws have affected the legal aspects of marriage and meeting their future spouse, however many cultural norms regarding matrimony remain unchanged. Cultural and religious values such as *bir alwalidayn*, as mentioned in 2.4, play a vital role in the marriage process as most Saudi Arabians have personal, cultural, and religious reasons to maintain a healthy relationship with their parents when choosing who they marry. It is also possible that young adults may avoid challenging the status quo publicly while privately being against it.

2.4 Family Dynamics and Values

In Islam, “silat ur-rahm” is an expression that means maintaining family relationships. Muslims are required to sustain a good relationship with their parents, siblings, and extended relatives. This relationship is based on love, respect, and care. Obeying and being kind to one’s parents is an Islamic obligation known as *bir alwalidayn*. These are considered guiding values within this context and are mentioned in many verses in the Quran. The importance of these values have generated a society that is highly collectivist in nature [15, 4]. This makes it important that spouses get along with their in-laws to

³ Khul'(خلع) is where a wife demands to be separated from her husband in Islamic Jurisprudence.

preserve a good relationship between the families. These values are very prevalent in the region and dictate familial relationships. Therefore, the opinion of family members and relatives on who one marries is respected and considered.

2.5 Permissibility of Using Technology for Marriage

For Muslim clerics and scholars, the permissibility of using technology for ordinary life matters is still a topic of debate due to the ongoing challenge of defining the line between proper and improper use. The general guideline is that if the use of technology is beneficial to Islam and to oneself, it is permissible. Otherwise, it is considered to be a waste of time and may lead to immorality [166]. Understandably, there is room for divergent interpretations, which allows some flexibility and assumes a person is accountable for their actions [166]. Specifically with cyber dating, the general guidelines, as mentioned by Wheeler[166], are that:

- 1) You have the intention to marry and communicate to know each other better;
- 2) It is done in a respectful and moral way;
- 3) Your parents are informed;
- 4) You do not delay marriage more than needed.

It is worth noting that the older generation who still controls the marriage process prefer traditional methods versus modern ones (i.e., using technology.) This is slowly changing with the recent trend of using social media to evaluate potential spouses in Saudi. Little previous work has investigated the *de-facto* use of matchmaking technologies in Saudi Arabian culture, which is a gap my dissertation aims to address.

2.6 Researcher's Position Statement

I was born in the US and raised between Saudi Arabia and the US and have dual citizenship. I spent my childhood and late adulthood in the US and my teenage years in Saudi Arabia. I am bilingual and accustomed to most of the traditions of everyday life in Saudi Arabia. My work is funded by a scholarship from Saudi Arabia.

Chapter 3

Related Work

This dissertation is centered around cultural-sensitive design, the use of matchmaking technologies, and building trust and preserving privacy online. Cultural-sensitive design is meant to redefine value-sensitive design to be more inclusive of diverse cultures and populations. Matchmaking technologies have been studied in the past to understand how to improve them for different cultures, which may compare or contrast with Saudi Arabian values. My work informs how matchmaking technologies can be improved for Saudi Arabians and also how these improvements may be appropriated for other contexts. Lastly, building trust and preserving privacy while using technology is an ongoing concern that affects how relationships are built online. This is especially important in the context of finding a life partner. I focus on how trust can be built while preserving privacy for Saudi Arabians seeking potential spouses online.

3.1 Online Matchmaking technologies

When online matchmaking technologies were introduced decades ago, they promised a better alternative to traditional matchmaking. While they did provide improvements and benefits such as more potential partners to choose from, that would not be reachable through conventional methods [23], they did introduce their own set of challenges such as figuring out how to evaluate potential matches properly online [175] and managing expectations between online and offline interactions [180, 21]. Even though virtual dates were successful in closing the gap of expectations between offline

and online [64], transitioning the interaction offline has been viewed as a better way to evaluate a match properly [175]. As we have seen during the COVID-19 pandemic, managing virtual interactions is as challenging if not more challenging than handling physical interactions, which includes virtual dating[53]. Online matchmaking technologies have made the process of finding a life partner more smooth and accessible while also introducing a new set of challenges and concerns.

While transitioning offline provides a better way to evaluate, it does introduce risks and miscommunication. For example, women may expose themselves to risky situations when attending an offline date. Work done by Bull et. al. has explored how technology could serve as a "guardian" that would help by intervening before harm occurs [35]. Another example is when online daters perceive being on an online dating platform as implied consent to engage in sexual encounters [184]. Dating platforms should play a more active role in eliminating assumptions that may lead to harmful actions such as sexual violence. This is especially important when perpetrators are not aware that they are committing sexual violence and not engaging in consensual sex. While some risks of offline interactions have malicious actors, some of these risks arise because of miscommunication that occurs between users. Designers of technology must remain aware of the potential harms they may cause and ensure that minimize them.

Applying a cultural lens to these challenges, Saudi Arabians may be stigmatized if it was revealed to the public that they sought their spouses online [26]. Since premarital relationships are not allowed in Saudi Arabia, finding a spouse online may be viewed as an indicator of an existing previous premarital relationship that would question the family's honor and reputation [5], especially for Saudi Arabian women. As a result, Saudi Arabian young adults might place themselves in risky situations since their families might be against utilizing marital matchmaking technologies to find a spouse[145]. My dissertation hopes to introduce design implications for a better marital matchmaking system that would help young adults build trust online and preserve their privacy to avoid being stigmatized and keep their family's honor and reputation intact while also involving their parents in the process.

3.2 Cultural Sensitive Design

Value-sensitive design as a concept has existed for decades and aimed to embed the values of users into the design of technological systems [61]. Cultural sensitive design takes it even further by focusing on how different cultures have different sensitivities. In this dissertation, I will focus on the Saudi Arabian culture that is heavily influenced by Arab and Muslim values. One of the earlier studies that explored how Arab and Muslim values interacted with utilizing technology was done by Alsheikh et. al. [15]. It highlighted how the design of communication technologies is mostly informed by Western values, which alienates users from Arab and Muslim cultures. This is aligned with recent work that highlights how the design of technological systems is mostly focused on Western, Educated, Industrialized, Rich, and Democratic cultures [101]. Alsheikh defines an Islamic feminist model that encompasses Islamic values while also supporting women’s agency, which is aligned with pluralism quality within feminist HCI [27]. My work aims to preserve Saudi Arabian religious and cultural values while also maintaining young adults’ agency in marital matchmaking technologies.

Parental involvement is crucial in the Saudi Arabian traditional marriage process. The concept of *bir alwalidayn* that was mentioned in 2.4 highlights the importance of involving parents in marital matchmaking technologies. Reviewing prior work that involved parents in technological systems revealed similarities between the relationship of Saudi Arabian parents with their young adults and American parents with their adolescents. American parents were concerned about their adolescent’s safety online [172], preserving their privacy [168], fostering resilience [171], and attempting to find a middle ground between parents’ control and adolescents self-regulation [169]. These concerns are shared by Saudi Arabian parents when it comes to finding a potential spouse. Interestingly, Saudi Arabian young adults might choose to not involve their parents in the early stages of seeking a potential spouse online similar to how American teens hide online risks from their parents [170]. It is important to balance between parents’ role in the marital matchmaking process and maintaining young adults’ autonomy to provide them with an opportunity to be more resilient.

Power dynamics grant parents the higher ground, which creates a concern for young adults and teens. Teens transitioning to young adults might still suffer from these

power dynamics when trying to maintain a relationship with their parents, which is why renegotiating the change of positions is important to make the power dynamics more balanced[119]. While Western values that prioritize individuality might find the renegotiation of positions to be irrelevant, it is very crucial for Saudi Arabians as they might want to maintain closer familial ties that are part of their collective nature and also manage expectations appropriately to maintain some form of individuality. While Saudi Arabian young adults consider it important to involve their parents when finding a potential spouse online, they want to decide when involvement is necessary to maintain their autonomy when deciding who they want to marry.

3.3 Building Trust and Preserving Privacy Online

Building trust while preserving privacy online is complicated. To build trust, you need to provide information that will allow others to trust you. At the same time, you need to control who has access to your information online to preserve privacy. Technology has provided ways to authenticate others online through biometric data such as face recognition and fingerprint verification or personal data such as their online and offline activities, which may be considered a violation of privacy[46], a source of discomfort[33] or unusable [161]. Even though technology has provided ways to preserve the privacy of biometric data during authentication [46], their trust in the organization or platform will determine if they decide to share biometric data or not[39]. Other options to authenticate might be less privacy-invasive but require specialized hardware[103]. Another alternative is authenticating a phone number with a one-time password (OTP), which introduces vulnerabilities [133] and minimizes trust since the phone number can be changed. Saudi Arabia's regulation that requires a phone number to be linked to a government ID[11], can help build more trust but does not necessarily eliminate vulnerabilities [133]. For example, young adults' sharing a phone number with their parents plays a role in building trust and preserving privacy [8].

Another aspect that comes into play is convenience. Technology has made it easier to conduct authentication online and any authentication that requires additional effort is not desired and is harder to adopt [58]. For example, a person would prefer to be authenticated by an automated system rather than attending a meeting with an actual

person. Automation makes the process smoother and helps preserve privacy. Even then, automation of authentication heavily relies on trust in the platform or the sensitivity of the information required to authenticate [163]. While being authenticated by an actual person may be viewed as more trustworthy, it is inconvenient and may raise privacy concerns. In my work, I hope to understand how I can build trust between Saudi Arabian young adults who are seeking a potential spouse online while preserving their privacy.

Even when technology provides ways to build trust, transparency is important when it comes to handling perceptions of privacy and trust. Prior work has shown that Saudi Arabians transitioning from an online marital matchmaking platform to an offline interaction is considered difficult [23]. It relies heavily on how offline stakeholders will react to it and how expectations are maintained. This is why transparency becomes crucial. It is important to be transparent so that online perceptions and offline interactions are not too disjoint, which may increase distrust in online platforms or users.

In the context of online dating, bad first dates are the norm since online impressions are not aligned with offline experiences during a first date [181]. Transparency could be improved by sharing offline expectations on the online platform. This transparency allows for accountability to be assessed appropriately [127] and minimizes or mitigates harms that may arise as a result. Work done by Zytka et. al. [184] has shown how certain online daters found it important that consent is communicated properly, understood mutually, and practiced continuously. Especially when consent affects offline interactions such as sexual intercourse.

Translating this to the marital context would mean that content provided online would indicate initial expectations that may remain the same or change over time and during the transition from online to offline. For example, work done by Bajniad et. al. has shown how a potential groom is evaluated first by the potential bride online and then by the potential bride's family offline, which is not necessarily identical [23]. This would stem from the different expectations from young adults online and their parents offline. While there are many ways to build trust online, the perceptions and transparency that come along with it play a bigger role in how trust evolves. It is not enough to know that the person online is who they claim they are. It is more important to know that

the information they are providing is transparent and aligned with how it is perceived by others, even when change may occur over time.

Chapter 4

Formative Investigation: Usage Perceptions and Opportunities for Design for Marital Matchmaking Technologies

Previous work has explored how matchmaking technologies in western populations are perceived and how their design can be improved to fulfill their purpose while studies targeting non-western populations remain to be limited or minimal. While many matchmaking technologies have existed in the last 2 decades, most of them are developed in the western context. Even though there have been recent platforms that target non-western populations (Shaadi, Minder, MuzMatch), there is a lack of studies that explore them compared to western platforms. This formative investigation is aimed at understanding how current matchmaking technologies are perceived in a non-western context (Saudi Arabia) and how their designed can take into account the contextual differences. This investigation consists of 2 studies, a qualitative interview study¹ (4.1) and a quantitative questionnaire study (4.2) and addresses **RQ1**.

¹ This qualitative interview study is publish as [51]

4.1 Qualitative Study

Websites and applications that match and connect individuals for romantic purposes are commonly used in the Western world. However, there have not been many previous investigations focusing on cultural factors that affect the adoption of similar technologies in religiously conservative non-Western cultures. In this study, I examine the socio-technical and cultural factors that influence the perceptions and use of matchmaking technologies in Saudi Arabia. I report the methods and findings of interviews with 18 Saudi nationals (nine males and nine females) with diverse demographics and backgrounds. I provide qualitatively generated insights into the major themes reported by my participants related to the common approaches to matchmaking, the current role of technology, and concerns regarding matchmaking technologies in this cultural context. I relate these themes to specific implications for designing marital matchmaking technologies in Saudi Arabia and I outline opportunities for future investigations.

4.1.1 Motivational Scenario And Introduction

Abdullah is a 29-year-old Saudi male. He approaches his mom to ask her to engage him to his childhood crush, but his mom is not as motivated as he is. Abdullah's crush becomes engaged to someone else, leaving him frustrated and heartbroken. Through the connections of his mom and sisters, he tries multiple times to find another suitable spouse, but is frustrated because his family often decides based on their own perceptions and without consulting him. Even in cases where a potential match is suggested, the prospective bride's family makes it hard for him to get any information about her, unless they meet in chaperoned settings. Abdullah has no alternative but to go through his mom or sisters, which is the most socially accepted method to finding a spouse in Saudi Arabia. Abdullah wants to have agency in this process and believes that technology may support his search. However, he knows that his culture considers "online dating" inappropriate, which leaves him stuck! Online personals have become prevalent for finding a spouse [60] and dating in many parts of the world [126]. Yet, these technologies have largely been rejected by Saudi Arabian culture. Take for instance, the number of Saudis subscribed to *Muslima.com*, one of the biggest Muslim matrimonial websites, is

one of the lowest in Muslim countries [84]. This is due to many factors: First, it reflects the traditional and religious conservative culture of Saudi Arabia, especially with their concerns for privacy [5]. Second, there is social stigma associated with participating in non-traditional behaviors (e.g., dating) [88]. Third, there is a common belief that Saudis who use these sites do so to engage in culturally controversial acts (e.g., flirting, attending mixed-gender gatherings, etc.) Thus, seeking a marriage match using nontraditional routes may affect one’s reputation, which is a high-stake value in this context, even if one’s intentions are sincere. Furthermore, the Human-Computer Interaction (HCI) community has not investigated this context, as most matchmaking technologies have focused on the concerns, values, and priorities of cultures where dating, flirting and mixed-gender gatherings are the norm and accepted.

4.1.2 Research questions

I address the gap by understanding Saudi Arabians perceptions of marital matchmaking technologies and uncovering opportunities for designing appropriate marital matchmaking technologies for by answering **RQ1**. through the following sub-questions:

RQ1a What challenges do Saudis face with the traditional matchmaking approaches?

RQ1b What are the perceptions of technologically mediated matchmaking in Saudi Arabian culture?

RQ1c What are the opportunities for culturally-appropriate technical interventions in this context?

I investigated these questions through the analysis of 18 in-depth interviews with Saudi participants with the aim to contribute to the ongoing discussion in HCI on inclusive design and cross-cultural computing.

4.1.3 RELATED WORK

I describe relevant work in two areas: technology-mediated matchmaking and cross-cultural research.

4.1.4 Technology Mediated Matchmaking

Researchers have explored many areas of online dating and technology-mediated matchmaking (e.g., self-presentation [54, 71, 79, 82, 142, 160, 159, 74], mate preferences [59, 86, 87, 143], deception [160, 159, 55, 74, 81]).

Ellison, Heino and Gibbs [54] found that participants mediated the tension between impression management and the desire to present an authentic sense of self. This was through tactics such as creating a profile that reflected their “ideal self.” Hancock and Toma [82] examined the accuracy of 54 online dating photographs posted by heterosexual daters. While online daters rated their photos as relatively accurate, independent judges rated approximately 1/3 of the photographs as not accurate. In this study, I approach a unique cultural context, where interaction between genders is not widely accepted and females are not expected to share their real photos on social media [76, 145, 31].

Toma and Hancock [160] highlighted the association between attractiveness and deception. They also linked such association to the technological affordances that allow online daters to engage in selective self-presentation. In addition, Rosen, et al. [142] compared between online and traditional dating. They found that the amount of emotionality and self-disclosure affected a person’s perception of a potential partner. An e-mail with strong emotional words (e.g., excited, wonderful) led to more positive impressions than an e-mail with fewer strong emotional words (e.g., happy, fine). This resulted in nearly three out of f subjects selecting the emailer with strong emotional words for the fictitious dater of the opposite sex.

Lastly, Fiore and Donath [59], revealed interesting results that illustrate how the medium shapes the way daters present themselves. The study found that users of an online dating system looked for people similar to themselves. The information online dating systems provided differed greatly from what a person might gain from a face-to-face interaction.

My work provokes the question of what changes in the current methods used for matrimonial matchmaking are needed for matchmaking technology to be more accepted in these contexts. This question is becoming more relevant as social media becomes more prevalent in Saudi culture.

4.1.5 Cross-Cultural Research on Mediated Relationships

HCI literature has chiefly focused on how technology is used in cultures where premarital relationships are the norm. Technology designs informed by these assumptions reflect these cultural values. Comparatively few studies have focused specifically on how technology is used in the Arab world and how this different set of values may impact design.

Elmasry [56] analyzed how different people used Facebook and Hatfield and Rapson [84] examined how culture shapes the use of technology in the Middle East. Guta [76] assesses how Saudi females use social media to negotiate and express their identity, which included finding a spouse. In the context of dating, Alsheikh, Rode and Lindley [15] investigated how 11 Arab individuals use technology in the context of their long distance romantic relationships. Lastly, Abokhodair [5] explains how privacy is perceived differently in the Arab Gulf and how it plays a role in the use of technology. The findings highlighted key differences that match with cultural expectations that impacted the use of technology.

Saudi's conservative culture has mostly followed traditional matchmaking through personal connections [85]. With social media becoming more prevalent [84] and improved awareness of potential health issues of marrying relatives, marrying non-relatives has increased [165]. Nevertheless, issues such as trust [145], privacy [5, 6, 2], and maintaining long distance relationships [15] manifest as roadblocks to accepting the use of technology for matchmaking. The above studies [84, 56, 15] give a general idea how culture shapes technology use. Elmasry [56] compared the users from liberal to conservative (US being liberal, Qatar conservative and Egypt somewhere in between). Other studies paint all the Arab/Islamic countries with a wide brush [15, 84]. They do not provide a contrast of the diverse subcultures in the Arab world. Further, none of the studies focused on conservative populations in the Arab/Islamic culture using technology for matchmaking. I address this gap in my work.

4.1.6 Methods

Recruitment

I initially recruited study participants through Saudi Arabian friends and an online sign up form that was shared through many social media platforms. The downside of this method was concerning reaching enough female participants with diverse backgrounds. This was solved by asking a female Saudi public figure on Twitter to retweet the online sign up form. I aimed to recruit participants in equal proportions from the three major regions of Saudi that are represented in the following cities: Riyadh (the capital), Jeddah, and Dammam. In addition, three age groups were represented for each gender: 18-25, 25-35 and 35-50. Most of the participants were between 25 and 35 years old (N=10), and participants from the age range of 35-50 were a minority in my study (N=3). I also recruited participants from all marital statuses, including single, married, and divorced, achieving a balanced distribution of each.

I continued recruiting participants until I deemed that data saturation was reached (i.e., most themes were repeating in the data). While I estimated that saturation was reached after 14-16 participants, I continued with a few additional interviews to confirm that no new themes were emerging and ensure enough diversity within participants' demographics. That been said, I acknowledge that the recruitment process is subject to self-selection bias and thus my findings might not be representative of the whole population of Saudi Arabia.

Interview Procedure

I conducted in-depth interviews with 18 participants, 9 males and 9 females. Table 4.1 provides additional details about each participant. Interviews were conducted mostly in-person or through Skype, but some were also done over the phone. Interviews were conducted in Arabic (a native language for most of the authors) and took between 60-90 minutes on average. Participants were offered compensation for their time, in the form of a 15\$ gift card or cash either in Saudi riyals or US dollars. But many participants were happy to take part in the study voluntarily and rejected the monetary compensation. My semi-structured protocol included questions on the following major topics of interest: participants background, thoughts about current marriage methods,

how can technology play a role, reflections on previous experiences if any and conclude with general remarks about the subjects. Additionally, participants provided written consent and basic demographics using an online form.

Table 4.1: Study Participants Characteristics.

#	Gender	Age Bracket	Marital Status
p1	Male	35-50	Married
p2	Male	25-35	Single
p3, p4, p12	Male	18-25	Single
p5, p6, p7	Male	25-35	Married
p8	Male	35-50	Remarried
p9	Female	18-25	Engaged
p10	Female	18-25	Single
p11	Female	25-35	Divorced
p13, p14, p16	Female	25-35	Single
p15	Female	35-50	Divorced
p17, p18	Female	25-35	Married

Transcribing, Open Coding, and Affinity Diagramming

I transcribed all interviews in Arabic and then open coded the transcripts (following the protocol described in [153]). The generated codes were then carefully translated to English during the axial coding stage, memo writing, and clustering process. During the transcribing and open coding stages, I took into consideration the context by explicating the meaning in relationship to the context rather than a mere focus on the literal. This was especially the case when idioms were used or terms that have a certain meaning in Saudi Arabian dialogue. After open coding, affinity diagramming was used to enact constant comparison between open codes (as described in [117]) to generate more thematic clusters. In this work, I focused on themes most relevant to the perceptions and use of matchmaking technologies in Saudi Arabia.

Ethical Considerations in a Male Guardianship Culture

There were unique ethical considerations in this work that may be informative to others doing research in this cultural context. As Saudi Arabia is a male guardianship culture, the Institutional Review Board (IRB) requested that I take special care with recruiting

and interviewing female participants. My initial recruitment was limited to males to allow us to refine the protocol and identify any potential cultural concerns. Before proceeding to interviewing females, the IRB's full board reviewed the protocol and initial insights at the lead author's institution. The final approved recruitment call requested that female participants obtain permission from their male guardian to take part in the study (though it did not require us to solicit any evidence of this approval). I explained to each female participant that should their male guardian object to their participation, I would be obligated to remove their data from the record. The inclusion of this request led to unfortunate side effects, as the *de facto* reality of Saudi Arabian gender politics do not always align with the *de jure* laws that bind IRB's policies. This caused several Saudi Arabian women to contact the study PI directly with concerns that requiring male guardian permission endorsed problematic gender practices. It is worth noting, that during the time the call was posted on Twitter, an ongoing social media campaign requiring the Saudi government to lift the male guardianship law was simultaneously occurring [129]. In response, I added a footnote to the call, explaining the specific reasons for the consent procedure and disavowing any endorsement of specific male guardianship laws. Other researchers may experience similar challenges if attempting to run studies in a similar context. Addressing these challenges is imperative, as it is important to engage the voices of women in formative research and design process.

4.1.7 Results

I present my themes in three major clusters: current issues with the marriage process, opportunities for technology, and technology fears and concerns.

Current Issues

In discussing the topic of marriage and finding potential partners with my participants, I learned that there are issues that might stem from family or society expectations. I divide these issues into two categories. The first category concerns the issues around finding potential partners and the societal and religious barriers. Particularly, the family's role in marriage and gender segregation, which limits interactions between potential partners. The second category concerns the practical and institutional obstacles that

can limit one's options and choices for marriage. Examples include costs and expenses of marriage, lineage concerns, and intercultural marriages.

Family Role Participants discussed the importance of the family in the process of finding a potential partner as explained in the following excerpt by P4. He is studying in the US and hopes to break out of the norms and marry a non-Saudi female as he hinted having relationships with females in the US. He says:

“Maybe [parents] think they understand life and have lived it and thus must enforce it on [their children]. That they see the best and suitable for them. For example, a mother would say to her son ‘this [wife] is suitable for you’ or ask her son ‘you want to marry? [The family] will look for you’.”

(P4)

The common belief is that mothers (or any close female relative like a sister or an aunt) will know better than anyone else who the right partner for their child is. Because she is the one who knows them well and has the knowledge and experience of being married. However, in some cases the interference of the family and the pressure they put on their children can lead to issues. P18, who met her husband through her blog and then got in touch on Facebook, explains the issue in the following excerpt, she says:

“Methods used now that cause problems or embarrassment is concerned with the intolerable interference from the family. For example, while looking for a life partner and when I am trying to know them there is a lot of pressure from family. I think this sometimes causes negative consequences because the person cannot be relaxed while under a lot of pressure.”

(P18)

In this example, P18 talks about the lack of freedom and flexibility in getting to know her potential partner during the family engagement phase. She mentions that the family pressure that follows can lead to “*negative consequences*,” which can range from the breaking of the engagement to divorce in some extreme cases. This is normally due to couples not given enough time to get to know each other in different aspects of life. She elaborates on this point by saying that “*during engagement the male and female try*

to hide all their flaws and show their best and when marriage comes they show their true colors and collision occurs.” Meaning that the husband and wife will face reality once they are married and live together. It is worth noting that during the family engagement couples do not meet alone and the bride’s father or brother (male mahram) chaperon meetings. However, they can speak on the phone, and that is what P18 is referring to in the previous excerpt. She emphasizes that on the phone you cannot know much about your partner and you get to face reality when one is already married. Overall, the interviews participants’ opinions varied on a spectrum from ones who support and encourage family involvement and traditional marriages to others that wanted to find their own partners outside the control of the family. P11, who felt culture and customs limited her ability to know her ex-husband enough, comments on this practice: *“Males and females need to have awareness that nobody has a say in their choice [of whom to marry.]”* In this excerpt P11, is clear about her message regarding the need to increase awareness for both genders to have the freedom of choosing their own partner. On the other hand, P7, who married the daughter of his dad’s friend, suggests a middle ground approach. He says: *“taking your own opinion is important but also see your family’s opinion, especially, your mom and dad.”* This relates to the fact that marriages usually unite two families together. Spouses not getting along with their inlaws is not usually a desired outcome by both the spouses and their families.

Gender Segregation and Desegregation In Saudi Arabia, gender segregation is culturally enforced; it is not accepted for non-mahram males and females to mingle together in public places. Because of gender segregation, it becomes very hard for males and females to meet or find potential partners. Things are changing in the Kingdom, however. A push towards modernization and globalization is slowly transforming the traditional social norms. Big international companies and hospitals are now moving towards a controlled version of a gender-mixed environment. But, these workplaces are still limited to males and females who come from families that do not mind mixed work environments. Commenting on this issue, P5, who studied in the U.S before and after marriage, says:

“When I came to America barriers were broken. It was like I was in Saudi but in a mix gendered world. It benefitted me more because I got to interact

with a lot of Saudi females.”
(P5)

Opposite to what he has experienced in Saudi Arabia, in the U.S. P5 got to meet and interact with many Saudi females studying abroad at his university and found that to be a positive experience. On the other hand, P15, felt that social pressure did not allow her to talk enough with her ex-husband. She comments on the drawbacks of gender segregation as an issue that effects females more than males, she says:

“Our society has not reach the point where a female can meet, go out and get to know someone. . . [I lack] freedom for a female to have her own opinion.”
(P15)

In this excerpt, P15 shares her frustration regarding the issue of social norms preventing her from getting to know her future husband at the time of the interview, before being married to him. On the other hand, P9 was expressing how some Saudis found a way to work around to meet potential partners and make it look like it was done traditionally: *“Society doesn’t have to know that I met a guy online. . . a girl went to a wedding that the guy’s family attended to make it as if they coincidentally met.”* P9 She later expresses her disapproval of it *“I don’t like these ways and feel they are twisted a bit.”*

Costs and Expenses Participants expressed a concern with the expensive marriage costs in Saudi Arabia. In general, wedding ceremonies in the Arab world are known to be associated with prestige and recognition, particularly on the bride’s side. The tradition is to invite relatives, extended family, and friends, so an average wedding will host around 200 guests. Hospitality is shown through the amount of food offered and the type of entertainment the hosts of the wedding provide. Different regions in Saudi have different traditions and expectations about who hosts and organizes the wedding (whether the bride or groom.) On average, marriage costs start at 150,000 riyals (about \$40,000), including the mahar, the wedding ceremony, gifts, and housing [77]. The highly-exaggerated cost of getting married was a topic of concern to many of my participants. P9 comments about this issue:

“[Exaggerated wedding costs] are not supposed to be accepted. I ask myself that these elders, maybe those responsible for the female or legislators in the society, how do they accept these [exaggerated wedding costs] and not reject them.”

(P9)

Another participant, P7, recommends government intervention on this issue. He says: *“government should intervene to place limits on mahar [and wedding costs] so it does not become an obstacle and place punishments if they do not follow them.”* P8, a remarried male participant, expresses his aversion to the lavish customs, he says:

“There are some customs I hate, such as, when you get married, you should rent out a Lexus (an expensive car brand), a hotel and get flashy. The honeymoon must be a big deal.”

(P8)

Lineage and Intercultural Marriages Saudi Arabia encourages within-Saudi marriages and makes marriage hard for males and females who want to marry from outside the Kingdom or the Gulf Cooperation Council (GCC). There are certain regulations and lengthy procedures that Saudis marrying from outside must adhere to before getting married, including a government approval that might take up to a year with stringent conditions to get the approval. It is worth noting that the approval still does not grant the citizenship to the foreigner spouse nor to the children of a Saudi female marrying a foreigner. Thus, families in many cases are discouraged from approving inter-country marriages for their children, especially their daughters. Expressing his opinion on this issue, P1, which has been married traditionally for almost 10 years, says:

“I see it harder because you will most likely end up with a person who is not close to the family or tribal society you live in and know their customs and culture. You should be careful because you do not want your relationship to end in divorce.”

(P1)

Saudi Arabia is considered a tribal society, therefore, maintaining blood ties and tribal traditions are of high importance to many families. Many cases have been reported of the challenges that surround males and females marrying from outside their tribes. There seems to be a voice within society that believes it is an issue that needs to get resolved as expressed by P10 “*Ashraaf (people with direct blood-line descendant from Prophet Muhammad) only marry Ashraf and Bedouins only marry Bedouins. This is a wrong concept.*” P9 can relate more to this issue as her fiancé is of a tribal lineage while she is not. Even though her family was understanding and accepted her fiancé, for the couple, life ahead is filled with struggles:

“I feel it is hard for our families to understand each other...His family accepted me and my family accepted him but to deal with it later is not guaranteed...two different societies.”
(P9)

Opportunities for Technology

While not all issues that are present in the marriage process are related to technology, participants have provided a lot of insight on the ways technology can play a role in the process. The role can be either by complementing the current process, offering ways to keep in touch, or helping to get to know more about their potential partners. Also, technology can fill in the gaps for those who cannot utilize traditional methods since they depend completely on personal connections. Lastly, developing technology that is culturally sensitive will be accepted and welcomed by the society that will allow it to be a vehicle for change.

Enhancing Traditional Matchmaking Given that traditional marriage is by far the most reliable method due to the importance of the “*trust factor through family,*” as stated by P2. Yet, P2 believes that “*social media complements,*” and can make this process better. In addition, P8, who went through three family-arranged marriages before finding his current wife, suggests that technology can broaden the search horizon since traditional means are limited to personal connections. P8 argues: “*Your family might search [for a bride from] 50 families during 10 years...through the database you have a million families to choose from.*” P8 believes that the traditional method is

inefficient as it only allows him to meet a limited number of potential wives and is time intensive. He believes technology will allow him to reach more potential partners in a short period. As mentioned earlier, due to additional challenge of gender segregation, knowing one's future partner becomes harder. However, social media is increasingly offering young males and females a new means for connecting and bending societal constrains. This is embodied in the following statement by P5: *"If the female had an account you can see what she cooked or if she made a painting... things that [will] keep you informed [about her]."* P5 believes that the ability to view a female's public profile in social media will allow him to know more about her. Since the traditional method limits the amount of information about her, P5 finds social media the perfect medium to fill in the gaps and know more about her interests and hobbies. Earlier research has discussed the common issue of data accuracy on social media. Due to the nature of these platforms, it becomes easy for the user to provide an inaccurate persona [34]. This could occur in the form of users manipulating their profile to present themselves in a specific way[34]. However, this still does not devalue the experience. P6 states that: *"She might delete or clean up [her profile]... [but it] at least gives you some hint about what her interests are."* P14 explains how she interacts and presents herself on twitter in the following passage:

"View his tweets and respond to them... show my interests... usually it is showoff... I put more literately quotes... it might have principles that could represent you in a good way."
(P14)

Our participants mentioned that social media allows them a real-time natural observation of others online participation such as comments, likes, or posts. However, this is limited by the profile being public as stated by P7: *"I might have a public account that has things I care about, such as art and books."* Since the interaction online is somewhat indirect, it allows for easy exploration of others without worrying about formalities that are required in the traditional method. P18 explains how her husband learned more about her from her Facebook profile: *"He went to my Facebook page... so he can decide if I am suitable or not without him needing to ask a person."* Her husband found her through her blog and enjoyed reading her blog posts. That

motivated him to check her Facebook profile to know more about her before talking to his family to propose to her. Certain technologies like Match.com seem to be promising, but do not adapt to cultural differences very well as they were designed with a specific group of users in mind (i.e. Western populations). One of the important culturally sensitive design needs for a website like Match.com to fit in the Saudi context is regulating the process. That will allow it to be trusted and decrease harassment. Harassment in the context of Saudi Arabia can include the case when someone pursues the other with no serious intention to marry, but rather for dating or being friends. This is vaguely mentioned by P18 as *“things they do not want”* in the following excerpt:

“A platform that is suitable for our customs...like Match.com, there would be moderators...it would be highly regulated so people can trust that when they enter this place they are not exposed to harassment or things they don’t want.”
(P18)

Certain populations might benefit from technology because of their limited or non-existent social connections, which traditional methods are based on. For example, P5 talks about an acquaintance struggling to get married because “he does not have sisters”, which means he does not have anyone to look for him. P1 brings up another example and that is for orphan females who do not have male relatives or family to represent them appropriately *“there are many deprived females because there is not anybody who can reach them in an appropriate way.”* Another rare case mentioned by P5 is when the female does not go to many social events with her mother *“sometimes the mom does not take her daughter to weddings and funerals.”* This is because social events in Saudi are the main space for females to be seen and known to other families that may consider her as a bride for their son or refer her as a bride for distant relatives or friends.

Knowing Each Other A major technology that seems to be used by many in Saudi Arabia is Twitter, producing about 150 million tweets a month [167]. They use it to interact with others, which may not be possible in real life. This is mainly important because it is viewed as a space to exchange and interact with others’ ideas and opinions. P9, who met her fiancé through Twitter, states: *“Twitter allows the most interaction*

with people as ideas.” She believes Twitter allowed her to understand others intellectually. Others prefer Facebook, as they find it more inclusive. P17, who got to meet and know her husband through Facebook, says: *“it allows for many things to see in a person.”* She believes that Facebook is not limited to a certain medium (e.g. text, image, and video) but rather allows expressing in multiple ways. Regardless of the technology being used, P15 believes that technology in general allows for a flexible interaction with the opposite gender with no strings attached: *“Technology allows talking comfortably and [if things are not working] separation is easier.”* A more detailed description on how technology can mediate the interaction that would be otherwise unacceptable because of cultural barriers is explained by P5:

“Applications that show you points on a map that is big enough to show individuals that you can tell that this person represents it. . . assuming society accepts it. . . he sends to her that I want to propose to you. She sees the person, she does not like him and sends to him to get lost.”

(P5)

P5 believes that direct interaction might not be acceptable, but an indirect interaction with physical presence might be a middle ground that could be accepted. Even when interaction through technology is considered acceptable, having it regulated by a mediator may make it more meaningful for those involved as P8 describes “a three person skype, me. . . a mediator and the female. . . [mediator] runs the discussion.” Many participants believed going through conflicts or problems would help understand each other’s thought process. In addition to seeing their potential partner in different circumstances, which might be closer to reality. These could arise over time as events occur naturally per P14 *“in a year conflicts arise. . . conflicts show the other face”* or caused intentionally by one of the partners as P3 insists *“I have to create problems in this period. . . see the reaction of the other in front of me.”* P6 suggests a different method for testing your partner, this is to involve a third party to arrange it: *“put them in a dilemma. . . and they decide if they are suitable.”* Although this is not a safe playground, there is always the issue of balance—that is, being realistic and reaching a decision in a reasonable period. While physical appearance may be an important factor when considering a significant other, P9 disagrees and believes it is important to know

the mentality of your future partner: *“When you feel harmonized intellectually, looks are not important.”* P18 considers physical appearances to be misleading and can cause intellectual compatibility to be overlooked *“Create attraction... [That] does not have intellectual compatibility.”* She believes it makes her focus on physical attraction without noticing intellectual incompatibility. P16 agrees that intellectual attraction should be the main attraction *“Be more intellectual and not have emotional be a big part.”* This might align well with some cultural expectations of females not showing a personal picture of themselves as P18 states *“If people accept that she puts her picture.”*

Quality of Interaction Most participants agreed that nothing could compare to meeting your potential partner in person. P3 mentions that *“seeing your facial expressions while talking”* is very important for him. However, when meeting in person is not feasible, technology might be suitable to simulate the interaction per P7 *“I take pictures of my daily life... It is like you are virtually with the person.”* P12 offers a solution that was outside the box for us, that is the use of holograms to simulate a virtual reality scenario for both partners as if they are next to each other to simulate the feeling of being together. There was the concern of it being acceptable as it may be considered a physical mixing of genders that is not allowed religiously:

“Holograms... there would be a scenario... You see how she moves, how she looks, her actions... like virtual reality... I do not know if it would be mixing or not.”
(P12)

Another aspect is the issue of transparency in regards to the traditional method, P6 explains: *“the problem of the traditional method is the lying and deceit.”* This is caused by the mediator, which is usually the mother as P9 states: *“the information provided by the mothers about her children is filled with lies,”* which is why P9 prefers online means to traditional ones. P18 believes it may come from the desire of both parties to advance beyond the engagement period: *“during engagement the male and female try to hide all their flaws and show their best.”* P17 disagrees because it might end up as an emotional relationship too quickly *“it should not transform quickly into an emotional relationship.”* P8 thinks indirect interaction might allow more transparency *“A person is not shy to say something in text like they are shy to say it on the phone.”* P7 suggests

that anonymity could be helpful “*Ask relatives or friends in an anonymous way,*” since judgment is usually reduced relatively.

Technology Concerns and Fears

While technology represents an opportunity for match seekers, certain fears and concerns are overtly expressed. Specifically, trusting the unknown, the seriousness of online match seekers and customs violation.

Trust when Using Technology In the absence of strategies and devices that enable match seekers to distinguish lies from facts, establishing trust remains a challenge. P9 expressed worries about approaching someone for marriage without knowing the person previously:

“Lie detecting technology...it is better to have a measure to confirm that they are truthful with you because you have not seen them and do not know who they are.”

(P9)

The issue of trust is common in the literature. However, in the case of Saudi Arabian culture, trust does not stem only from the fact that the two parts have not met in person before but also from the fact that establishing a relation needs to come through common connections (i.e., referrals). P14 stressed the point that a successful and a sustainable marriage requires that either the two families know each other or the mediator is known by both families:

“Who led him? There has to be previous knowledge or...people that know you...If there is not it would be a problem for the female. There will be collision, there will be complete rejection.”

(P14)

Participants expressed worry regarding the fact that marriage seekers can hide the dark side of their lives to show a deceiving image of a perfect life. To this point, P15 posits: “*see the background of the person...it is important for me to know things that are disastrous.*” Nevertheless, as match-seekers require sharing negative experiences, the

issue of privacy emerges and thus the need for privacy management becomes crucial. P2 wonders: *“I do not know if there is a mechanism to share your info without violating your privacy.”* In the same regard, P2 wanted to manage his profile in a way to share only with the person he is interested in, but still maintain his privacy. Also, he believes it is important to ensure that both are only considering one potential partner at a time rather than considering many at the same time:

“If there is a way to ensure a one-way communication. . . I could communicate with everyone but with the person I want to know more, I want to focus on him or her.”
(P2)

Serious Use of Technology Some participants questioned the usefulness and usability of technology for seeking a life partner. For them marriage is a very serious matter that cannot be tackled through a website or an app. P13 believes social media is not an appropriate tool for seeking marriage. It does not align with Saudi culture and how marriage in such context is carried out. She believes technology should be utilized appropriately:

“Social media is not suitable because it does not match the way of thinking in our community. . . Technology is very beneficial but I do not use it for this issue”
(P13)

In the same token, P15 questions the seriousness of those people using technology for marriage and relates to her experience with a male that was not serious and could have led to him exploiting her *“he was not serious and gave room that it becomes exploitive”*. Also, P17, who met her husband online, mentions that the process is complicated and is not necessarily easier than the traditional method; *“It is not easy to find someone to marry through the internet. It is really hard and a very complicated process.”*

Technology Might Violate Customs or Religion Because Saudis believe in gender segregation and protecting females from stranger males, online match seeking is considered an outlying behavior that contradicts the common prevailing cultural and/or religious rules. P18 illustrates such common viewpoint:

“The internet made it easier for youth to know each other but I am against knowing each other when they are complete strangers.”
(P18)

In the same vein, P13 explains the reason behind such position and refers to the fact that in online match making there is no initial agreement. This is comparing to what happens in the real life Saudi Arabian marriage process. Such agreement indicates the seriousness of the marriage seeker and protects the females. The above condition is believed to be a religious one which stands highly above any customs or cultural considerations:

“If I allow them to know each other before there is initial agreement, a lot will not allow it because I always talk and say it is prohibited in religion. . . I are not limited by customs and culture but religion and I have mostly 90% conservatives”
(P13)

An interesting point relevant to the Saudi Arabian context is the nuances in what interactions between the potential partners can be allowed during the matchmaking process. P14 highlights such element:

“Some families allow phone calls before legal marriage, but in our community, they still reject this. Like there is no communication until the day of the meeting.”
(P14)

With that being said, the permissibility of exchanging phone calls, images and conversations using technology prior to any formal meeting in the Saudi Arabian society remains relative. Nevertheless, it is rare for families to allow interaction between partners before they are engaged in the Saudi Arabian culture.

4.1.8 Discussion

Unique Considerations for Technology Use in Conservative Societies

This investigation reveals the unique aspects of the marriage seeking process in Saudi Arabian culture. It may align with conservative traditions in other Muslim countries,

but it differs from the Western process in significant ways. Saudi Arabia’s conservative culture has mostly followed traditional matchmaking through personal connections [10]. As online dating became popular, technology has provided a novel opportunity for marriage seekers. However, most available marriage platforms do not account for the unique context of Saudi Arabian marriage, thus the numbers of Saudi’s using such platforms remains low.

The following cultural elements constitute the unique aspects of Saudi Arabian match making culture and represent roadblocks to Saudis’ use of the available technology for match seeking purposes. 1. *Gender segregation*: a woman and a stranger man are not allowed to meet without a “mahram” for the woman to be protected. In contrast, online dating platforms are not designed for gender segregation or the involvement of mahram chaperones. 2. *Family involvement*: “*bir al walidayn*” is a rooted principle stipulating that a son or a daughter need to involve their parents in the marriage process and obey their opinions. Online dating platforms currently do not afford this kind of parental involvement. 3. *Khotobah*: The formal agreement between both the families that is necessary for the relationship to proceed. This notion is absent in online dating, thus exchanging phone calls and messages violates customs or religion in conservative cultures like Saudi Arabia.

The absence of such cultural elements in the design of match making platforms involves three values of ethical importance [63]: trust, privacy and credibility. (1) While trust as a value has been frequently highlighted in works relevant to matchmaking and dating [79, 159], trust in this Saudi Arabian context is violated by the fact that no family member knows the other party or a third party mediating the introductions. This is exacerbated by the fact that people tend to misrepresent personal characteristics in online dating contexts [82]. (2) Privacy is also a common issue specifically in the Saudi Arabian context where women are encouraged to be covered from head to toe. Striking a balance between trust and privacy is a difficult goal since gaining trust presupposes revealing more about the self, which has the potential for endangering privacy. (3) Lastly, my study reveals that the credibility of technology for matchmaking is questioned by Saudis. The fact that existing platforms do not comply with the Saudi culture stigmatizes the entire class of technologies, associating it with culturally forbidden activities like flirting or fornication.

Opportunities for Future Investigation

Many concerns for transparency and honesty have been expressed by participants, which may align with the work done by Ma et al. [104]. It is worth investigating how transparency and honesty can be attained while still preserving Saudi Arabian values. My participants mentioned many existing technologies, like Match.com, Twitter, and Facebook. As we seek a cross-cultural understanding of social computing, it would be prudent to conduct in-depth studies of how these technologies are used, their pros and cons, and whether they can be appropriated in culturally sensitive ways (or if new technologies need to be made available in these cultural contexts). I discuss these tensions below.

Appropriating Current Platforms or Developing New Ones Our participants have expressed interest in certain technologies (e.g., Facebook, Twitter, Match.com) to find potential partners. However, it is still unclear whether the best solution is to design and develop a new platform or support appropriation of present platforms. This is a question I also aim to tackle in my future work. Specific concerns with current matchmaking technologies could be addressed by implementing affordances for gender segregation and family involvement, which are important in Saudi Arabian culture. Our future research will focus on developing and deploying culturally-sensitive prototypes to understand how these implications may be embodied in technical artifacts. In addition, I will investigate the role of matching algorithms, to understand how profile information and personalized matching may be designed to accommodate Saudi Arabian cultural values and Muslim users' in general. Namely, I plan to interview Saudis about using technologies like Match.com and how they can be designed to be culturally appropriate.

Designing for Traditional versus Emerging Values Many HCI researchers have offered ways to keep users' values in mind during the design process. One of the well known methods is Value Sensitive Design (VSD), which is a "theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process"[63]. One of the decisions that VSD keeps open to the designer is regarding the nature of the values they are designing for and whether the designer role is to remain neutral or partisan in the selection of

values. In the case of Saudi Arabia, the research to date is revealing a set of complex values that lean towards traditional values, rather than emergent ones.

I learned from my participants that the most applicable design for this context will allow them to benefit from modern technologies while maintaining traditions, customs, and religious practices that they value. However, these preferences may not be representative of all Saudi Arabians and may privilege certain value systems. Therefore, as I continue in my research, I leave a set of open questions:

- What values do I design for?
- How do I avoid marginalizing a group of users with design?
- How do I design systems that can respect the needs of cultural traditions without creating systems that reinforce existing power structures?

4.1.9 Limitations

The type of methods used and participants I was able to interview limited the study. While I recruited for diverse participants that represented different subcultures within Saudi, I neither sought nor attained a representative sample. Several self-selection biases may have influenced our recruitment. For example, a male conducting the interviews limited female participants to those who self-selected as being comfortable talking to a male about the topic. I also noticed that most participants seemed to have progressive views, which may not be representative of the older population. Finally, the interview method relies on self-report by the participant. Participants (especially, female participants) may have felt pressure to self-present in a positive light and focus on views consistent with their cultural context. We hope that in the future these limitations may be ameliorated through investigations of this topic using other methods and triangulating findings between this and other work.

4.1.10 Conclusion

In this study, I highlighted the unique context of Saudi Arabian marital matchmaking. Through an analysis of in-depth interviews with 18 Saudis, I uncovered the culturally accepted process of marital matchmaking, discussed the potential role of technology,

and highlighted concerns in this context. I found that while participants wanted to benefit from matchmaking technologies, they were only willing to use such technologies if they fitted within their cultural context and adhered to their religious norms. The findings of this study support the growing interest within the HCI community in culturally-sensitive and inclusive design that focuses on understanding and accounting for human values in the design process to allow for proper deployment and global use. I also provided design principles to support culturally-sensitive design of matchmaking technologies in this context, focusing on providing affordances for gender segregation and family involvement. Finally, I uncovered several challenges for researchers and designers working in this context and provided our solution. With this work, I provided an additional contextually-grounded research study to benefit the future value-sensitive work in the DIS community.

4.2 Quantitative Study

Muslim and Arab populations' values are not incorporated in social computing systems that are built with the western context in mind. Previous work to support this population has focused on qualitatively eliciting values, but not extending to investigations of how those values may be enacted in technical systems. In my study, I deployed a questionnaire to 478 Saudi Arabians, focusing on specific operationalization of values in marital matchmaking technologies. The participant responses indicated that they preferred parents to be informed about their activities in an online matchmaking site, but not have direct control over their profile. In addition, parental involvement influenced the acceptability of profile photos and other types of content. I also report participant reactions to specific features and profile design ideas. I end by discussing the opportunities and challenges that provide design implications for building matchmaking technologies for Muslim and Arab values.

4.2.1 Introduction

Muslims and Arabs, which respectively represent 25% and 5% of the world population, usually struggle between utilizing technology and preserving their values. Even though value sensitive design has been employed for over two decades [61, 62], many systems

today are built without considerations for non-western cultures. There have been some studies exploring the use of technology by Muslims and Arabs in relationships [15, 21, 25, 23, 26], but none have operationalized how these findings may be enacted in technology. In addition, it is challenging to study these populations because the use of matrimonial matchmaking technologies is stigmatized within Arab and Muslim societies [25]. The stigma originates from a common stereotype that individuals who use matrimonial websites engage in controversial behaviors (flirting, mixed-gender interactions). Even though Saudi Arabia's public sphere has seen recent changes about gender segregation, matrimonial websites remain stigmatized. In addition, trust and privacy concerns are widespread [5, 12, 144].

Saudi Arabia is a country where Muslim and Arab values have a major effect on the marriage process, due to centuries of cultural and religious marriage traditions. In this study, I deploy a questionnaire to investigate how to operationalize Saudi Arabian values in a future online matchmaking site. My contribution is determining what type of parental involvement, site features, and profile information is preferred by this under-investigated population. Building on my formative investigation in the previous qualitative study in section 4.1 that explored Saudi Arabian values within marriage and how technology may play a role, my work aims to understand how such technologies can be operationalized for Saudi Arabians.

4.2.2 Research questions

Through my quantitative study, I aim to answer the following research questions:

- RQ1d** What form of parental involvement (full control, parents informed, or user decides when to inform parents) best supports the matchmaking process in Saudi Arabia?
- RQ1e** What is the relative importance of providing certain information on a matchmaking service to complement the Saudi Arabian matchmaking process?
- RQ1f** What is the relative importance of providing certain features on a matchmaking service to complement the Saudi Arabian matchmaking process?

I surveyed opinions of Saudi Arabians regarding the design of matrimonial matchmaking technologies in a Muslim and Arab context. I begin by highlighting related work that touches upon values and concerns that Saudi Arabian users have when using technology. I describe how my online questionnaire was conducted and my participants' demographics, which included 478 Saudi Arabians from 13 different regions of Saudi Arabia. I report my findings on preferences regarding parental involvement and how it influences the specifics of profile content (e.g., photo presence). I also report participant ratings of different types of profile information and site features, as well as the role of demographics in these preferences. I conclude with a discussion that articulates the opportunities and challenges for matchmaking technologies and provide implications for design when building such technologies.

4.2.3 Related Work

I describe relevant work in three areas: value sensitive design, family involvement for Saudi Arabian users, and disclosure & privacy for Saudi Arabian users.

Value Sensitive Design

Value sensitive design (VSD) has improved the design of technologies and helped research advance within HCI. VSD seeks to incorporate human values of specific communities of interest into the design process [63], aiming to provide users with autonomy and minimize bias in computing systems [61]. VSD may consist of conceptual, empirical, or technical investigations [63]. Previous relevant work with communities of interest described below has consisted of qualitative empirical investigations. My contribution in this investigation is in providing a quantitative, empirical understanding of the sensitizing concepts uncovered in previous work [21, 23, 26]. I also focus on transitioning toward specific operationalizations that would be actionable in a technical VSD investigation.

I build upon previous work in this space, which has utilized VSD to understand values of Arabs and Muslims when using technology [15], perceptions on changing values after travel abroad [3], and privacy in the context of Islamic values [5]. One relevant study done by Alsheikh et al. studied how Muslims and Arabs managed their long distance relationships [15], which led to identifying and articulating “the Islamic feminist model”

where women adhere to Islamic teachings and values while maintaining their agency. My work continues to explore the relationship between values and relationships in the matchmaking context. Most relevant to this investigation is my previous qualitative study, where I conducted interviews focusing on understanding attitudes toward the use of matchmaking technologies to address challenges in the traditional matrimonial process in Saudi Arabia. I found that most participants showed interest in utilizing matchmaking technologies but were concerned about their ability to do so while preserving culture and religion in the process, particularly in terms of providing an adequate role for parents in finding and vetting potential partners. Lastly, it is worth noting that many relevant studies have been conducted recently in a Western context by Zytka et al [176, 175, 181, 179] and in a Saudi Arabian context by Bajnaid et al [26, 23, 21], which show that online matchmaking is generally an underexplored topic and one of significant potential impact.

Overall, previous work has pointed to three sensitizing concepts that may be important to consider when transitioning to technical investigations in this field: privacy and self-disclosure in the context of Islamic values, role of parental involvement in matchmaking, and considerations of how personal agency interacts with these ideas. I describe previous work on these considerations in more detail in the sections below, articulating how it has led to my specific research questions and approach towards my contributions.

Family Involvement as a Value Consideration for Saudi Arabian Users

Previous work has highlighted the importance of family values in the marriage process in Islamic and Arab cultures. The concept of *bir alwalidayn* is ingrained in Islam and Arab culture—it requires obeying and respecting parents or other family elders, even after becoming an adult [4, 123]. Most decisions regarding marriage are traditionally made by the parents or other family elders, rather than by the potential bride and groom [85, 165]. This may introduce tensions regarding personal agency for people who want to choose whom to marry but also want to respect the opinions of their parents. This may also introduce tension when using technology, which was designed with the individualistic and independent values of the West in mind. It is worth noting that this resonates with similar themes in previous work done by Wisniewski et al. [169,

170] concerning online parental control with teens. Finding a balance between personal agency and respecting parents in Saudi Arabia is a constant struggle.

Some people may resolve this tension by keeping parts of their life separated. Some Muslims and Arabs present different aspects of themselves offline versus online [5]. For example, they may hide information or photos that show them at mixed-gender gatherings [12] in order to follow the social expectations set by their families [5, 144], which is known as context collusion [49]. When people employ this strategy, technology may increase the danger of context collision [49], such as being tagged in content that would violate cultural or religious norms [5]. This may cause people to be extra vigilant that their posts or online activity cannot be used to harm their own or their family's reputation and honor [4, 14, 76]. Many users protect their family's reputation and honor by hiding their identities in their online activities [76, 4, 12]. One of the concerns of this strategy is that people may hesitate to use online tools for purposes that traditionally include family involvement, particularly matchmaking. While these practices do protect users' privacy and give them more personal agency online, they may alienate their families in the process.

The potential stigma of technologically-mediated matchmaking is evident in the fact that most Saudi Arabians report not knowing any acquaintances who have used matrimonial websites [25]. As this stigma is more prominent for women due to traditional courtship roles [25], men were more likely to be open about using matrimonial websites and were also more active on them [25, 156]. Both Saudi Arabian men and women on such sites agreed that they used them to find more choices compared to traditional means [25], but wanted to conform to cultural and religious norms while making use of such sites [15, 144, 76]. Most current matchmaking sites do not take parental involvement into account, which was a common concern for Saudi Arabians. However, while previous work has articulated the importance of family involvement, the specifics of this involvement and how it relates to other sociotechnical considerations of a potential matchmaking site remain unclear. My work contributes an empirical investigation comparing three potential types of parental involvement in an online matchmaking context. In addition, it investigates how preferences for specific types of parental involvement influences what the type of information is disclosed on a user's profile.

Disclosure and Privacy as a Value Consideration for Saudi Arabian Users

Preserving privacy is connected to preserving reputation and honor in Muslim and Arab cultures [12, 52]. Abokhodair et al. defined privacy in Islam in terms of three aspects: haq al-khososyah, hurma, and awrah with each encompassing the others in that order [5]. Haq al-khososyah includes the right for an individual to protect their private life to preserve their reputation. Hurma is meant specifically to protect the body from those who are not allowed to see it. Awrah is more specific to intimate body parts. Saudi Arabians view their privacy as a right that is respected collectively in Muslim and Arab cultures, but may find it harder to achieve the same level of collective recognition of this value in the Western world [6, 6]. Most current social media systems are developed with Western values in mind. This creates fundamental tensions in the use of social media and makes controlling privacy troublesome. While Saudi Arabians are avid users of social media (e.g., 75% penetration rate on Twitter [150]), both liberals and conservative users [93] may hesitate to reveal any personal information online. Previous research reveals that Saudi Arabian users are likely to use unidentifiable nicknames online and have multiple accounts to maintain more control over individual privacy [76, 4]. These concerns also have gendered components. Social media is frequently viewed as a dangerous space for women [14] due to concerns over the potential for blackmail if personal photos or information is gained using social media [144, 5]. This usually means that women are less likely to use their personal photos on social media [146, 31]. While using nicknames and having no personal photos may seem to undermine their agency in a Western context, it allows them to use social media more freely in the Muslim and Arab context with no fear of repercussions. Use of social media and online dating tends to increase more for women compared to men when they move to Western countries where this stigma may be less salient [156, 14]. Given these concerns and stigmas, Saudi Arabian women are only likely to use matrimonial websites after exhausting all possible traditional methods [25]. In comparison, Muslim men may face this stigma less frequently but may consider women on matrimonial websites to be risky as potential partners, even as they are willing to move cautiously forward with a potential match [145]. Personal agency is a concern for both genders when using technology and a culturally-sensitive redesign may provide more potential benefits for women in Saudi Arabia. While previous qualitative

investigations point to privacy as a sensitizing concept, in designing matrimonial matchmaking systems for Muslim and Arab cultures, the specific operationalization of this concept of privacy is underexplored. What kinds of information must be revealed to evaluate a potential partner? What kinds of information may be omitted in the early parts of the evaluation process? How do individual characteristics such as gender, age, cultural, and religious affiliations affect these considerations? In this work, I contribute a quantitative investigation seeking to address these questions.

4.2.4 Methods

Participants

Participants were recruited through Twitter by soliciting retweets from Saudi Arabians, especially public figures. This helped in reaching participants who fit the selection criteria. The selection criteria were that a participant must be Saudi Arabian or immediately related to one (spouse or child), must be 18 years or older, and must have lived at least ten years of their life in Saudi Arabia. In my recruitment process, participants were expected to respond as if they were actively seeking marital partners, which could have been in the past. After a pilot study that uncovered some design concerns that were addressed, about 644 participants started the questionnaire and 478 participants completed it. Figure 4.1 shows a break-down of the demographics of the study sample.

5: Committed, 4: Somewhat Committed, 3: Neutral, 2: Somewhat Not Committed, 1: Not Committed

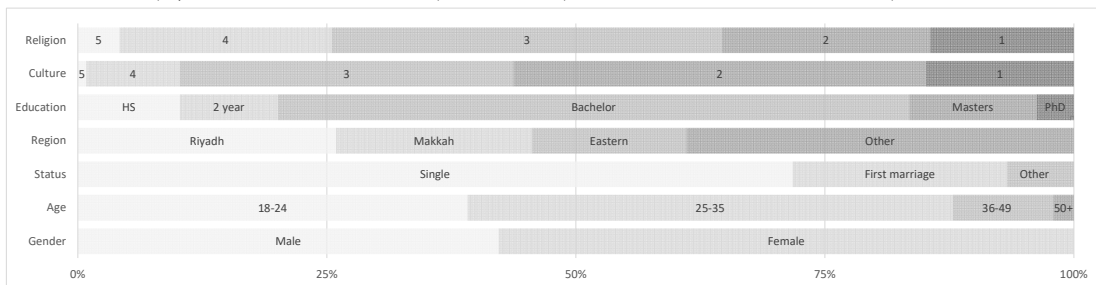


Figure 4.1: Percent of participants in each demographic group

There was an almost equal representation for gender in my sample, with 58% of participants being women. Eighty-eight percent of participants were between the ages

of 18-35, 72% were single, and 80% had a bachelor's degree, which includes those who reported having a masters or a PhD. The other category for marital status consisted of divorcees, widowers, and those who remarried representing 7%. Compared to the Saudi Arabian population, my sample has more women (58% vs 49%), younger participants (88% vs 28%), more singles (72% vs 37%), and more educated participants (80% vs 24%)[66]. Most participants were from the three major regions in Saudi Arabia, which are Riyadh (26%), Makkah (20%) and the Eastern province (15%), which is similar to the distribution of the Saudi Arabian population [66]. I aimed to obtain at least 100 participants from each region to have substantial geographic diversity in the sample, but only Riyadh met this with 124 participants. Makkah and the Eastern province came close with 94 and 74 participants.

Procedure

A questionnaire was deployed through Qualtrics in the months of July and August of 2017. The questionnaire was conducted in Arabic and had four parts, which were: a consent form, rating twelve profile variations, rating 14 items about site features and profile information for a marital matchmaking system, and the demographics that were presented in section 4.2.4. My work is exploratory in nature and not hypothesis driven.

Consent form. The consent form introduced the participants to the questionnaire and the researchers and asked for their consent to take part in the questionnaire. After obtaining participants' consent, they were directed to start the questionnaire. Otherwise, they would be directed to the end of the questionnaire.

Profile ratings. Participants rated all twelve variations of a profile based on three variables: parental involvement (full control, informed parent, and user decision), photo presence and content type (social media or Q&A). Full parental control retains all the influence the parents have as outlined in section 2.2. Informed parent immediately informs parents about the user's actions. Lastly, the user decision condition of parental involvement lets the user decide when parents are informed about their actions. These variables were adopted from previous work [5, 144] and my qualitative study in section 4.1. Before the ratings began, a sample profile was

provided highlighting which parts would vary (Fig. 4.2) and explaining how the ratings would work. Participants were told to rate profiles based on how acceptable they would be for an actual matchmaking service. The order of the profile variations was randomized to insure the independence of ratings. Participants rated one profile at a time and were not allowed to go back to it after they had rated it. The rating was a 7-point Likert scale with 7 being “I really like it” to 1 being “I did not like it at all.”

Item ratings. The rating of 23 items was based on how important they were for participants. 9 items were eliminated during the analysis because their average rating was too low or there was no significant difference. Of the remaining items, Seven dealt with site features and the other seven consisted of profile information. The items rated were derived from my previous qualitative study in section 4.1. My previous study helped to identify items of interest, while my current study is meant to quantify them. The items were presented together on one page with a request to rate each item based on its importance. Each item had a short description in Arabic followed by a drop-down menu with seven options on a 7-point Likert scale from “Very important” to “Not important at all” with 7 being “Very important.” Site features (see Table 1) and profile information (see Table 2) are listed in the results with their average scores, standard deviations and which demographic found them more important.

Figure 4.2: An example interface with placeholder for parental control, showing a photo, and a placeholder for type of content (Social Media vs Q&A.)

Demographics. Demographics included gender, age, marital status, which region in Saudi Arabia participants belonged to, and participants educational background. In addition, participants were asked to rate their level of affiliation with religion and culture to measure the interaction between their cultural and religious commitment and their ratings. Religious and cultural commitment ratings had five categories: “Committed,” “Semi-committed,” “Neutral,” “Semi-uncommitted,” “Uncommitted.” A short description for each category was provided to explain different levels of commitment to the belief and practice of customs and culture, as well as the concept of committing sins or good deeds religiously. I will reference those who are committed to culture as culturally committed and those who are not as culturally not committed throughout the results.

Analysis

For the twelve profile ratings, repeated measures ANOVA was conducted for the three variables to determine main effects and interactions between them. In addition, two sets of linear regressions were conducted with the interface rating as the dependent variable. In the first set, it was 2-way interactions between profile variables (parental involvement, photo presence and content) as the independent variables. In the second set, it was 2-way interactions between demographics (gender, age, cultural or religious ratings) and profile variables (parental involvement, photo or content) as the independent variables. For the 14 item ratings, linear regression was conducted with the rating being the dependent variable and demographics (gender, age, cultural or religious ratings) as the independent variable. In addition, Bonferroni correction was applied to represent actual significance for both the profile and 14 item ratings with the significance threshold being lowered to $p < 0.01$. Questionnaire responses that did not have all twelve interfaces, 14 items ratings and demographics completed were excluded (166, 26% exclusion rate) to ensure the quality of the data collected. This resulted in a total of 478 questionnaires.

4.2.5 Results

I present my results in three sections: ratings of site features, ratings of profile information, and ratings of user profiles.

Ratings of Site Features

For item ratings corresponding to site features, I analyzed the statistically significant differences of ratings for gender, age, religious and cultural ratings through linear regressions. Table 4.2 shows the means and standard deviations for these ratings and which demographic found it more important. Site features will be referenced by keywords in the following paragraphs.

Table 4.2: Site Feature Ratings and Demographics Differences

Site features	Rating	Rated More Important by
Partners meet in arranged volunteering events (VOLUNTEER)	6.5 (sd=1.2)	Women; Younger
Protect users' privacy and identity (PRIVACY)	6.0 (sd=1.6)	No Difference
Limit interactions to be only one-to-one (1-to-1)	5.9 (sd=1.5)	Younger; Not Culturally Committed
Regulated and monitored by an official authority (AUTHORITY)	5.4 (sd=1.7)	Younger
Partners meet through social media (SOCIAL)	4.7 (sd=2.2)	Religious; Culturally Committed
Partners discuss and resolve expected marital issues (DISCUSS)	4.3 (sd=1.8)	Not Culturally Committed
Meet and know partners through friends & family (FAMILY)	4.1 (sd=2.0)	No Difference

Gender. Significant differences in ratings ($p < 0.01$) were found for gender only for VOLUNTEER ($r = -0.16$). VOLUNTEER was rated as important by both men and women, but women consider it very important (6.7 vs 6.3).

Age Groups. There was a significant difference between age groups ($p < 0.01$) for 1-to-1 ($r = -0.18$) and AUTHORITY ($r = -0.17$). 1-to-1 was considered important by all age groups, but those between 18 and 24 considered it more important compared to those 50 and older (6.1 vs 4.7). AUTHORITY was considered important for those between 18 and 24 while those 50 and older were neutral about it (5.3 vs 3.7).

Religious rating. SOCIAL ($r=0.51$) had a significant difference ($p<0.01$). SOCIAL was important to those who identified as religious and somewhat not important to those who identified as not religious (6.1 vs 2.5).

Culture rating. 1-on-1 ($r=-0.19$), SOCIAL ($r=0.41$), and DISCUSS ($r=0.24$) had a significant difference ($p<0.01$). 1-to-1 was considered more important to those who identified as culturally not committed (4.7 vs 5.9). SOCIAL was considered important to those who identified as culturally committed and somewhat not important for those who identified as culturally not committed (5.5 vs 3.2). DISCUSS was considered more important to those who identified as culturally not committed (2.5 vs 4.2).

Ratings of Profile information

For item ratings that corresponded to site information, I analyze the statistically significant differences of ratings for gender, age, religious and cultural ratings through linear regressions. Table 4.3 shows the means and standard deviations for these ratings and which demographic found it more important. Profile information will be referenced by keywords in the following paragraphs.

Table 4.3: Profile Information Ratings and Demographics Differences

Profile Information	Rating	Rated More Important by
Interests and life goals of users (GOALS)	6.2 (sd=1.5)	Women; Younger; Not Religious; Not Culturally Committed
Show nearby users on a map (NEAR)	6.0 (sd=1.3)	No Difference; Younger
Marriage principles and expected gender roles (ROLES)	5.9 (sd=1.5)	Women
Subculture and social circle of a user (CIRCLE)	5.1 (sd=1.9)	Religious
Provide the results of a personality test (PERSON)	5 (sd=1.8)	Women; Not Culturally Committed
Sexual familiarity and knowledge (SEX)	4.7 (sd=1.8)	Women; Not Culturally Committed
Importance of religion for a user (RELIGION)	4.3 (sd=2.2)	Culturally Committed

Gender. There was a significant difference ($p < 0.01$) for GOALS ($r = -0.19$), ROLES ($r = -0.23$), PERSON ($r = -0.12$), and SEX ($r = -0.18$). GOALS and ROLES were considered important by both women and men with women considering them slightly more important (6.4 vs 5.8, and 6.2 vs 5.5). PERSON and SEX were somewhat important for both genders, but women considered them more important (5.2 vs 4.8, and 5.0 vs 4.4).

Age groups. There was a significant difference ($p < 0.01$) between age groups for GOALS ($r = -0.17$). Participants between 18 and 24 considered GOALS important while those 50 and older consider it somewhat important (6.3 vs 4.6).

Religious rating. There was a significant difference ($p < 0.01$) for GOALS ($r = -0.18$), and CIRCLE ($r = 0.20$). Those who identified as not religious found GOALS important when those who identified as religious considered it somewhat important (6.3 vs 5.4). Those who identified as religious found CIRCLE important when those who identified as not religious were neutral about it (5.0 vs 4.2).

Culture rating. There was a significant difference ($p < 0.01$) for GOALS ($r = -0.33$), PERSON ($r = -0.21$), SEX ($r = -0.21$) and RELIGION ($r = 0.24$). GOALS was considered important for those who identified as culturally not committed while those who identified as culturally committed were neutral about it (4.2 vs 6.4). PERSON was considered somewhat important by those who identified as culturally not committed while those who identified as culturally committed were neutral about it (4.0 vs 5.0). SEX was considered more important to those who identified as culturally not committed (3.5 vs 4.5). RELIGION was considered somewhat important to those who identified as culturally committed and somewhat not important to those who identified as culturally not committed (5.0 vs 3.4).

Profile Ratings

The analysis of the twelve profile variations rating gave some insight on the interaction between parental involvement, photo presence, and type of profile content. In addition, I considered how gender, age, cultural and religious affiliation would affect these ratings.

Main Effects and Correlations between Parent, Photo and Content. Repeated measures ANOVA was conducted to find the main effects of parental involvement, photo presence and type of content (Table 4.4) and the interactions between them for profile ratings (Fig. 3-6).

Table 4.4: ANOVA profile ratings main effects and interactions

Factor Effects	Significance	Partial Eta Squared
Parental Involvement Type	$p < 0.01$	$\eta = 0.088$
Photo vs No Photo	$p = 0.02$	$\eta < 0.001$
Q&A vs Social Media	$p = 0.09$	$\eta < 0.001$
Parent * Photo	$p < 0.01$	$\eta = 0.009$
Parent * Content	$p < 0.01$	$\eta = 0.010$
Content * Photo	$p < 0.01$	$\eta = 0.002$

My results show that participants want less parental involvement (Fig. 4.3), especially when their photo or personal opinions were present. Also, photo presence is more important when presented with questions and answers rather than a social media feed.

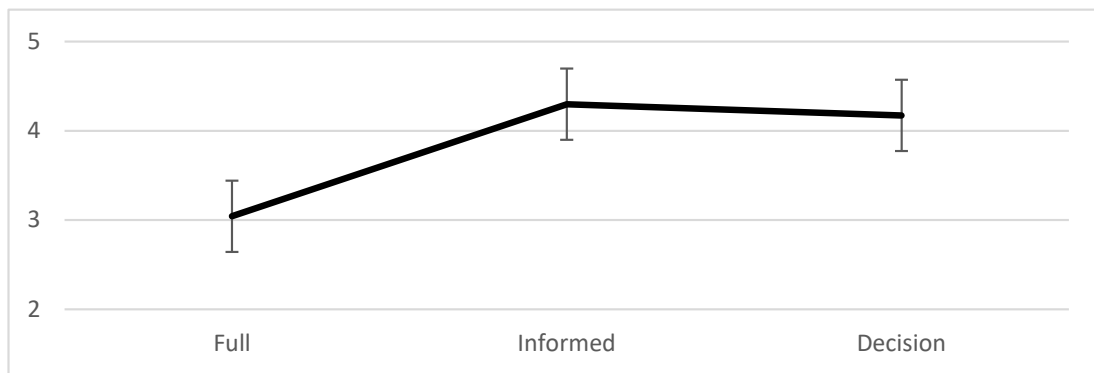


Figure 4.3: Parental Involvement Average Ratings

When it came to photo presence, there was a significant interaction ($p < 0.01$) with parental involvement (Fig. 4.4). This shows that photo presence was preferred with less parental involvement and vice versa.

When it came to content type, there was a significant interaction ($p < 0.01$) with parental involvement (Fig. 4.5). Less parental involvement was preferred across content

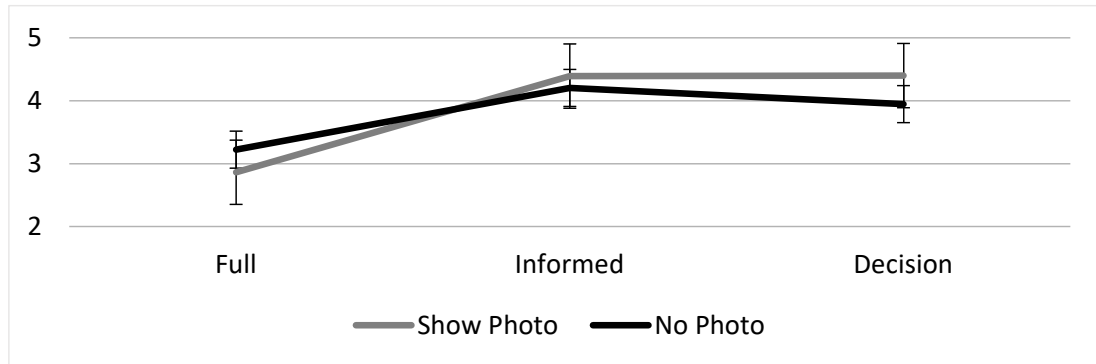


Figure 4.4: Photo Presence and Parental Involvement

type, and this preference was stronger for when a Q&A was available. There was a significant interaction ($p < 0.01$) between content and photo presence (Fig. 4.6), but a small effect size. Photo presence was slightly more preferred with Q&A.

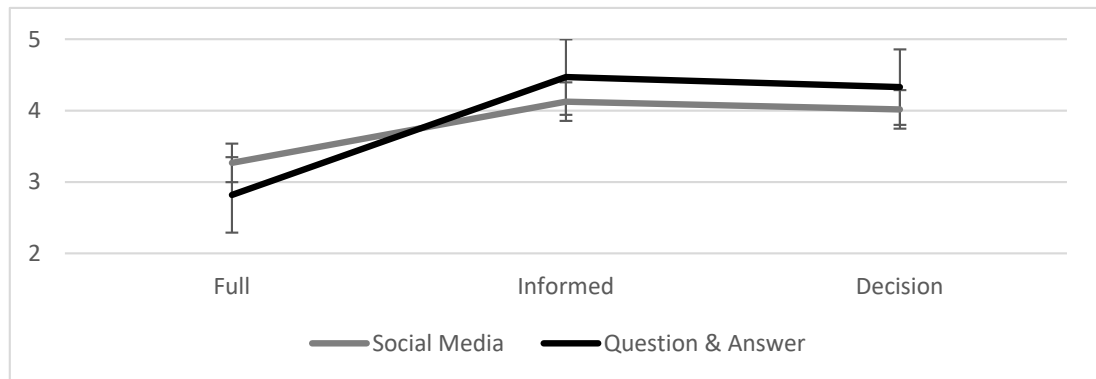


Figure 4.5: Parental Involvement and Content

Effect of Demographic Characteristics on Interface Ratings. To understand the effect of demographics on interface ratings, I conduct a linear regression between profile variables and demographics. Most significant differences were found with parental involvement, but there were also some differences for content and photo.

Gender. When it came to gender, there was only a significant difference for parental involvement ($p < 0.01$, $r = 0.30$) (Figure 4.7). Even though both women and

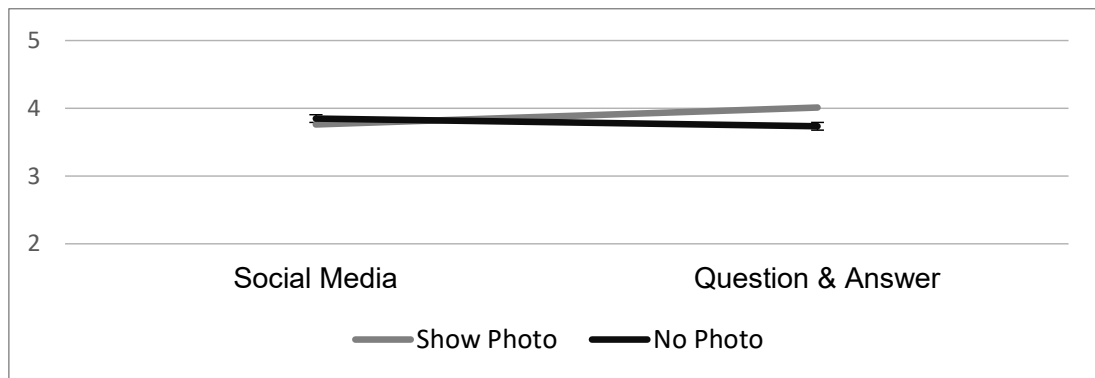


Figure 4.6: Photo Presence and Content

men did not prefer “full control”, women rated it lower than men (2.9 vs 3.2). For “informed parent”, men and women rated it 4.3 out of 7. For “user decision”, women rated them slightly higher than men (4.3 vs 4.0). For photo presence and content, there was not a significant difference ($p > 0.01$).

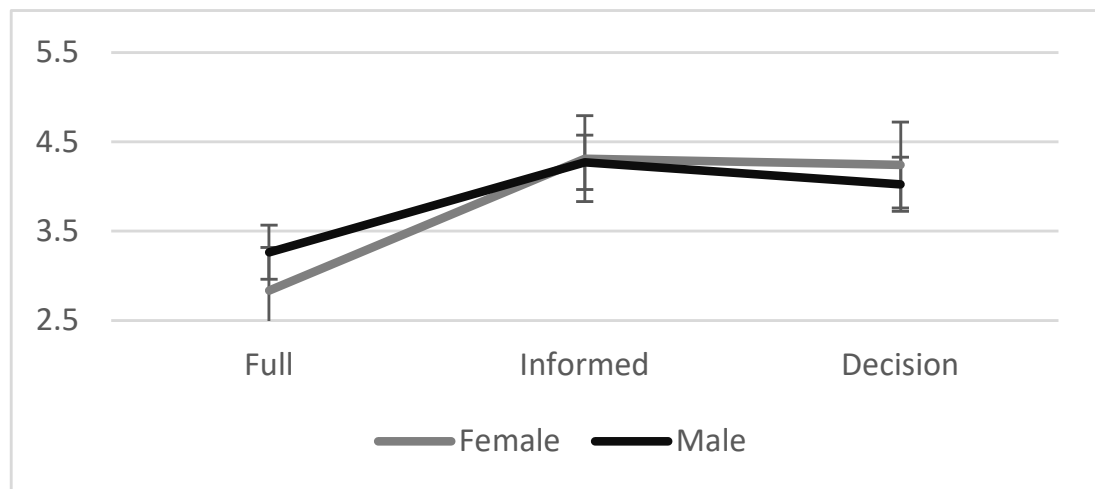


Figure 4.7: Interaction of Gender and Parental Involvement

Age Groups. When accounting for age groups, less parental involvement and Q&A were preferred overall and photo presence was preferred by younger participants. For parental involvement, there was a significant difference ($p < 0.01$, $r = 0.31$) between age

groups, with those 50 and older preferring “full control” (4.7 vs 2.9) and those between 18 and 24 preferring “informed parent” and “user decision”, even though older participants had higher ratings (Full: 4.7 vs 2.9, Decide: 5.1 vs 4.1, Inform: 5.2 vs 4.3) (Fig. 4.8).

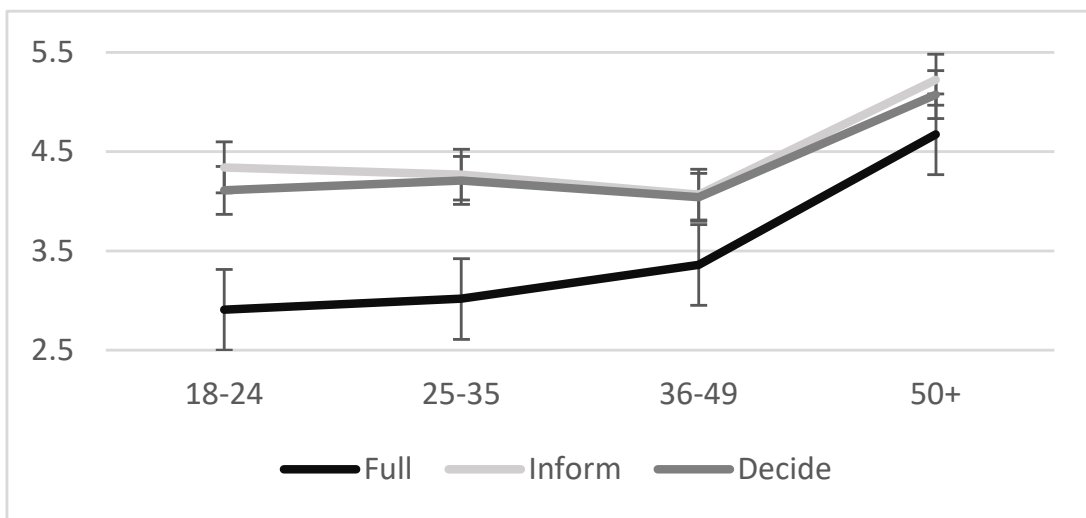


Figure 4.8: Interaction of Age and Parental Involvement

There was a significant difference in preference for the presence of a photo ($p < 0.01$) with a small effect size ($r = -0.09$) (Fig. 4.9). Participants between 18 and 24 preferred it while those 50 and older did not, even though older participants had higher ratings for both (No: 5.1 vs 3.7, Yes: 4.9 vs 3.9). There was a significant difference in preference for specific content ($p < 0.01$, $r = 0.09$) (Fig. 4.10). Q&A was slightly preferred for younger participants over social media with older participants having a similar preference for both (SM: 5.0 vs 3.7, Q&A: 5.0 vs 3.9).

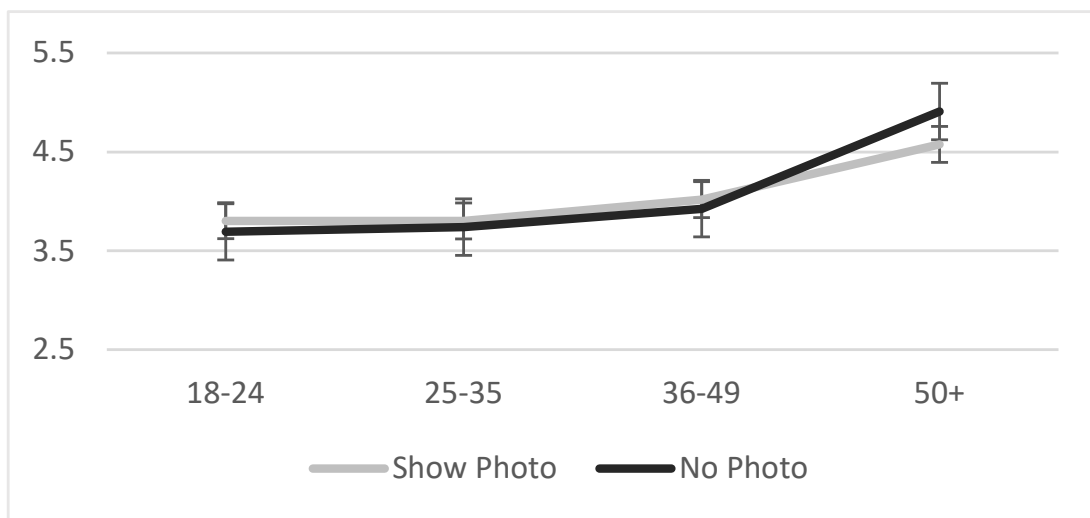


Figure 4.9: Interaction of Age and Photo Presence

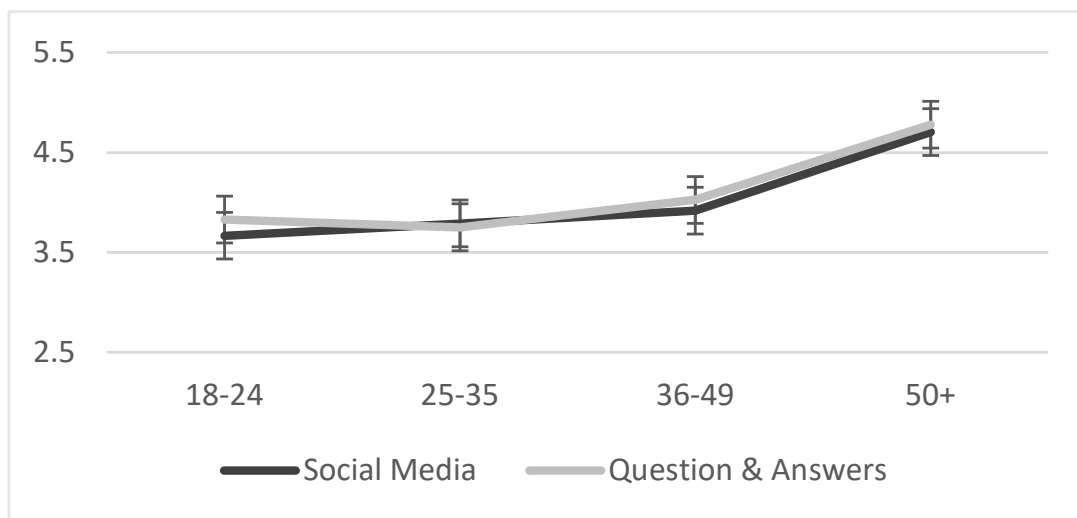


Figure 4.10: Interaction of Age and Content

Religious Rating. For religious ratings, less parental involvement and Q&A were preferred overall, but those who identified as not religious preferred a photo being present.

For parental involvement, there was a significant difference ($p < 0.01$, $r = -0.30$) with “full control” being more desirable for those who identified as religious, and less desirable for those who identified as not religious (4.0 vs 3.0). “Informed parent” was slightly preferred over “user decision” with the largest difference being for those who identified as religious preferring informed over decision (4.7 vs 4.0) (Fig. 4.11).

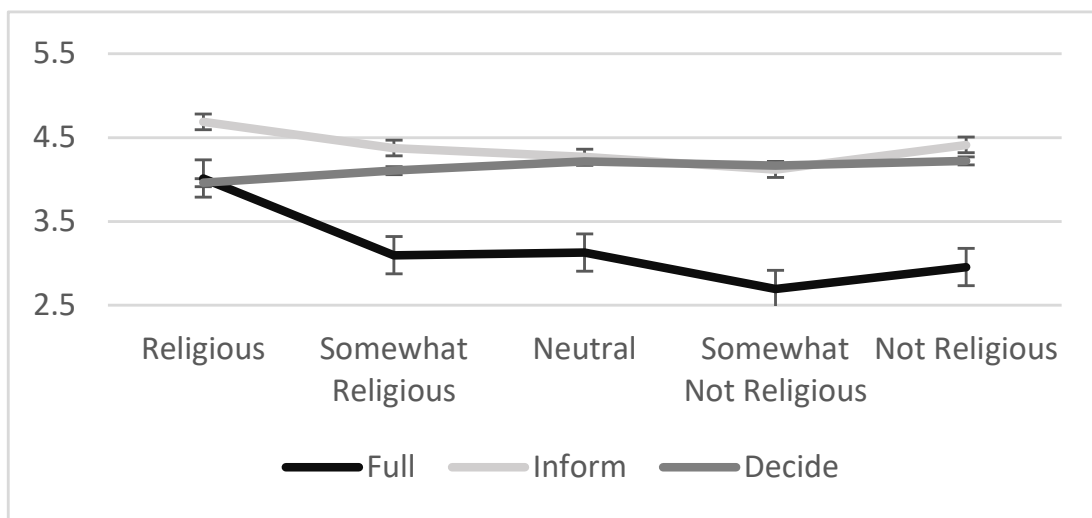


Figure 4.11: Interaction of Religious Rating and Parental Involvement

There was a significant difference for photo presence with those who identified as “not religious” preferring it ($p < 0.01$) but with a small effect size ($r = -0.05$) (Fig. 4.12). Nonetheless, those who identified as religious had higher ratings for both conditions compared to those who identified as not religious (No: 4.2 vs 3.7, Yes: 4.2 vs 4.0). There was a significant difference for specific content ($p < 0.01$) with a small effect size ($r = -0.05$) (Fig. 4.13). Q&A was slightly preferred over social media with those who identified as religious rating both higher than those who identified as not religious (SM: 4.1 vs 3.7, Q&A: 4.4 vs 4.0).

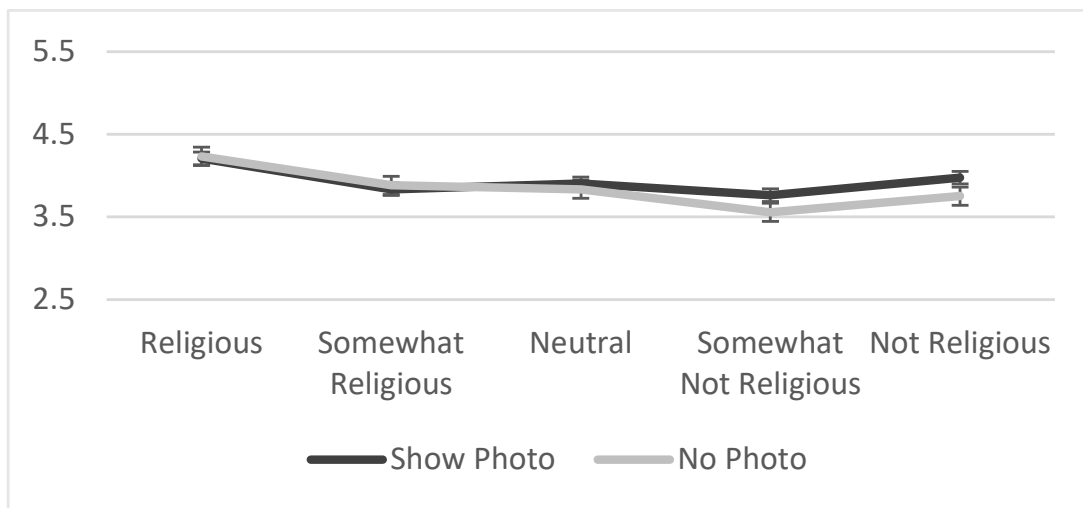


Figure 4.12: Interaction of Religious Rating and Photo

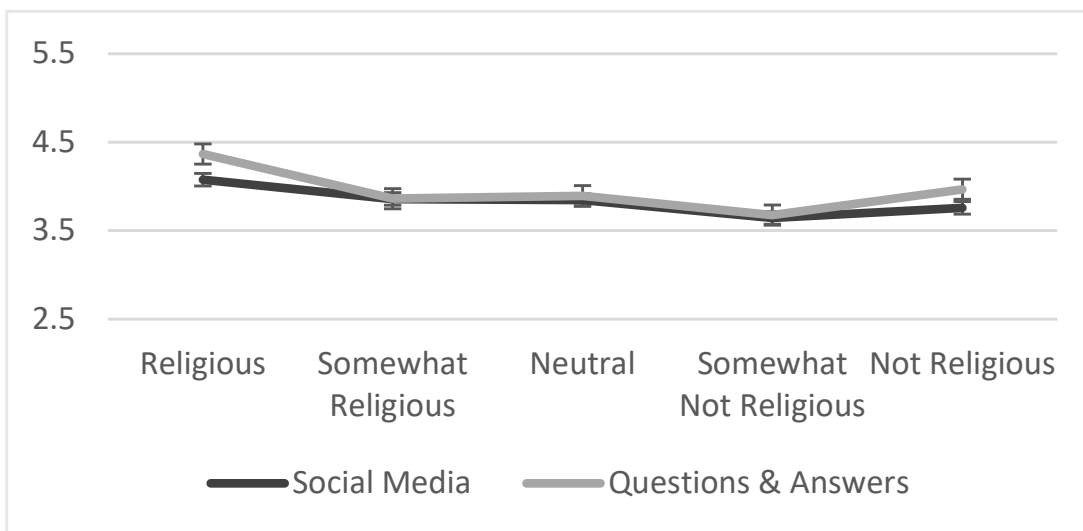


Figure 4.13: Interaction of Religious Rating and Content

Cultural Rating. When it came to cultural commitment, less parental involvement was preferred overall. For content type and photo presence, there was not a significant difference ($p > 0.01$). Regarding parental involvement, there was a significant difference ($p < 0.01$, $r = -0.30$) (Fig. 4.14). “full control” was generally preferred the least but rated slightly higher by those who were culturally committed (3.4 vs 2.9). On the other hand, “informed parent” was preferred the most overall and was slightly more preferred by those who were culturally committed (4.4 vs 4.2). “User decision” was slightly more preferred by those who were culturally not committed (4.1 vs 4.3).

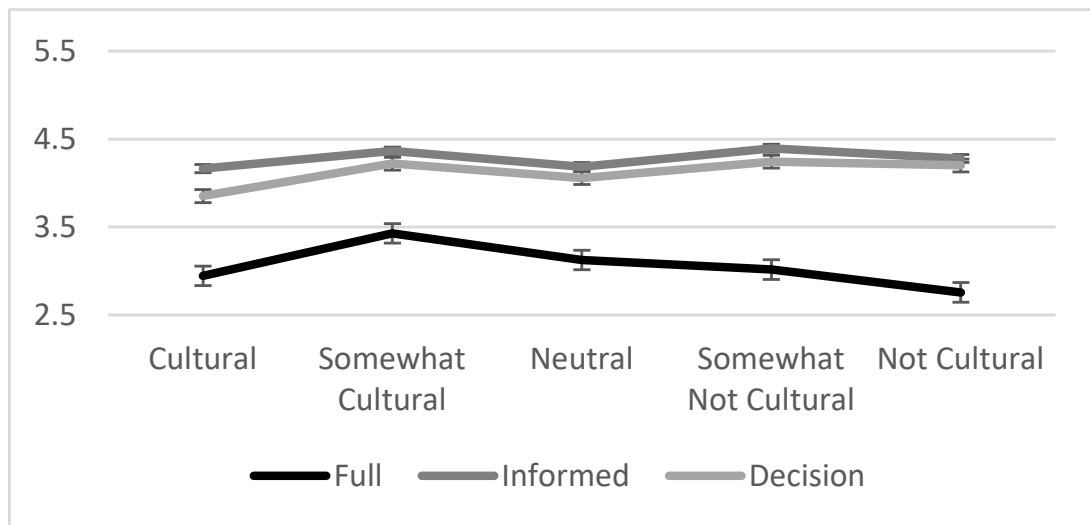


Figure 4.14: Interaction of Cultural Rating and Parental Involvement

4.2.6 Discussion

The results indicate that Saudi Arabians want to change parental involvement in courtship and marriage to be less intrusive. They want to exchange more information with potential spouses and allow women to have more control. I clarify the trade-offs in three design decisions when building matchmaking technologies for Muslim and Arab values. In this section, I discuss three major implications for future research and design in this context: new conceptions of privacy and anonymity, technology as an extension of women’s agency, and the role of parents in matchmaking.

Managing Privacy and “Family Anonymity” Online

As discussed in previous literature (see 4.2.3), privacy is a critical consideration for potential Muslim and Arab users of matrimonial matchmaking technologies. Default options on a Western dating site, such as sharing photos, were controversial for my participants. In my study, there was no consensus on whether the ability to share photos made a site design more or less acceptable to the participants. This may particularly reflect concerns around women facing blackmail if they make photos available [144]. However, not all forms of possible profile disclosures were equally problematic. I identified several different forms of information that participants marked as important to reveal in a search for a potential partner. For example, sharing one’s geographic information may seem like a privacy violation, but general geographic area (e.g., town) may be important to facilitate meeting people who have family ties nearby. Given the importance of proximity to nuclear family in the Muslim and Arab value system and specifically in marriage, this may be a consideration where the potential value of disclosure overrides the need for privacy.

One approach that individuals use for balancing online privacy and self-disclosure in Muslim and Arab contexts is managing anonymity and unidentifiability. Previous work has shown that anonymity can support self-disclosure [106, 104] and meaningful online relationships [95], while incurring less risk of “bringing shame” to the family. For individual social media use, Saudi Arabian users may use anonymous or pseudonymous accounts and block their parents from accessing that content [5]. However, I see that a different solution is needed within the context of matchmaking. Participants in this study viewed matchmaking as a type of social media in which they wanted their parents to be informed of their activity, rather than blocked by the use of a pseudonymous account.

One useful framework for considering this issue lies in previous work which has considered privacy in Muslim and Arab contexts as existing at multiple levels: individual, family, collective, etc. [4]. An example that conveys this is a Saudi Arabian man who deleted his social media account because his friend was able to view a picture of his sister that was meant to be accessible only to his nuclear family [5].

One possible resolution to the seemingly conflicting needs of online anonymity and family involvement may be in introducing a new concept of “family anonymity,” which

aligns with protecting privacy and identity (Table 4.2) and the preference for parents being informed (Fig. 4.3). Under such a model, a user may create an anonymous profile to find a match with the family being aware of its existence. While the main user's activity on this site would be visible to the parents, all outward activity would be anonymous—revealing profile information deemed important for finding a compatible partner while hiding the family name and other identifying features. As the matchmaking process advances towards an engagement and risks to family honor are reduced, more sensitive information (e.g., photos, family name) may be gradually revealed.

Women's Agency and Saudi Arabian Values

In the Western context, interactions between genders usually have no restrictions—dating is a cultural norm and parents do not typically play a deciding role in marriage. In contrast, dating in Saudi Arabia is considered taboo and almost non-existent in the public sphere [158]. Interactions between opposite genders are usually limited to professional settings and many public spaces are segregated by gender [5, 12]. Parents are expected to mediate and control the marriage courtship process, with potential spouses only interacting within the specific bounds set by their parents. The prospective groom's mother traditionally initiates the process of seeking a spouse after the son indicates his interest in marriage or a specific woman to his mother as mentioned in section 2.1. In some cases, the mother might have already independently initiated the process and created a shortlist of suitable prospective brides for the son to choose from. In both cases, the son is presented with a potential wife to consider for marriage. The traditional model provides little agency for women who want to take initiative in seeking a spouse. This might also apply to men when their mothers are reluctant or refuse to approach families with no prior mutual social connections for marriage. Even then, it is much more socially and culturally acceptable for the man to approach a woman's family directly for marriage than it is for a woman.

On the other hand, the underlying assumption of a marriage matchmaking site is that a roughly equal number of women and men will make themselves available as interested parties. A matchmaking site may provide opportunities for women to self-identify as being ready for marriage and even actively seek out or filter potential partners based

on shared interests, activities, and other features. This blurs traditional courtship roles in ways that may not have been culturally-appropriate in the past [88]. Matchmaking technologies may be another step toward the “Islamic feminist” model defined in previous work by Alsheikh et al. [15]—a model defined by women seeking greater agency through use of technology.

However, my participants did not want the same kind of operationalization of agency as may exist on Western dating sites. Perhaps this should not be surprising, as others have pointed out that current western matchmaking technologies seem to be designed to meet men’s needs while neglecting women’s needs [102]. This is similar to how women reacted to male guardianship in Saudi Arabia in my previous study in section 4.1, which can be used to influence their decisions. These problems may be amplified for Saudi Arabian women who are also expected to preserve the family’s honor (more than men) [13]. In my study, participants expressed a desire for a more controlled experience (e.g., regulated and monitored by an official authority, Table 4.2) where they would be able to get to know a person’s interest and values in a safer online environment. These authorities may include government entities or private companies that are endorsed by the government or public figures, but further research is needed to identify what constitutes an official authority in this context. Nonetheless, women might see an opportunity in online tools that affords them greater agency in finding a potential partner while still vetting the process through regulation, parental involvement, and privacy protections. This could be similar to how social media sites have “verified accounts”. This may be a case where increasing constraints and regulation may actually lead to increasing agency for Saudi Arabian women. For example, when women cannot be easily identified online and feel protected by an official authority, concerns about reputation and the risk of being blackmailed is reduced significantly. In my results, I found that younger participants found regulation by an official authority more important and “full control” by parents less desirable for women. Future work should explore if regulation by an official authority might be a suitable alternative to parental involvement that would meet the needs of parents and provide more agency for women.

Valuing Parental Involvement Over Control in Matchmaking Technologies

My study operationalizes and identifies levels of parental involvement that would be most acceptable to Saudi Arabian users.

If considering only liberal western values and traditions around marriage, values of independence and personal choice are at the forefront. Any form of parental involvement on such websites would be a violation of those values. Additionally, it may be difficult for designers trained in the Western tradition to consider that limiting user choice or flexibility improves the acceptability of a potential online matchmaking solution. This difficulty stems from the fact that all design is inherently influenced by the background of the designer. This limitation is intensified when they are faced with a concept that contradicts their own beliefs or values. My results highlight a new perspective on cases where limiting user choice may in fact be the right solution for users in a particular context. This difficulty stems from their limited understanding of other cultures. This limitation is intensified when they are faced with a concept that contradicts their own beliefs or values. My results provide a different perspective on limiting user choice. When presented with a choice between a site that keeps parents informed of how all users use a matchmaking site and a site where each user makes an individual choice on parental involvements, my participants significantly preferred the first option. This is in line with Islamic and cultural guidelines that strongly encourages or requires parents' involvement in the marriage process [28, 166]. Given the current stigma around the use of conventional dating sites in conservative cultures [25], it may make sense that users prefer a site that ensures parental involvement and where one knows that potential partners will be following a similar method of parental involvement. In this case, enforcing a consistent level of parental involvement addresses cultural concerns regarding the use of those sites for flirting, unsupervised gender-mixing, and other practices seen as problematic in the Saudi Arabian value system. It may also help allay concerns about deception or exaggerated self-representation in profiles [74, 159], since the parents are more likely to be motivated to maintain the integrity of a profile.

On the other hand, a reader who is coming from an Arab or Muslim tradition, may find it interesting or surprising that participants preferred a design where parents are not directly in control of the online matchmaking process. "Full control" was the least preferred category among my participants and those rating it highly may represent

a generally more conservative group (e.g., also preferring that no photo is available). Overall, this preference against full parental involvement may represent a cultural shift within Saudi Arabia. This insight complements findings from my previous qualitative study in section 4.1, which suggested that participants may resent too much parental involvement, while still wanting to respect underlying cultural traditions.

Rating “full control” more negatively may also echo other behaviors of contemporary Saudi Arabians online, such as blocking their parents from their social media accounts [5]. It is common for Saudi Arabians to hide any activity that would not be approved by their parents or social circle. In that light, it may be surprising that my results show that participants would prefer that their parents are aware of their activity on matrimonial websites. This could be due to the greater sensitivity of the role of family in the matchmaking process. Social media use may be cast as an issue of individual privacy, while use of matrimonial websites may reflect on the whole family and therefore be cast as a case of family privacy. Individual privacy includes the ability to selectively deliver important information to potential spouses on matrimonial websites, while secluding this information from a broader audience, including parents of potential spouses, who may find it inconsistent with familial or social expectations.

Parental control preferences also varied between different demographics. From my results, it is evident that participants who were either women, younger, less religious, or not culturally committed indicated less preference for full parental involvement. Participants preferred that parents are informed about their activity on matrimonial matchmaking technologies, but not in control of it. On the other hand, participants aged 50 and older preferred “full control.” From my investigation, it is not immediately clear whether they would seek parental involvement when they are seeking a spouse for themselves, seek parental control when they are a parent of a young adult seeking a spouse, or more generally find this the more culturally-appropriate approach regardless of their personal context. Since participants aged 50 and older were a minority in my study, further investigations would be needed to understand their perspective as both as a parent and an adult seeking a spouse. It is particularly important for future investigations to understand how to balance parents’ inclusion and control with the preferences expressed by the younger participants in my study. Overall, my findings indicate that parental involvement is an important factor that should be included when

designing matrimonial matchmaking technologies for Saudi Arabian users.

Limitations

My study has three major limitations: selection bias, the lack of parents' and official authorities' perspectives in this investigation, and simplified cultural and religious self-report ratings. The selection bias was caused by convenience sampling since I were trying to reach out to as many participants as possible and did so over Twitter. Given the demographics of my participants and the fact that Twitter was the medium for my study may mean that my participants are more likely to be more tech savvy and accepting of matrimonial matchmaking technologies compared to the general population. At the same time, these demographics indicate that most of my participants are most likely potential users of a matrimonial matchmaking technology and not parents or other stakeholders. It is worth noting that parents and government entities are not well represented in this work and future work should focus on understanding their perspectives on marital matchmaking technologies. My findings will guide future work in exploring ways to involve parents in matchmaking technologies, incorporate "family anonymity" and design technology that is more inclusive of Muslims and Arabs. In this investigation, participants self-reported their religious and cultural affiliations on two 5-point Likert scale questions. This leaves room for interpretation for participants on what it means to be committed to religion or culture. Additionally, each question only provides a single dimension to position oneself on issues that may be quite complex, multidimensional, and nuanced for Saudi Arabians. In the future, it may be more useful to focus more directly on the role that religious and cultural commitment plays in the use of marital matchmaking technologies.

4.2.7 Conclusion

In this work, I surveyed opinions of Saudi Arabians regarding the design of matrimonial matchmaking technologies for the Muslim and Arab context. I discovered that parental involvement, but not control, is necessary for matchmaking technologies to be accepted. In addition, the need to share relevant information while maintaining privacy presents a unique challenge to maintain "family anonymity" for users. Lastly, it is important to

understand that regulation by official authorities may provide more agency for users, especially women. The main contribution of this work is providing empirically-informed value-centered guidelines for designing matchmaking technologies for Saudi Arabians. These guidelines consist of keeping parents informed about usage, designing with both genders in mind, and paying close attention to privacy concerns that Saudi Arabians have expressed.

4.3 Conclusion

From my findings in 4.1 and 4.2, I was able to understand what aspects of the traditional marriage process can be enhanced with marital matchmaking technologies and what Saudi Arabian values need to be embodied within marital matchmaking technologies for them to be accepted. The only concern that remained is understanding the role of Saudi Arabian Parents as secondary stakeholders in the traditional marriage process. While my findings in this chapter did touch upon the role of Saudi Arabian parents, it was mostly from the perspective of young adults and not the parents themselves. This led me to conduct another formative investigation with Saudi Arabian parents in chapter 5.

% Chapter Template

Chapter 5

Formative Investigation: Understanding Secondary Stakeholders Role in Marital Matchmaking Technologies

As mentioned in Chapter 4, I realized that my participants mainly consisted of primary stakeholders (young adults) that occasionally referred to secondary stakeholders (parents) in their responses. To avoid bias, I decided to conduct an investigation aimed at Saudi Arabian parents as secondary stakeholders. I used data I collected in my previous investigation to design my study protocol. This investigation is a qualitative interview study with Saudi Arabian parents¹ aimed at answering **RQ2**. mentioned in Chapter 1.

5.1 Introduction

Finding a date or a spouse online is usually considered an individualistic endeavor in Western cultures. This presents a challenge for collectivist non-Western cultures such as Saudi Arabia where choosing a spouse is viewed as a union of two families with parents

¹ This qualitative interview study is publish as [50]

of both spouses being heavily involved. My formative investigation aims to understand how Saudi Arabian parents view the utilization of technology by their young adults to seek potential spouses online.

Technology has been utilized to find dates or relationships for almost two decades [60]. However, to my knowledge, not much work has explored the use of technology with other stakeholders being involved (i.e. family). While it is common that people seek dates and relationships individually, recent work has explored how it is different for “Eastern” populations where involving the family in the process makes it safer [155]. In addition, another study has explored the role of community in online dating platforms [113]. These studies have suggested that a collective experience on dating or matrimonial platforms might be more effective than an individualized experience.

As Saudi Arabia marriages usually follow a traditional process where both families are involved in the process, it is important to understand how this would translate to a matrimonial matchmaking system. My previous investigation in Chapter 4 has shown that Saudi Arabians are interested in utilizing technology for marriage, but are unsure how to navigate it while preserving their cultural and religious values and involving their parents in the process. Other studies have explored how Saudi Arabians utilized matrimonial websites to seek a potential spouse [24] and how it might conflict with the traditional process [23]. For example, women in Saudi Arabia require their legal guardian’s approval when deciding who they want to marry, which can vary based on many familial and social factors [124]. In addition, family members who are against the marriage can create obstacles for potential spouses [23]. Lastly, Saudi Arabians are obligated to please their parents and respect them based on Islamic teachings [4]. To the best of my knowledge, no previous work has explored Saudi Arabian parents’ perspective on marital matchmaking technologies. For those reasons, this investigation answers the following research questions:

RQ2a What concerns and views do Saudi Arabian parents have about marital matchmaking technologies?

RQ2b What is an effective role for Saudi Arabian parents to play in marital matchmaking technologies?

I investigated these questions through the analysis of 16 semi-structured interviews that

I conducted with Saudi Arabian parents with the aim to contribute to the ongoing discussion in HCI on inclusive design and cross-cultural computing. In doing so, I aim to inform the design process for building a technology to support matchmaking in Saudi Arabia.

5.2 Related Work

5.2.1 Cross-Cultural Online Matchmaking technologies and Privacy

Online dating has been around for almost 3 decades [137] and U.S. marriages that started online between 2005 and 2012 were associated with better marital satisfaction and were less likely to end up with divorce or separation compared to alternatives [36, 78]. This topic is complicated to study but also needs to be explored more by the HCI community overall [177, 185, 60, 32], but most previous work was done with western populations in mind (North America and Europe). I highlight previous work on online dating in general and relate it to work done on understudied populations.

Authenticity and trust are a constant concern when using technology and especially in the case of online matchmaking technologies. Lee and Bruckman found that users managed their identity differently between social media and online dating, but their social media identity was more authentic and “natural” [100]. The ability to view a friend list on social media was a method to measure the credibility of a user. Trust and credibility are a major concern with online dating especially when deception and self-exaggeration is more likely to occur in online dating platforms [74, 159] and current mechanisms have not been successful with establishing trust [130]. Even though deception is expected in online dating, Hancock et. al. found that that its magnitude is usually small [81]. Nonetheless, this creates a struggle when evaluating potential romantic partners on an online dating platform as found by Zytka et. al [178]. They also found in another study that online dating coaches focused on moving the interaction offline as soon as possible. They believed that online evaluation of profiles was not effective at measuring a user’s personality and meeting in person would be more effective [175, 182]. On the contrary, Saudi Arabians found online settings to provide more information since their interaction with the opposite gender offline is limited [21, 22]. Even though recent changes have made it easier to interact with the

opposite gender in public settings, exchanging information for marriage publicly is usually not acceptable. It is preferred if it is done discretely, and online platforms are well suited for that. Nonetheless, online matchmaking platforms lack a community that would provide feedback and advice for users, which would lead them to seek third party community forums (i.e. Reddit) as found by Masden and Edwards [113].

In line with that, Nayak et. al. found that social matching based on previous relationships in online dating platforms increased the success rate of recommendations [125], but this depends on how success is measured in online dating platforms [112]. The definition of success is important for my population since it usually translates to marriage and not going on a first date or being engaged [112, 26]. Another indicator of success in online dating was more self-disclosure as found by Handel and Shklovski [83], which was found to be associated with anonymity by Ma et. al. [104]. At the same time, there is the concern that anonymity would question the authenticity of self-disclosed information [106]. On the other hand, self-disclosing sensitive information such as a disability [136] or being HIV positive [83] might seem unfavorable for the user, but is also considered as a filtering mechanism to avoid negative outcomes. In addition, Ma et. al. found that online daters considered overlapping location data to be useful, even though it presented security and privacy concerns [105]. I can see that information sharing is useful, but only when it is trustworthy and does not violate users' privacy.

Preserving privacy is connected to preserving reputation and honor in Muslim and Arab cultures [52, 12]. Privacy invasion online can be a serious threat to relationships in Arab societies, which is more prevalent for those with a mid to low socioeconomic background that might hold onto traditions more compared to those from a high socioeconomic background [147]. In Arab culture there is a perception that not sharing information with family and friends is a sign of mistrust, but this is also where they become vulnerable to privacy invasion threats. Abokhodair et al. defined privacy in Islam in terms of three aspects: haq al-khososyah, hurma, and awrah with each encompassing each other in the same order [5]. The first, haq al-khososyah, includes the right for an individual to protect their private life to preserve their reputation. The second, hurma, is meant specifically to protect the body from those who are not allowed to see it. The third, awrah, is more specific to intimate body parts. Saudi Arabians view their privacy as a right that is respected collectively in Muslim and

Arab cultures, but may find it harder to achieve the same level of collective recognition of this value in the Western world [5, 6]. Since most current social media systems are developed with Western values in mind, this creates a fundamental tension in the use of social media and makes controlling their privacy troublesome.

While Saudi Arabians are avid users of social media (e.g., 75% penetration rate on Twitter [150]), they may hesitate to reveal any personal information online. Previous research reveals that Saudi Arabian users are likely to use unidentifiable nicknames online and have multiple accounts to maintain more control over individual privacy [5, 76]. These concerns also have gendered components. Social media is frequently viewed as a dangerous space for women [14] due to concerns over potential for blackmail if personal photos or information is gained using social media [5, 144]. This usually means that women are less likely to use their personal photos on social media [146, 31]. While using nicknames and having no personal photos may seem to undermine their agency in a western context, it allows them to use social media more freely in the Muslim and Arab context with no fear of repercussions. Use of social media and online dating increases more for women compared to men when they move to a western country where this stigma may be less salient [14, 156]. Given these concerns and stigmas, Saudi women are only likely to use matrimonial websites after exhausting all possible traditional methods [25, 24]. A previous study by Bajnaid et. al. found that Saudi Arabian men have a higher success rate of moving from online marital matchmaking technologies to offline interactions compared to Saudi Arabian women [24]. Personal agency is a concern for both genders when using technology for marriage in Saudi Arabia [24]. Nonetheless, Technology seems to provide more agency for women since they have less control over the traditional marriage process compared to men (Chapter 2).

The potential stigma of technologically-mediated matchmaking is evident in the fact that most Saudi Arabians report not knowing any acquaintances who have used matrimonial websites [25, 24]. As this stigma is more prominent for women due to traditional courtship roles [25], men are more likely to be open about using matrimonial websites compared to women and were also more active on them [25, 156]. Both Saudi men and women users of such sites agreed that they used them to find more choices compared to traditional means [25, 23], but wanted to conform to cultural and religious norms while making use of such sites [144, 15, 76]. Even though marital

matchmaking technologies are viewed as challenging social and religious norms, Saudi Arabian users find that their religious and cultural values shape how they view themselves online [22, 21].

My previous investigation in section 4.1 found that most Saudi Arabians showed interest in utilizing matchmaking technologies but were concerned about their parents accepting the use of matchmaking technologies and how to find a suitable way to collaborate with parents in finding and vetting potential partners that does not undermine young adults' agency. One aspect of parental vetting of potential partners for marriage in Saudi Arabia is lineage [26]. For Saudi Arabians, this usually means differentiating between those who belong to a tribe and those who do not with some tribes preferring to marry within. A study done by Ortega and Hergovich [131] shows that interracial marriages increased in the US with the increase of online dating usage. In other words, marital matchmaking technologies could challenge the status quo of only marrying based on lineage compatibility that Saudi Arabian parents support [26]. This is a source of tension between parents and young adults since parents prefer mono-cultural marriages and young adults are willing to explore intercultural marriages while being aware that they might struggle as mentioned by participants in my previous investigation in section 4.1. As Saudi Arabian culture is becoming more technology-oriented, it might be possible that intercultural marriages would increase.

While previous investigations covered privacy and trust concerns while using online matchmaking technologies, the role of Muslim and Arab parents when marriage is conducted online is under-explored. What information do they consider appropriate or important to exchange when evaluating a potential partner? What kinds of cross gender interactions would they find acceptable? How does privacy and trust play a role in the information exchange and interaction between potential partners? In this formative investigation, I contribute a qualitative study seeking to address these questions.

5.2.2 Parent-Child Technological Interactions

Previous work has highlighted interactions between parents and their children when using technology [135, 152, 169, 170]. While I understand young adults have different interactions with their parents compared to children, the difference is blurred between

Muslim and Arab young adults and their parents given the religious and cultural expectations. I highlight previous work on parent-child technological relationships and explain the uniqueness of the Muslim and Arab context for these relationships.

Previous work has explored how parents and adolescents manage their use of technology. Technology is meant to enable teenagers to learn about making safe decisions on their own as restricting or monitoring their usage by their parents is not effective [172, 69, 18]. In other words, technology should be designed for them to be able to explore its usage properly and learn from their experiences with parents providing them with guidance. In one study, adolescents were better at making moral judgements with authoritative parents which had high expectations regarding appropriate use of technology but did not restrict usage [172]. In other studies, it was found that parental control actually increased online risks while granting teens more autonomy helped them learn from their negative experiences [68, 69] and that developing resilience toward online risks is more effective than using restrictive measures to limit exposure to online risks [171]. In a study where parents monitored their children's activities, children were less likely to voluntarily disclose information, which had a negative effect on trust between children and their parents [94]. Teens prefer that their parents are not involved in their online usage to preserve their privacy. At the same time, teenagers are willing to give access to their information when it is an emergency. Teens are also more likely willing to share their information with parents if they were notified about it. In other cases, technology might provide a medium for brokering between parents and their youth that would improve communication channels between them [162]. In two studies done by Muñoz et al, they worked on exploring how technology can play a role in improving parent-adult children relationships by incorporating dialogue that would allow them to renegotiate their positions after children have left home and manage expectations for both ends [119, 118]. For Arabs and Muslims, this may be slightly different as the renegotiation of positions and expectations is guided by religion and culture.

Previous work has highlighted the importance of family values in Islamic and Arab cultures. The concept of *bir alwalidayn* is ingrained in Islam and Arab culture and it requires obeying and respecting parents or other family elders into adulthood [4]. Most decisions are traditionally influenced by the parents or other family elders rather than

by young adults [85, 165]. Even when young adults make the decision on their own, they usually consult the parents about it [99]. This may introduce tensions with personal agency for young adults who want to make their own decisions but also respect the opinion of their parents, which may seem to be contradictory. This tension is usually intensified when using technology that was designed with the individualistic and independent values of the West in mind. Muslim young adults may view respecting their parents' opinions as part of their personal agency as they choose to partake in it. In other cases, they may feel socially pressured to do so. Finding a balance between personal agency and respecting parents in Muslim and Arab cultures is a constant struggle online.

Some people may resolve this tension by keeping parts of their life separated. Some Muslims and Arabs present different aspects of self offline versus online to avoid conflict with their parents [5]. For example, they may hide information or photos that may reveal them at mixed-gender gatherings [12] in order to follow the social expectations set by their families [5, 144]. When people employ this strategy, technology may increase the danger of context collapse, such as being tagged in content that would violate cultural or religious norms [5]. This may cause people to be extra vigilant that their posts or online traces cannot be used to harm their own or their family's reputation and honor [14, 5, 76]. For example, some users protect their family's reputation and honor by hiding their identities in their online activities [5, 12, 76]. One of the key implications of this strategy is that people may hesitate to use online tools for purposes that traditionally involve family involvement, particularly matchmaking. While these practices protect users' privacy and gives them more personal agency online, it alienates their family in the process.

However, while previous work has articulated the importance of family involvement, the specifics of this involvement and how it relates to other sociotechnical considerations of a potential matchmaking site remain unclear. My work contributes an empirical investigation on how parents perceive online matchmaking technologies and what role they would play in them and investigating what types of interactions and information would be suitable or important in the online marital matchmaking process.

5.3 Methods

5.3.1 Participants

Participants were initially recruited through an online sign up form that was distributed through multiple social media platforms. The main platform was Twitter, which was utilized by soliciting retweets from Saudi Arabian public figures to reach more participants. Another recruitment method was the first author personally reaching out to acquaintances that might be interested or know someone who was interested. I attempted to recruit participants from diverse backgrounds but were not successful. The regions my participants belonged to were limited to Riyadh (8), Makkah (4), Najran (2), Albaha (1) and Tabuk (1). It is worth noting that Saudi Arabia has 13 regions, which means less than half the regions are represented in my sample. Most of my participants were highly educated with 10 of them having a masters or a PhD. I have an even distribution for income with middle class being the majority and lower middle class and upper middle class as outliers. Participants were as young as 38 years old and as old as 63 years old. For the background column, Qabali is having tribal lineage while Arabi is not having tribal lineage, which I will refer to in other parts of the study for simplicity. In addition, a Hadhri lived a modern lifestyle (e.g. City) while a Badawi lived a simpler lifestyle (e.g. Rural). Table 5.1 below provides more info about my participants.

5.3.2 Inclusion Criteria

Even though I aimed to recruit Saudi Arabian parents that were at least 45 years or older and have a child that is at least 15 years old, 5 parents were younger than 45 and one of them had a child that was 14 years old. The reason I decided to be flexible with the inclusion criteria is to include more participants in my study. Also, this did not violate my rationale for these age thresholds, which is that parents would relate to their current role in finding a spouse for their young adult children rather than have them hypothesize future scenarios. Fifteen years is the age when a child would reach puberty from an Islamic perspective and are considered accountable adults [91]. They would not necessarily get married when they turn 15, but it would be the earliest age that the topic of marriage would be introduced. Also, this age is not associated with what

Table 5.1: Study participants Characteristics.

#	Region	Gender	Background	Education	Income	Age
P1	Riyadh	Male	Qabali Hadhri	Bachelors	Mid	53
P2	Riyadh	Female	Qabali Hadhri	PhD	Mid	46
P3	Riyadh	Male	Arabi Hadhri	Masters	Mid	43
P4	Makkah	Female	Qabali Hadhri	Bachelors	Mid	38
P5	Riyadh	Male	Arabi Hadhri	Highschool	Low	63
P6	Riyadh	Male	Qabali Hadhri	Bachelors	Mid	52
P7	AlBaha	Male	Qabali Badawi	Masters	Low	45
P8	Tabuk	Male	Qabali Badawi	PhD	High	50
P9	Riyadh	Male	Qabali Hadhri	PhD	High	57
P10	Riyadh	Male	Qabali Hadhri	Bachelors	High	60
P11	Makkah	Female	Arabi Hadhri	Masters	Mid	38
P12	Makkah	Female	Arabi Hadhri	PhD	Mid	39
P13	Makkah	Female	Arabi Hadhri	Masters	Low	48
P14	Riyadh	Female	Qabali Hadhri	Some college	Low	51
P15a	Najran	Male	Qabali Badawi	Masters	Mid	47
P15b	Najran	Female	Qabali Badawi	Masters	Mid	40

parents perceived as an acceptable age for their children to use technology for marriage or any other purpose. Other inclusion criteria were that they are Saudi Arabian citizens or closely related to one (spouse or child) and have lived at least 10 years in Saudi Arabia.

5.3.3 Procedure

I conducted semi-structured interviews with 16 participants with 9 males and 7 females, which included one couple. Interviews were conducted either in person or over Skype, based on the participants' preference. Interviews were conducted in Arabic and lasted between 45 and 90 minutes and generated 87 pages of interview data. Participants were compensated with a gift that was equivalent to 50 Saudi Riyals or more. I were advised by a Saudi Arabian professional that it is more suitable to give gifts such as chocolate or fancy pens rather than cash to older participants. The interviews covered three aspects: participants initial thoughts about matchmaking technologies, reflecting on hypothetical features of matchmaking technologies, discussing the importance of sharing certain pieces of information through matchmaking technologies and concluding with any

general comments or remarks they have about the study. Participants were provided a consent form both when signing up for the study as a soft copy and before conducting the interview as a hard copy. I stopped conducting interviews when data saturation was reached, and I did not gain new information from interviews.

5.3.4 Analysis

Interviews were transcribed in Arabic by the first and second authors. After that, the first author conducted qualitative inductive data driven thematic analysis. This began with open coding the interview transcriptions as mentioned in [154]. The interviews generated a total of 440 codes. After that, the first author used affinity diagramming [117] to generate thematic clusters by constantly comparing and organizing codes based on how similar they were to each other. Thematic clusters were generated when a significant number of codes were highly similar to each other. During the process, clusters grew, shrunk, split and merged until the final set of clusters was generated and all codes were evaluated appropriately.

5.4 Results

Based on the thematic clusters resulting from my qualitative analysis, I identified three major themes which capture Saudi Arabian parents' perspectives on the potential use of matchmaking technologies. The first theme captures parental perspective regarding preserving their religious and cultural values and integrating them within technological systems. The second theme focuses on the parental belief that young adults are becoming more independent and autonomous when they use technology to seek a spouse for marriage. The third theme provides a rich accounting of parental concerns about how technology could be used or misused in the Saudi Arabian context.

5.4.1 Preserve Religious and Cultural Values Within Technological Systems

In this section, I report how Saudi Arabian parents sought to preserve their cultural and religious values when technological systems are involved in the marriage process. I begin with parents describing important religious and cultural aspects in the marriage

process. After that, parents express how technology complements the traditional marriage process. Lastly, parents expect technology to preserve privacy from a cultural viewpoint.

Managing Religious and Cultural Values

Parents wanted to maintain the role that cultural and religious factors play in the process of choosing a suitable spouse for their young adults. For religion, being religious was preferred but it was more important that both spouses agreed on what it meant to be religious. For culture, it was important that families are culturally compatible to avoid conflicts and divorce. In addition, some cultural beliefs and practices negatively affect the traditional marriage process and technology might provide alternatives. Even though Saudi Arabians as a society might be skeptical about using technology for marriage, as seen in section 4.1, parents are hopeful that technology can play a positive role in the marriage process while respecting religious and cultural expectations.

Religious Compatibility. Religiosity is a source of reassurance for parents when they evaluate potential spouses for their young adults. They consider a potential spouse who is not religious to be more likely to cause injustice in a relationship. A mother, P15b, states *“you know the person fears god”* when describing a potential spouse who is religious. A potential spouse being religious is viewed as a sign of a successful marriage. It is typical in Saudi Arabian culture that potential spouses are asked about their religiosity as an initial filter to decide if they are a suitable candidate for marriage or not. A father, P9, explains that choosing a religious wife *“might have a positive effect”* on his son. This is supported by another father, P5, that prefers to marry off his son or daughter to a religious person even if they are not religious themselves. Parents viewed religion as a binary concept, with a religious person being *“good”* and a non-religious person being *“bad.”* This is also associated with the marriage’s success or failure.

“Even if my son is not good and the girl is good, I prefer it. Better than a bad girl like him...or my daughter is not good, I marry her to a good man better than another because he is the best choice”

(P5)

On the other hand, religious compatibility between potential spouses was important to avoid conflicts in the future. A father, P6, emphasizes the importance of religious compatibility for his daughter's prospective proposals, "*If an extremely liberal family proposed for my daughter, I would not accept.*" As a religious father, he would not want his daughter to feel obligated to assimilate with her potential husband's liberal family or vice versa. A mother, P13, argues that "*If there is a religious conflict, it would be hard for [their marriage] to continue.*" This religious conflict arises because of different interpretations of what being religious means. Parents view a person's religiosity as an extension of their expectations and lifestyle, which may cause conflict when potential spouses have different expectations.

"What type of hijab is required and other religious principles so they would help each other because religion is an important factor. Also, so they would not be surprised with something different in their lifestyle later"
(P14)

Overall, parents view a religious potential spouse as an indicator of a successful marriage but worry that conflicting interpretations of religiosity between spouses might lead to a tough marriage or divorce. Conflicting interpretations arise when cultural and religious values become interleaved. For example, in the previous quote, P14 mentions "*What type of hijab is required,*" which has both a cultural and religious component. Some view niqab as religiously optional or a cultural obligation while others believe it is religiously required. As a result, both cultural and religious compatibility are needed.

Culture Compatibility. Parents emphasized that it was important that families are culturally compatible and were against certain cultural practices and beliefs that hindered the marriage process but did not want to stand out.

One of the most important cultural factors in Saudi Arabian marriages is tribal lineage. A mother who is Qabali, P4, explains "*A man that has no tribal association, it is hard to accept him.*" The reason this matters for the parents is that they do not want their grandchildren to be outcasts because their father is Arabi. Parents generally prefer that spouses are either both Qabali or both Arabi to avoid problems that could affect their extended family. For example, Qabali families might boycott marrying from

a certain Qabali family because one of their members married an Arabi. In some of these cases, the extended family might pressure the spouses or their parents to end the marriage to restore order within the family. In addition to that, identifying a person as Qabali or Arabi is not easy. Parents are reluctant to use technology for marriage because they are not sure if tribal lineage can be easily verified online as P2 states “Names are similar, like our [family name] can be tribal or not and you cannot tell.” Compatible lineage is crucial as it affects potential spouses and their extended family’s future prospects.

“Compatible lineage is very important because it affects the family. It affects my sisters, their daughters and female cousins.”
(P2)

Another reason parents prefer the traditional marriage process is that it was easier to identify a Badawi or Hadhri lifestyle. The conflict of lifestyles could be a concern for the potential spouses. A mother, P2, recounts her experience “*I married a Badawi and I am Hadhri and had a hard time. In the end I asked for khul² .*” In some cases, the potential spouse is suitable as an individual but the community they belong to has an undesirable gender hierarchy that is imposed by their lifestyle.

“When a great guy proposes to your daughter, but you know...their community demeans women. Why make my daughter deal with this? I do not want this environment”
(P6)

While it may seem discriminatory to not accept marriage between Qabalis and Arabis or Badawis and Hadhris, parents believed that the differences will eventually cause issues for their young adults and lead to separation or a bad marriage. From a religious standpoint, these cultural values conflict with Islamic teachings that are against discrimination. Nonetheless, they are still socially and culturally present in Saudi Arabia.

Technological Alternatives are stigmatized. While cultural practices such as spouses not meeting before the wedding night can lead to divorce, technological

² *Khul’ is where a wife demands to be separated from her husband in Islamic Jurisprudence.*

alternatives are stigmatized in the Saudi Arabian community. Parents are also concerned that the traditional method has led to many divorces. A mother, P4, explains “*Each one blames the other and you know the reason is ‘scratch and win’³ .*” She believes divorce is a byproduct of spouses not knowing each other before the wedding night and compares it to buying a lottery ticket. Even though Saudi Arabian practices can create obstacles in the marriage process that parents do not necessarily agree with, they do not want to be the ones that break norms as it may have a negative effect on them and their young adults. This means parents realize that technology can be useful but are worried that other Saudi Arabians view it in a negative light. This in turn would threaten both the parents and their young adults’ reputation.

“It is sensitive that someone knows that I allowed my daughter to use technology...It is like she is putting herself on display...there might be criticism from the community...I might allow it, but I will not let anyone know about it until it becomes common and [acceptable].”

(P12)

Parents realize that customs and culture have been changing recently and believe that technology might be able to help with the marriage process while preserving their values. With the changes in social dynamics over time, parents consider technology as a leverage they could utilize. A father, P10, states “*Because of social circumstances, social connections have weakened, and people got busy. . . Technology might help in finding solutions for marriage seekers.*” Parents do not consider technology as a threat but rather that technology should be designed to improve the traditional marriage process while preserving and respecting their values. This becomes crucial when cultural and religious values conflict because of the different ways Saudi Arabians enact their religious and cultural values.

“Customs and culture have changed. Therefore, even in the process of [marriage], it is possible that [technology] serves us, such that I do not impinge on our religion, customs and culture.”

(P3)

³ ‘Scratch and win’ is a phrase used in Saudi Arabia to describe traditional marriages in a negative light.

Conclusion. Parents were concerned about maintaining their cultural and religious values during the marriage process. Religious potential spouses were favored if they had compatible religious views. Having a similar lineage and lifestyle was culturally preferred. Some cultural practices and beliefs created obstacles in the marriage process, but parents did not want to break the norms. Maintaining both cultural and religious values while avoiding conflicts between them is a complex process. These findings address some of the concerns and views Saudi Arabian parents have about marital matchmaking technologies (RQ1). Nonetheless, Parents are hopeful that technology can play a role in the matrimonial matchmaking process if it preserves and respects their values.

Technology Enhances the Traditional Marriage Process

Technology can improve the traditional marriage process, but the former should not cause the latter to become obsolete. Technology allows potential spouses to know each other better before marriage while the traditional marriage process maintains cultural norms and involves parents in the process.

Access to Information. The traditional marriage process limits potential spouses from exchanging information and representing themselves appropriately and technology could provide alternative solutions. Those who try to seek more information than what the traditional process provides are viewed negatively. Technology would allow potential spouses, especially women, to decide how they present themselves appropriately for marriage. A father, P8, explains “*Women might need [technology] more... some present themselves in a bad way in weddings.*” The traditional marriage process utilizes weddings and social gatherings as a medium for women to present themselves to mothers of potential grooms. Technology is viewed as a better alternative for potential spouses to present themselves and exchange information compared to the traditional marriage process.

“There is a lack of information when someone looks for a spouse. [Technology] might help with solving problems. Culturally, there are limitations and there is social pressure for those who try to seek information. Sometimes they seem like they have crossed boundaries or are attempting to seek people’s secrets.”
(P7)

Technology to Traditional Transition. Parents realize that young adults may utilize technology without their knowledge as it provides them with more options but insist that it must transition to the traditional process. Parents are against technology when it is used to replace the traditional process. A father, P8, says *“There is no way [a dad] comes and proposes for his son and tells [me] they knew about my daughter through technology.”* Parents prefer to maintain the traditional process publicly even if technology was used privately. Parents are willing to help their young adults by convincing other parents to transition from technology to the traditional process. A father, P7, explains *“I would meet her father and try to convince him that [they] would meet...in her house or a public place.”* Parents might accept that their young adults utilize technology for marriage without their knowledge if it transitions into the traditional process.

“Technology would provide them with the comfort of freedom of choice. Some families are more accepting of technology. Sometimes the youth use it without telling their families.”
(P12)

Parents consider their involvement in the transition from technology to be essential to make sure it aligns with cultural expectations. Parents viewed themselves as secondary screeners for potential spouses that are chosen by their young adults through technology so that societal standards are not affected. A father, P10, elaborates *“I must sit with [potential grooms] to know everything...social status...intellectual compatibility and social compatibility.”* Parents usually want to be involved in the transition from technology to the traditional process to ensure it is done properly.

“In the beginning, it will be only the two knowing each other and understanding each other more but after that when it transitions into marriage, the families must intervene. They must educate each other about their family’s norms [and traditions].”
(P12)

Technology Utilized when Traditional is not Viable. Parents prefer the traditional route when social connections are strong within the community but realize

that technology can help widen the pool of potential spouses. A mother, P12, believes that technology might help spouses find each other within their own community that they would not consider otherwise. She says “[*Technology*] might be beneficial in making a person notice... [*It*] might say that this girl and her cousin are compatible.” Parents would find technology helpful when they live in a community that they are not familiar with. A father, P10, says “[*The father*] lives in a community where no one knows him... if he went to technology, it would benefit him.” Parents do consider technology to be helpful but prefer the traditional process as it is more efficient when it is feasible.

“A person living close to his family and community and everyone knows him... I think technology will not help. Traditional is better and faster.”
(P10)

Conclusion. Parents prefer the traditional marriage process (without technology’s facilitation), even though they realize that technology can help improve it. Parents major concern is that technology would replace the traditional process, which in turn would minimize their role as parents in the matrimonial matchmaking process. This addresses (RQ2) what role Saudi Arabian parents would play in matchmaking technologies. They emphasize that their role is to ensure that matchmaking technologies are only a tool to find a suitable potential spouse and that they lead to a transition to the traditional marriage process.

Managing privacy online to protect young adults and preserve cultural values.

Parents are concerned that technology might expose young adults to dangerous situations or cause them to violate cultural expectations. Young adults should take precautions by not disclosing their identity online until they find a suitable spouse. At the same time, they should know enough about potential spouses to ensure they meet cultural standards. Daughters should be more vigilant about sharing their information online as it is more culturally sensitive compared to sons. In general, sharing excessive information can attract unintended harm to young adults. Parents want to protect their young adults and ensure that cultural expectations are preserved.

Parents believe that young adults have more control over the marriage process and can preserve their privacy online when they use technology anonymously. Some young

adult's might be more sensitive about keeping their identity confidential and preserving their privacy online compared to others. A mother, P2, says *"Some might die if their name is known...it is respectful to preserve someone's privacy."* At the same time, technology enables young adults to get to know their potential spouse before they decide to get engaged to them traditionally and without their parents' knowledge. A mother, P12, says *"You can choose that your mom and dad do not know because at first it is getting to know the person, not an engagement."* Being anonymous also allows young adults to make multiple attempts to find a suitable spouse without worrying about their identity being revealed. A father, P10, states *"A person used technology once, twice and thrice...when his identity is unknown, I think it would help this person to use it until he finds the suitable person."* Being anonymous allows young adults to find a suitable spouse online and decided when to transition to the traditional marriage process while maintaining their privacy.

"First talk about finances, age, school and tribal compatibility...in the beginning, a person would not want others to know him. After the family and community are compatible, I start an individual agreement."

(P4)

While being anonymous has its benefits, knowing a potential spouse's tribal affiliation and geographical location is essential for parents and young adults to decide if they are culturally compatible. Tribal affiliation should be known earlier in the process as it can make or break the relationship. A father, P8, explains *"When they know each other, it is revealed that she was not tribal...if it was known earlier, there would not be a relationship."* Geographical location could indicate a cultural mismatch as a father, P10, states *"Some do not like to marry from different regions...they like from their environment, their region."* It could also indicate a transportation burden for potential spouses as a father, P1, explains *"The region is important to know the commute. Be sure she is from your region. Like taking her to her family."* At the same time, young adults should not know each other's precise locations as it may cause them to get involved in culturally unacceptable interactions. It is important to know a potential spouse's tribal affiliation and regional location to measure cultural compatibility but revealing their precise location may lead to culturally inappropriate interactions.

“Even if they were engaged, I prefer that they do not know their locations before marriage. . . they might meet when engaged and I find it unacceptable before marriage.”
(P11)

Parents are more concerned about preserving their daughters' identity and modesty online compared to their sons. A father, P3, says *“Maybe the man does not mind putting his picture and specific details, but a woman might be more reserved.”* It is common for Saudi Arabian women to manage their privacy online based on how their family would react to it. A father, P7, explains *“Privacy is always an obstacle. . . What if [her family] saw [her] picture online? They will kill [her]. Social pressure is involved.”* How a woman presents herself online reflects on how society perceives her and accepts her as an acceptable potential spouse.

“Most people are fearful to marry a girl having a picture, uncovered. . . she would be liberal or has a strong personality. Not suitable as a mother or to handle responsibility. . . if it was a pseudo name and her identity is hidden, society would accept it. It is unusual for a girl to be bold. Not usual for a girl to impose herself or show her identity frankly and transparently. It is hard, let us be realistic.”
(P15b)

Parents are concerned about young adults sharing information about their location or identity that could threaten their safety. For example, if a young adult rejects a potential spouse that is not suitable for them, the potential spouse might retaliate. A mother, P13, says *“Maybe if someone knew my daughter and she rejected him he would hurt her or try to chase her.”* Young adults sharing their location could result in potential spouses using it to stalk them. A father, P6, explains *“Location could be a tool for the stalkers. I know they are going to this store, let me go there.”* As a result, parents encourage young adults to be cautious when they share their information and make sure it is done in a safe and private manner.

“Even if you share, you can share it safely. Like do not put coordinates, put a large circle. . . this the applications main responsibility, to preserve the privacy and safety of the users”

(P7)

Conclusion. Parents want to ensure that young adults are using technology appropriately when seeking potential spouses to remain safe, preserve their privacy and maintain cultural expectations. While technology provides young adults with more agency in the marriage process, parents are worried about the risks that may arise. This section addresses some of the concerns that Saudi Arabian parents have about using marital matchmaking technologies (RQ1). They believe that marital matchmaking technologies can be utilized appropriately if young adults follow cultural and safety guidelines.

5.4.2 Young Adults Autonomy Requires Maturity

Parents believe that young adults should be able to decide who they will marry if they maintain a respectful relationship with their parents and are mature enough to understand what marriage entails. While parents demand respect and young adults demand autonomy, they both need a middle ground where both can voice their opinions and their communication can flourish. Parents are usually concerned that their young adults are not prepared enough for marriage, especially when it comes to understanding the opposite gender. At the same time, gender interactions and expectations have drastically changed recently, which affects the marriage process for both parents and young adults. Parents want to be involved and respected in the marriage process and understand that they should grant their young adults more autonomy as they become more mature and aware of the changes in gender roles and expectations.

Respecting Parents vs. Young Adults' Autonomy

Parents want to balance between granting their young adults' autonomy and maintaining their respected role in society. Young adults choosing who they marry helps maintain a healthy relationship with their parents. Parents value their young adults' autonomy and privacy, which was unheard of in previous generations. Parents seek their young adults trust to keep them aware about their technological interactions. That given, parents expect young adults to respect their opinions when they disagree and hope to

reach a mutual understanding when it comes to choosing a potential spouse. Parents could resort to utilizing their legal or social authority when their young adults are not cooperating with them. Finding a middle ground where young adults can make their own decisions and parents' opinions are respected is a constant struggle.

Young adults should be able to decide who they want to marry as it could make the marriage process easier and maintains a healthy relationship between parents and young adults. Parents might consider young adults finding their own spouse as relieving their parents from the burden of finding a suitable spouse for them. A father, P1, says *"I have children and give them total freedom...they went and searched and made it easier for me."* Parents believe that their intervention is limited to providing advice and it is up to young adults to decide to take it or leave it. At the same time, parents believe that young adults need their support and guidance as they explore alternative methods. A mother, P14, says *"a person might accept alternative methods for marriage and young adults need the family and their support and guidance."* Parents do not want to threaten their relationship with their young adults because of disagreement on who the young adults want to marry.

"I cannot intervene except by simply advising but he is free. He would be a man. Fully and mentally aware of his choices...I am not ready to lose my daughter or her love because of this...her decision and she does what she wants. I respect it. She did not like the advice, she does what she wants."
(P15b)

Parents intervening too much in the marriage process undermines young adults' autonomy. Parents cannot claim that their young adults can choose who to marry if they need their approval in the process. A father, P7, explains *"If the son or daughter need approval, then it means they are not given the full authority...the problem of choosing a spouse is that the mother and father intervene."* Parents realize that times have changed and what was acceptable for them is not necessarily acceptable for their children. A mother, P15b, explains *"The usual abuse that is the pressure of [parents] on their [young adults] in deciding a suitable spouse for them. Our time, me and their dad, is different from their time."* Young adults should be granted autonomy by being able to preserve some privacy in their personal lives away from their parents to build some trust between them when it comes to marriage.

“I do not know everything about them. . . I do not have any of my children on snapchat and do not want to know it because I tell them spying is not a way. Because the prophet says do not spy. . . Trust is needed.”
(P2)

Parents realize that they must open communication channels between them and their young adults to be involved in the technological marriage process. If parents try to prevent their young adults from utilizing technology for marriage, they will find ways to do it without their knowledge. It is better for parents to support their young adults to remain in the loop. A father, P9, explains *“If they are doing it anyways, do not be an obstacle. At least they would inform you about it.”* Parents also realize that restrictions that were given during their time no longer apply and that they need to adapt to the change to remain relevant. A father, P3, says *“In our time it was unacceptable to talk to your father in this manner. . . The change that is happening is not in your hands. You either get along with it and see the positive aspects or. . .”* Parents want their young adults to trust them and keep them informed about their technological marriage endeavors.

“I try to build trust between me and them. So, they can tell me what they are doing. Know how they are using this technology. Are they using it appropriately? Maybe they went in a different or wrong direction. Building trust between me and my children is really important.”
(P12)

Young adults are expected to do their part too by respecting their parents’ opinions when they disagree. Parents understand that their young adults might leave them out when they know parents would not approve of their actions. A mother, P2, says *“She does not consult her mother because she does not like her mother’s opinions. . . I will not tell you because you will say no.”* Parents want to maintain a space for dialog where parents and young adults discuss and attempt to persuade each other without either of them imposing their opinion on the other. A mother, P12, explains *“Young adults would try to convince their family that this choice is the most suitable. . . there would be acceptance from both ends and room for dialog and not imposing opinions on each other.”* Parents want to be respected by their young adults to reach a middle ground where both are satisfied.

“I cannot prevent my boys and girls because they are old and make their own decisions, but the family have their respect in our society and the authority to reject or accept. I cannot tell my son not to do it but if I am not satisfied, he will reconsider.”
(P13)

When parents’ opinions were disregarded by young adults, parents may resort to using their authority to assert their opinions. This applies to daughters as fathers still have the legal authority to approve or disapprove of the marriage. This has not changed with the recent changes in male guardianship laws to one of the father’s relief, P8, as he says, “*They still have not removed guardianship for marriage.*” The parents realize that they cannot intervene like they used to in the past, but their legal authority for their daughters is their last resort.

“In the past the family intervenes...today no, they cannot. It is his personal decision; he deals with it. No, the girl you can refuse, why? Because some things are in your hand. The boy no, his matters are in his hands.”
(P5)

Conclusion. Young adults’ autonomy is important when it comes to deciding who they marry, and parents believe their opinions can be valuable when making that decision. Parents worry that young adults would exclude them from the process when they decide who to marry. Parents want to grant their young adults’ autonomy but also prevent them from making bad decisions. Parents also refer to how family dynamics have changed compared to the past where their own parents had more influence on them when it came to marriage. Nonetheless, parents expect their young adults to make decisions that do not go against their parents’ wishes. This section addresses some of the concerns that Saudi Arabian parents have about using marital matchmaking technologies (RQ1). While it is up to young adults to decide who they marry, parents can provide them with guidance and advice to make the right decision.

Young adults need to be educated about the opposite gender

Parents are concerned that their young adults are not mature and prepared for marriage especially when it comes to understanding the opposite gender and sexual interactions.

Parents are worried that their young adults cannot handle the responsibility that comes with marriage as their view of it is superficial. Another thing parents are worried about is that young adults need to have set and clear goals and make sure they do not conflict with their potential partner. Parents want to find a suitable way to educate their young adults about the opposite gender and sex. Parents related to their own experiences on how they were not educated properly about sex and how it affected their marriage. Parents wanted to ensure that their young adults have a positive experience with their marriage and avoid mistakes that parents have committed in their own marriages especially for a culturally sensitive topic like sex.

Parents are worried that their young adults do not understand what marriage entails and view it superficially, which leads to divorce or a negative experience. If a young adult cannot manage their own individual responsibilities, they are not prepared to get married. A mother, P2, explains *“Who cannot handle responsibility cannot be trusted even for traditional marriage.”* Young adults must understand what their goals are before they decide to get married. This would help them understand themselves better and avoid divorce that could be caused by potential spouses’ goals not being compatible. A father, P9, says *“It is better that everyone knows their goals... because first you would educate the person. Second, decrease divorce rates”* Parents do not believe that incompatible goals mean that potential spouses are not suitable for each other but rather that it would make the marriage tougher. A mother, P2, says *“When they have shared goals, they can accomplish them quickly... but if they are different, they might struggle a bit, take time.”* Parents are generally concerned that young adults have a distorted view about marriage and do not realize that until it is too late.

“Marriage is not brand names and travel. I know a woman who married and went to France and bought everything she wanted and when she came back, she asked for divorce and said he is not suitable. Because he refused to buy a Rolex watch worth \$40k...she does not know that marriage is a responsibility.”

(P4)

While parents find that sexual education is essential for a successful marriage, they are concerned about how it would be gained appropriately. Islam stipulates sexual

guidelines in marriage and parents are concerned that some might not be aware of them as P3 says *“For the religious limits in sexual interactions, some might make a mistake.”* and he considers sexual education through religion as appropriate *“if they are religiously educated, they would be modestly sexually educated.”* In addition, sexual education is not mandated in Saudi Arabian schools and parents called for programs to fill the gap. Parents were against potential spouses discussing sexual matters with the opposite gender before marriage as P13 says *“Our religion, values and customs do not allow cross gender dialog about [sex]”* and P8 adds *“Maybe they will say what about [premarital sex]?”* Parents reflected on their previous marriage experiences and admit that they could have benefited from being educated properly about sex before marriage. A lack of sexual education could lead to a horrible marriage experience or a divorce that could have been avoided.

“What ruined traditional marriages is [the lack of sexual education]. . . Now I teach my daughter because it is essential for a successful marriage. It ruined some of our marriages because I were not educated.”
(P2)

Even though it is important for potential spouses to understand each other’s sexual needs, it was not appropriate for it to be to be the only priority. When the process starts with sex as the driving factor, *“it will lose the credibility of both being serious”* according to P10. At the same time, given how sex is a sensitive topic in a conservative country like Saudi Arabia, potential spouses would be reluctant to share details about it. P7 states *“I do not think anyone will give a real answer”* when it came to how sex would be addressed for potential spouse, even though he agrees that it is a valid and important concern for potential spouses. Sex should come after other more important goals that would be achieved through marriage such as creating a family.

“The goal is to create a family, not pleasure. . . sexual pleasure should be secondary, not primary. Tranquility is important. You need comfort more than pleasure.”
(P5)

Conclusion. Being mature and properly educated about marital responsibilities and priorities can make or break a marriage. Parents consider their young adults as

irresponsible and not well educated about what a marriage requires. Parents are worried that their young adults are not fully aware of their actions and would only realize their mistake when it is too late. Marital matchmaking technologies role should ensure that potential spouses are aware of what marriage entails before they decide on a suitable spouse (RQ2).

Change of gender expectations, roles and interactions

Previous generations had stricter gender segregation rules in public spaces and defined gender roles in marriage. This made interacting with the opposite gender before marriage unlikely especially when meeting online was not an option. Young adults nowadays are more likely to interact with the opposite gender before marriage in public spaces as many Saudi women are joining the workforce. It has changed how they approach marriage and decide who they marry as gender roles have drastically changed and can no longer be assumed. In addition, online platforms allowed them to freely express their opinions, thoughts, identities, and different perceptions to the opposite gender. The increase in gender interactions has given young adults more opportunities to choose who they marry independently, but the process became more nuance with gender roles becoming more fluid rather than agreed upon.

The change in gender interactions has made traditional marriages undesirable for young adults as it usually means their interaction with the opposite gender is limited and controlled by their parents. Parents have realized that young adults are not interested in traditional marriages as a mother, P12, finds it a sequence of them being “*more aware*” of alternative options. She points out that young adults have opportunities that were “*not available for previous generations*”, and it therefore “*became easier to choose through interactions between genders, which now became more prevalent.*” This also shows that the case of gender interactions being “*more prevalent*” seems to justify it. This subtle sense of justification can be easily questioned, as parents tend to explain why genders mixing can be beneficial, even when they are against it. “*I am honestly against mixing and openness, but there is one advantage. That you get to know the other before anything happens*”, says P4, a mother. Her phrase “*before anything happens*” shows a case where parents do not accept relationships as experiences, but as projects that lead to marriage. And where if the relationship is not to last; it shall not start. P4 also highlights that

when cross-gender interact occur, potential spouses can evaluate each other intellectually, *“when you accept the person it is because you knew them intellectually.”* Even though gender interactions are limited to certain settings such as work and school, these settings create a perfect environment for potential spouses to evaluate each other. Technology that is utilized for school or work makes it easier for potential spouses to transition to marriage eventually. The prevalence of technology and cross-gender interactions allows and encourages young adults to seek alternative ways to find a suitable spouse that would not be available in a traditional marriage.

“The next generation will marry through technology. . . They started to talk with each other for work or school. . . the mature guy and gal will think about marriage because it is the goal for a proper relationship.”

(P2)

Even though gender expectations about modesty and genders mixing are changing in Saudi Arabia, parents believe there is no consensus on them and that they can vary from one family to another. For example, a mother, P4, believes that *“As long as she has not married, she must be modest.”* At the same time, she finds it reasonable that *“When she has children and becomes a mother. . . as she grows, she breaks boundaries.”* Becoming a mother seems to loosen the expectations that are enforced on women as they are considered more mature. Another example is a mother, P2, stating that *“Some do not like it if their brothers come and she goes inside. No, cover up and stay with us”* as some families find it acceptable that genders mix as long as modesty is maintained. On the other hand, she states that women covering is changing and that *“In the meantime, most girls do not cover. . . they must get into the details.”* She highlights that it is important to discuss expectations to ensure that there is no conflict between potential spouses. With recent changes in gender dynamics, potential spouses need to discuss their expectations and validate their assumptions to avoid any conflict in their future marriage and how they raise their own children.

“Dad’s principle is that his daughters cover up in a certain way or they do not show their face. The [mother] is from a family that were raised on showing their face and consider it normal. Here is a conflict of principles. It will cause a disagreement in the marriage. It is better that it is clear from the

beginning.”
(P12)

The traditional role of husbands being breadwinners has become controversial with the increase of Saudi Arabian women joining the workforce. A mother, P12, states that “[Women] gained a form of independence” and adds that “[they do] not need a husband” as she compares it to traditional roles where wives were dependent on their husbands. At the same time, she believes that “for the man, nothing has changed” as the husband is still expected to be the breadwinner, even if their wife is employed. As a result, she concludes that “the burden remains on the man in marriage.” A mother, P2, explains that it is important to discuss financial expectations when both spouses are employed “even if it might be hurtful” as she believes that “it is normal to be transparent.” It is worth noting that from an Islamic perspective, husbands are expected to provide for their wives [90], even if the wife is financially well-off. However, some cultural practices and Islamic rulings provide room for negotiations between spouses where income might be shared [92]. As potential spouses’ sharing their expenses and incomes is still controversial in the public sphere, it is important that they discuss and clarify their financial roles and expectations in marriage.

“A guy might say I am responsible to spend even if she is employed and another says if you are employed, I will not spend on you. . . it is not right or wrong but him or her decide based on that. A woman might say. . . if I [am employed] my money is mine. Maybe it is hers, but another person might say no, that does not work.”
(P7)

Saudi Arabian women’s traditional role of being caretakers of the household is being challenged when they choose to work. As stated by a father, P3, some men “[believe] that a woman does not leave the house” but he believes this creates a conflict as when “she is employed, it is impossible that [they] are compatible.” He also links it to the man attempting to protect his authority in the marriage by stating that “some men do not want her to work. . . [they want] to be controlling and the guardian.” Even when women working does not affect men’s authority in the marriage, fathers believe there is a clash between mothers working and raising their children. As a father, P1, says that it is

“better to clarify she wants to work or not.” He highlights the issue of childcare that would conflict with the mother working *“The issue when she works is where to put the children.”* It is important to note that childcare for working women is a relatively new concept in Saudi Arabia, which means it is not always available or affordable. As a result, P1, argues that *“if he is satisfied that she works, the children could be delayed.”* His statements demonstrate his perception of a separated role of motherhood and work for mothers, and that if a woman wants both, having children would be postponed. Parents believe that it is important to discuss gender roles as the assumed traditional roles are no longer salient in Saudi Arabia.

Conclusion. With Saudi Arabia’s public sphere changing rapidly in the last couple of years, cross-gender interaction and gender roles and expectations have changed drastically. Parents are aware that these differences did not exist during their time and realize it is important for young adults to be transparent about them as it definitely would affect their future marriage. As a result, it is important for marital matchmaking technologies to take into account these changes and ensure that potential spouses are aware of them and how they may be perceived differently by different potential spouses (RQ2).

5.4.3 Concerns About Technology’s Risks, Reliability and Regulation

There were many concerns that technology could be used inappropriately or abused by young adults or others. These concerns stem from not being familiar with marital matchmaking technologies, which causes parents to be fearful of them. In addition, information found online was questionable and usually unreliable for young adults to make informed decisions when looking for a suitable spouse online. As a result, regulating the use of technology was considered as a suitable method to make finding a spouse online more effective for young adults. These concerns made parents feel hesitant about their young adults utilizing technology to find a suitable spouse.

Afraid of Potential Technological Harms

Parents were fearful about their young adults utilizing technology to find a potential spouse online. Their fears were mainly around three aspects: not trusting strangers and

the potential harm they may cause, worrying that their daughters are more susceptible to harms online, being uncertain about potential spouses' seriousness about marriage.

“I do not think our society is fully aware how to use technology...that it could be beneficial, effective and safe...I think it needs time.”

(P10)

Parents worried about young adults seeking potential spouses online since they are not familiar with it and could not fully trust strangers online. Parents were skeptical of this unfamiliar way to get married. A father, P1, says he *“Never heard of people who got married via technology”* and a mother, P11, rejects it by saying *“I did not believe in this thing, and do not support it.”* Even though she has heard that some people found this method successful, she argues that *“it is not suitable for our community.”* Another mother, P13, argues that her concerns stem from the fear of the unknown *“I cannot guarantee the manners of people who will communicate with my sons and daughters.”* Her fear of the unknown is linked to the fear of the potential harm as she says, *“I do not know how it would affect our family’s privacy if they get in touch with a stranger.”* When parents are not sure how finding a potential spouse online will pan out or who is behind it, they are usually more fearful than they are hopeful as it is considered an unexplored territory for them and they want to become more familiar with it.

“Even though I do not expect it...it might become a phenomenon and I would like to be aware of it... there might be something positive or good. I always focus on the negatives.”

(P8)

The fear of the unknown is more sensitive for most parents when it comes to their daughters searching for a spouse online compared to their sons as they view it to be riskier. One mother, P12, argues that *“the girl might be deceived or embarrassed or someone might manipulate her with words”* and as a result *“she would need guidance and monitoring from the family to avoid mistakes or being a victim.”* A father, P15a, supports this by saying *“[women] are emotional about their decisions”* but a mother, P15b, argues otherwise *“I do not agree with this. Boys are emotional and make wrong choices too.”* These conflicting perceptions might be related to the changes in cross gender interactions

that were almost non-existent during the time of the parents. A mother, P15b, says “5 years ago, I used to think differently” as she realizes that her perception has change over time. Nonetheless, parents are more cautious when their daughters utilize marital matchmaking technologies to interacting with potential spouses that are strangers.

Parents are worried that marital matchmaking are not utilized for marriage and lack the seriousness that is present in the traditional process. A father, P9, believes that “some people are serious about marriage on these websites, but the other side might be doing it for fun.” A mother, P12, supports this by saying that “[young adults] use it for fun but not for marriage.” A mother, P11, says she is willing to reconsider her position on marital matchmaking technologies “If he proposes directly and showed himself from the beginning to us, I might change my mind.” This is supported by a father, P6, who draws the line by saying “if he did not propose to your dad, eliminate him” as he considers the proposal as serious step in the right direction. He continues by saying that “Some bad people took advantage of [technology]. They used it to blackmail.” On the other hand, he also believes that “not everyone who uses technological means is bad. . . there are respectful people.” Determining if a user of a marital matchmaking technology is serious about marriage is crucial and challenging for parents compared to the traditional process. Conclusion. Parents are concerned that using technology to find a potential spouse is risky. This concern is mostly rooted in the uncertainty that comes from interacting with unknown potential spouses. While parents are willing to be more open minded, they still cannot fully trust technology. Compared to the traditional marriage process, these potential spouses’ intentions are not clear for young adults and parents (RQ1).

Concerns About Information Reliability

Deception or lack of transparency and seriousness are concerns that arise when young adults seek a potential spouse online. The traditional method relies on meeting potential spouses in person to validate their information and seriousness. Since technology lacks that aspect, parents are reluctant to trust information that is provided by technology without meeting potential spouses in person. A father, P9, explains “Sometimes they doubt the available information if they do not meet and know.” The concern is that potential spouses might attempt to present themselves in a positive light, which might involve deception and questions their credibility. “There is no credibility” as a mother,

P4, states. She believes that *“the man always lies or makes himself perfect”* and her concern is that *“she believes him.”* Nonetheless, P4 realize and admits that *“the problem here is the people and not technology.”* Deception might not always be intentional as information presented online is usually selective, especially in Saudi Arabia where not all opinions are respected equally. A father, P7 says *“Even if it was real, it would be partial. . . our community is not open to accept all opinions.”* In some cases, the concern is that potential spouses are not serious or transparent enough when providing information to potential spouses online. This makes the process less effective when potential spouses have different levels of seriousness and transparency. A father, P10, explains *“Those using technology must be serious when providing their information and be transparent and precise for it to be effective.”* Parents are concerned that their young adults are not cautious enough about the authenticity of information provided by potential spouses online and if potential spouses are actually serious about marriage online.

Misusing or abusing technology when seeking a spouse online is a concern as it may lead to young adults being blackmailed. Parents linked the misuse of technology to it being accepted by the community as a mother P2 states *“Misuse, I have to underline it. Also, community acceptance.”* Since using technology for marriage is a new concept, parents are concerned it may be utilized for extortion. *“It might have greed or extortion”* as a father, P5 states. He believes that *“because it is new and those who use it. . . use it negatively”* but he is also hopeful that at some point *“when something becomes successful, people will follow.”* Parents hope that there is a way to prevent blackmail and exploitation and believe it is reliant on protecting young adults’ information appropriately. A father, P7 supports this by saying *“You need to do it in a way so that nobody can exploit or blackmail. You need to find a method to not allow a person to take people’s information.”* Parents are concerned that technology might be utilized by others to inflict harm on their young adults, which causes them to discourage their young adults from finding a potential spouse through technology until it is proven successful. Conclusion. Parents are worried that finding a potential spouse online is lacks transparency and could cause harm for their young adults. Measures need to be taken to increase transparency and minimize technological misuse. Marital matchmaking technologies must incorporate these measures to be effective (RQ1).

Regulation of technology is needed for it to be effective

Regulating marital matchmaking technologies was suggested by parents to circumvent their concerns and worries about their young adults' safety and adherence to religious guidelines. This could be done by involving a mediator that would oversee the process and ensure that it is properly conducted. The mediator could be a private entity or a public entity such as the government. The government is viewed as an authority that would prevent any misuse and is trusted by Saudi Arabians. Other ways of regulation were related to how marital matchmaking technologies restricted users from certain actions that could lead to misuse. While regulation might seem restrictive and intrusive, it helps create a safe environment for young adults to seek potential spouses without worrying about being harmed or compromising their religious beliefs.

Having a trusted authority that regulates marital matchmaking technology is considered a safety net that would prevent unacceptable behavior that would occur between potential spouses. Unacceptable behavior might relate to general misuse of technology or violating cultural and religious expectations. A father, P6, believes that *"Not every source is trustworthy"* when questioning who is behind a marital matchmaking technology as he believes that a *"[well known] sheikh or a government entity"* is considered a trustworthy source. It is important that the those *"who run them are known"* according to a mother, P2. She believes it guarantees that they are not those *"who might leak information"* as marital matchmaking technologies *"[have] confidential info."* As a result, the government or a trusted entity implementing the marital matchmaking technology is *"more assuring for parents"* according to a mother, P12, as she thinks it ensures that *"there is no manipulation."* On the other hand, a father, P15a, is concerned that corruption within government entities could allow people to *"know loopholes in the system [and abuse them]."* At the same time, he believes that *"if it was a private entity? It would be more negative."* It is important that the entity that implements a marital matchmaking technology in Saudi Arabia is known and trusted, which is more likely to be a public entity rather than a private one.

Limiting interactions on a marital matchmaking system can prevent misuse and ensure that interactions are aligned with religious values. While interacting with multiple potential spouses at the same time is consider an advantage, it could be a distraction from finding a suitable spouse. A mother, P4, says *"after choosing a specific person,*

there would be no options until I am done with them.” She believes that a potential spouse should be evaluated appropriately before moving on to another potential spouse. In addition, this would minimize abuse as a father, P7, says *“You need a strategy to not allow a user to be a player.”* He believes that limiting a user’s actions would prevent them from abusing the system. Even if users are not abusing the system, they might get distracted by the available options. *“Why get distracted?”* says a mother, P15b, as she believes young adults should focus on one person at a time and not *“get to know 100 people at the same time.”* A father, P8, links this to religion as *“the prophet said do not propose on your brother’s proposal.”* He considers potential spouses interacting with each other as a form of proposal between them and proposals should not be simultaneous. Marital matchmaking technologies can minimize misuse and preserve religious values by controlling what actions are available for users.

Conclusion Marital matchmaking technologies should be regulated by a public entity with limited interactions between users. This would make marital matchmaking technologies safer and more aligned with Saudi Arabian religious values **RQ2b**.

5.5 Discussion

My findings indicate that parents want their young adults to preserve religious and cultural values, keep parents involved when choosing who they want to marry and understand that parents are attempting to help young adults remain safe in the technological facilitated process. I explain how these finding can guide future work and the design of suitable marital matchmaking technologies in Muslim and Arab cultures.

5.5.1 Technology Should be Religiously and Culturally Inclusive

As technology is usually perceived to be disruptive, parents were concerned that religious and cultural values would be compromised when young adults utilized marital matchmaking technologies to find a suitable spouse. Technology does not need to be disruptive to be successful as a previous study [155] indicated that adhering to traditional cultural values has led to matrimonial matchmaking websites being more successful than dating websites.

My findings suggest that parents believed that marital matchmaking technologies should coexist with the traditional process as they would complement each other. The traditional process could benefit from the ease of access to information in marital matchmaking technologies. At the same time, parents were worried that sharing too much information online could harm their young adults. Partial anonymity allows young adults to exchange religious and cultural information to determine compatibility. This ensures that they protect their privacy and reputation since no identifiable data is shared. This partial anonymity would gradually fade away as more private information is exchanged between potential spouses to determine if they are individually compatible and transition to the traditional process. The implementation of partial anonymity that ensures a smooth transition from online to offline needs further exploration to understand it better.

5.5.2 Involve Other Stakeholders in Matchmaking Technologies

Parents want to be involved in the marriage process and maintain a good relationship with their young adults. While parents believe young adults could benefit from their guidance and wisdom, they understand that it is important for their young adults to independently decide who they want to marry. Parents' demand to be respected stems from the concept of *bir alwalidayn*, which does not require that young adults lose their autonomy. Finding a balance where parents can be involved in a marital matchmaking system without threatening young adults' autonomy is complicated. As parents have mentioned different variations within Saudi Arabian culture, parents' involvement in marital matchmaking technologies is not uniformly unique.

My findings indicate that parents consider involvement to be either collaborative or transactional. An example for collaborative involvement is where parents mentioned that they would keep in touch with their young adults throughout the process by being aware of their actions and providing them with guidance. For transactional involvement, parents would vet potential spouses found online and transition to the traditional process to make things official. Collaborative involvement is not clearly defined compared to transactional involvement that is an extension of the traditional process. As a result, collaborative involvement could be determined through discussions and negotiations between parents and young adults while transactional

involvement would be defined based on certain phases in the matchmaking process. Implementing these types of involvement in a technological system may assume that young adults need to cooperate with their parents. An alternative would be a negotiation system where young adults and their parents have different access based on their agreed upon level of parental involvement. For example, young adults could propose potential spouses to their parents to get initial feedback or parents may suggest potential spouses for their young adults to consider.

Both types of involvement would require further investigation to understand how they would be implemented in a marital matchmaking technology in Saudi Arabia. Even though there are existing marital matchmaking technologies for Muslims that have considered parents' transactional involvement (i.e. Minder), there have not been any studies in the HCI community that have explored their effectiveness in Muslim and Arab cultures and if they can be improved. Previous studies [155] have explored forms of collaborative involvement for Indian matrimonial websites. To the best of my knowledge, there have not been many studies in the HCI community that explore how collaborative involvement can be affective in matrimonial websites for Muslim and Arab cultures. In general, I encourage the HCI community to investigate involving other stakeholders in matchmaking technologies as previous studies [113] have shown that matchmaking technologies benefit from having a "community." I also encourage the HCI community to conduct more inclusive investigations, as mentioned by Sharma et al. [155], with understudied populations such as Muslims and Arabs.

5.5.3 Regulation of Matchmaking Technologies Makes Them Safer

Given that marital matchmaking technologies are not widely used in Saudi Arabia, parents are concern about them being safe and reliable. Some of these concerns have been mentioned in many previous studies [148, 83, 47] and are not unique to the Saudi Arabian context. However, these concerns are perceived differently when viewed through cultural and religious lens.

My participants have mentioned involving the government to make marital matchmaking technologies safer, which has been shown to be successful in previous studies [155]. Unfortunately, the Saudi Arabian government has not been involved in any marital matchmaking technologies so far. This opens an opportunity to explore

alternatives on how matchmaking technologies can emulate the government's involvement. A previous study by Masden and Edwards [113] mentioned how a community for dating sites might serve as a form of regulation similar to how Wikipedia articles are regulated. It is also possible that other stakeholders (i.e. family or friends) can be part of the community that regulates matchmaking technologies. This might serve as a suitable alternative for involving the government in matchmaking technologies, even though it lacks the authority to prosecute users.

My findings indicate that information reliability and validity is another concern for parents. One way to address it is by providing a verification mechanism by matchmaking technologies similar to how Indian matrimonial websites verify users through their phone numbers and official documents [155] or other online platforms such as AirBnB [9]. It is not clear if these mechanisms can be implemented in Saudi Arabia as having a copy of a Saudi national ID card is prohibited by the Saudi Arabian ministry of interior [73]. Even though using a Saudi national ID for verification might be problematic, verification through phone numbers is a suitable alternative since all phone numbers are required by law to be linked to a Saudi National ID⁴ [72]. Further investigations are needed to explore if these verification methods are possible and effective.

5.5.4 HCI Feminism

Previous work has introduced 6 core qualities for feminist HCI and the pluralism quality is the most relevant to my study [27]. While individualistic cultures value being independent, collectivist cultures value collaboration. Parents expressed more concerns about their daughters being safe when using technology for marriage and fathers were more likely intervene in their daughters' decision-making process. While these might seem restrictive from a Western standpoint, it could be viewed as favorable for some Arab and Muslim women. Even when Saudi Arabian Women are against parents controlling who they marry, they still adhere to Islamic and religious guidelines. Feminist ideology and talking about "private matters" is considered socially unacceptable in Saudi Arabia. As a result, Saudi Arabian women have to construct their own version of Islamic Feminism [15, 89, 120] where they define what women's

⁴ Saudi Arabia's communication and information technology commission also provides a service to check phone numbers linked to a Saudi National ID to prevent it from being misused

empowerment means in a patriarchal and Islamic society. For example, Saudi Arabian women might avoid going against their fathers in a case of *'adhl* as they view following their father's wishes falls under *bir alwalidayn*. It does not mean that they do not value being able to choose who to marry, but rather give priority to their Islamic obligation to respect their parents. In fact, some Saudi Arabian women have stated that "*Islam has freed women before the West comes with its conventions*" as a protest against the term "feminism" [89]. While Saudi Arabian women still face many challenges in Saudi Arabia, they prefer to tackle them while adhering to cultural and religious values as they consider this approach to be more socially acceptable.

5.5.5 Limitations

One limitation of my study was the use of Twitter, word-of-mouth, and snowball sampling to recruit. While I aimed to recruit a diverse set of participants, most participants were either acquainted with the authors through some channel or tech-savvy enough to have found out about this study via Twitter. I had limited access to participants who did not meet those characteristics. Due to the snowball sampling, my participants were not representative of the Saudi Arabian population geographically. Even though I attempted to recruit participants from Eastern region, which is one of the three major regions in Saudi Arabia, I were not successful. Perhaps due to the bias introduced by recruiting via Twitter, most of my participants were open and accepting of using technology for marriage in Saudi Arabia. I am certain that there are Saudi Arabian parents that are more strongly against using technology for marriage, but they did not take part in my study. Thus, my findings may be skewed towards Saudi Arabian parents that are in favor of using technology for marriage. Finally, I realize that there are secondary stakeholders and topics that I were not able to include in my investigation given its current scope, such as siblings or extended family members and the topic of polygamy. These secondary stakeholders might also serve as mediators between young adults and their parents, especially when parents are against using technology for marriage. While polygamy is practiced in Saudi Arabia, only one father and one mother from my participants brought it up when relating to their own experiences.

5.6 Conclusion

My study has explored how Saudi Arabian parents perceive marital matchmaking technologies and what role they want play in them. My interviews with 16 Saudi Arabian parents revealed that it is important to preserve Saudi Arabian values within marital matchmaking technologies, find ways for technology to coexist with the traditional marriage process and minimize potential harms through regulation. I provide implications on how to design matchmaking technologies in this context based on preserving values, involving parents and ensuring young adults' safety. I outlined different avenues for future investigations in this context and provide my solutions. My findings provide insights to guide me in proposing TBYAAN in Chapter 6 as a prototype that embodies my empirical findings in Chapters 4 and 5.

Chapter 6

Formative investigation: Operationalizing Saudi Arabian Values into a Marital Matchmaking Technological prototype (TBYAAN)

In the previous chapters, I have conducted formative investigations to answer **RQ1.** and **RQ2.** to better understand Saudi Arabian's perceptions and needs when it comes to utilizing technology to find a potential spouse. To operationalize my previous findings, I conducted a field trial study by deploying a marital matchmaking prototype named TBYAAN (Trust-Building for Young Adults in an Anonymous Network). My field trial's contributions include the development of TBYAAN and an empirical investigation of how TBYAAN operationalizes building trust and preserving privacy within matchmaking technologies in the Saudi Arabian context. TBYAAN is a platform that aims to improve trust-building between young adults in Saudi Arabia while preserving their privacy via an anonymous network that incorporates Saudi Arabian values to find a suitable spouse. I state my hypotheses in section 6.1 for answering **RQ3a**, **RQ3b**, and **RQ3c**. I go over the design requirements for TBYAAN in section 6.3, and my study design is covered in section 6.4. This work is meant to conclude my dissertation by answering **RQ3.** The field trial study lasted 4 weeks and addressed the following research questions:

RQ3a How does authenticated identity affect perceptions of trust in matchmaking technologies?

RQ3b How does authenticated parental involvement affect perceptions of trust in marital matchmaking technologies?

RQ3c How does anonymity affect perceptions of privacy in matchmaking technologies?

It is understandable that **RQ3a** and **RQ3b** would appear to conflict with **RQ3c** as authentication goes against anonymity that preserves privacy. This is later clarified in section 6.3.

6.1 Hypotheses

I would like to start by stating my hypotheses for answering the research questions mentioned above. To start, **RQ3a** aims to measure how authenticating participants affects perceptions of trust between participants in TBYAAN. I hypothesize that participants will consider other authenticated participants as more trust worthy compared to unauthenticated participants (**H1**). As TBYAAN has different methods of authentication, a sub-hypothesis would state that more stringent authentication methods will increase the trustworthiness of a participant (**H1a**). Authentication methods are explained in 6.3.3.

H1 participants of TBYAAN trust authenticated participants more than unauthenticated participants

H1a participants of TBYAAN trust participants with similar or more stringent authentication more than those with less stringent authentication methods

RQ3b aims to measure how authenticating participants' parents and the level of parental involvement affects perceptions of trust between participants in TBYAAN. I hypothesize that participants will consider other participants with higher levels of parental involvement as more trustworthy compared to participants with lower

parental involvement (**H2**). In addition, more stringent parent authentication would increase the trustworthiness of a participant (**H2a**). Parental involvement levels are explained in 6.3.4.

H2 participants of TBYAAN trust other participants with higher levels of parental involvement more than participants with lower levels of parental involvement

H2a participants of TBYAAN trust participants with more stringent parental authentication more than those with less stringent parental authentication

Combining **RQ3a** and **RQ3b**, I hypothesize that participants will consider TBYAAN to be more trustworthy when compared to other online platforms (**H3**).

H3 participants of TBYAAN consider it to be more trustworthy when compared to other online platforms.

RQ3c aims to measure how participants being anonymous on TBYAAN affects how much control they have over their data privacy in TBYAAN, which may lead to more transparency between participants. I hypothesize that participants will report that they have more control over their data and privacy in TBYAAN compared to other online platforms (**H4**).

H4 participants of TBYAAN report they have more control over their data and privacy in TBYAAN compared to other online platforms.

6.2 Related Work

My work is centered on building trust in matchmaking technologies, negotiating parent-young adult technological interactions, and preserving privacy in non-western collectivist contexts.

6.2.1 Building Trust in Online Matchmaking Technologies

Building trust online is a complicated process, especially when it comes to finding a life partner. The process to build trust online requires having a safe space online to

evaluate others and minimize risks. I break down each of these concepts in the following paragraphs.

Building Trust Online with Strangers

Building trust with strangers online enables them to have more meaningful technological online interactions. These interactions include e-commerce transactions [37, 29], offering accommodations[57, 174], fostering social relationships [107], organizing events [44], and dating [114] or marriage [145]. Trust plays a role in enriching these interactions and can vary from one interaction to another. For example, in e-commerce, a trusted third party can certify the trustworthiness of a certain business online [37] or consumers measure trust based on ratings provided by other consumers on the e-commerce platform [29]. On the other hand, dating and marriage platforms would require a higher level of trust to avoid users being placed in risky situations. While failing to measure the trust of an online seller might cause you to lose your money, meeting a person romantically who is not trustworthy could lead to being traumatized for life [151, 43].

Previous work by Sharma et. al.[155] has explored how to create safe spaces online in the context of matrimonial websites. This includes involving family members in the process and utilizing government agencies to build trust. This usually means incorporating offline trust measures into online platforms. When it comes to finding a life partner online, building trust is a gradual process. Before technology was introduced to the process, people met through family and friends, and trusting others was taken for granted [85, 50]. When technology got introduced, some were skeptical about meeting strangers [51]. Those who were adventurous and utilized technology for finding a life partner found ways to build trust online [113, 179]. Eventually, matchmaking technologies prioritized improving the process by creating a safe space online by limiting or eliminating misuses and abuses of their systems [130, 155].

Creating a safe space online is hard. Harm can be easily multiplied online through affordances that are meant to make technology easier to use, which in turn makes inflicting harm also easier. For example, cyber-bullying has been a concern for online platforms[40, 134]. This creates a paradox for designers of technological systems that are meant to connect people since the same capabilities they provide to build relationships (ie. posts, friending) can be used to cause harm to others [139, 157].

Also, when they design systems to protect users from harm, they might limit the capabilities or inflict harm in other ways. One example is when users are anonymous to preserve their privacy [42, 164], offenders may also feel safe from repercussions or consequences [7]. This creates a predicament where anonymity is preferred to preserve privacy and also is not desirable because of the harm that it may cause without being able to prevent the harm or track the offender. Anonymity abuse has led to social media platforms being shut down[40, 134]. On the other hand, previous work done by Andalibi et. al. [16] has found that anonymity doesn't always open the door to abuse. The study found that being anonymous was not associated with abusive behavior in the context of providing support for sexual abuse disclosures. Nonetheless, this positive side of anonymity might be unique to online support-seeking platforms. My work would like to understand if it would be possible to positively utilize anonymity for online marital matchmaking technologies.

Evaluation of online profiles

Even when online spaces are safe and all parties are being honest, there is the obstacle of evaluating others online. One study concluded that online dating coaches encouraged their clients to meet in person as soon as possible as they viewed the evaluation of online profiles to be ineffective[175]. This is not necessarily caused by intentional deception and can be a result of users unconsciously presenting their ideal image rather than their actual image. Another reason is that users might be focusing on what makes them compatible with others rather than what makes others compatible for them, especially when genders disagree on what makes them compatible [186, 185]. The advantage that technology provides is being able to reach people who would be rather hard to reach offline [155], which creates a unique and safe space to exchange information before transitioning offline. Also, recent work has explored how collaborative activities might improve the evaluation of others and lead to finding a suitable life partner in unpredictable ways [176]. Evaluating others online and offline and setting expectations for the transition between them requires more exploration to improve the process [180].

Managing Risk in Offline Interactions

Assuming users were able to evaluate others properly, they would still need to manage and mitigate risks that may occur online or offline. While both online and offline risks are a concern, offline risks place users in a vulnerable situation where they attempt to figure out ways to remain safe without the safeguards provided by online systems. Previous work done by Bull et. al. [35] has explored how a social matching app can take the role of a guardian when the user is meeting offline by monitoring users' data to verify it with data online and allowing trusted contacts (friends and family) to intervene when the situation seems unsafe. Another study explored how the concept of consent remains vague in matchmaking technologies [184]. The assumption that being on these platforms is equivalent to consenting to engage in sexual activities means that users could end up being victims of sexual violence or being coerced into non-consensual sexual activities. Researchers have explored ways to incorporate consent into dating apps by encouraging and normalizing conversations relating to consent and setting boundaries and expectations online before meeting offline [65]. While it is understood that these conversations about consent might not transition to an offline meeting, this makes it easier for users to bring it up offline and assess if their sexual boundaries are respected and that affirmative consent practices are adhered to before deciding to meet offline or not.

Through this study, I understand how trust is built online between participants in a marital matchmaking system, how participants evaluate their trust in others, and what risks could be minimized in the process. These topics would address **RQ3a** and **RQ3b**.

6.2.2 Technological Interactions between Parents and their Young Adult

While it is common for young adult's to find their potential spouses on their own, involving parents in the process is important for my target population [50]. Understanding how roles are negotiated to foster collaboration between young adults and their parents is discussed in the following paragraphs.

Position Negotiations

A lot of previous work has explored how parents control [169], monitor [69], keep their children safe on [141], and communicate with their children about their usage of online platforms[170]. Young adults' relationships with their parents evolves over time as they usually gain more autonomy, which leads to the need to renegotiate the relationship continuously [119]. Previous work done by Munoz et. al. [118] has explored how the relationship was viewed by young adults and their parents using Position Exchange Theory [110]. Moving from parents being responsible for their children's safety, both young adults and their parents navigate and negotiate their roles as their relationship transforms from parent and child to adult and young adult. The negotiation of roles is an attempt from both sides to maintain the relationship by understanding the other's perspective. In my work, I seek to understand how technology can play a role in the process of finding a spouse online for Saudi Arabians. Technology must maintain the role of parents as secondary stakeholders and enable young adults to negotiate and manage that role as they see fit. In my field trial study, we implement the role of parents by allowing young adult participants to indicate the level of involvement their parent have in the process. While we aimed for the involvement to indicate online interactions, we found out that participants had different perceptions of what "involvement" meant. We explain the levels of involvement we presented to participants in 6.1 and explain how participants perceived parental involvement in the results section. It is worth noting that parents were not involved in my study and it is limited to how young adults perceived and shared their parents' involvement with others.

Young Adults and Parents Collaborative Decision Making

As children become adults they go through a transition of gaining independence that manifests during adolescence. Parents also usually transition from controlling and monitoring their young adults to providing them with guidance and support. Adolescents usually protest that their parents are too controlling [169] and do not understand their needs[170]. While adolescents understand their parents want them to remain safe, adolescents want more autonomy and to play a role in the decision-making process [169, 168]. Previous work has shown that adolescents can become more

experienced when they play a role in the decision-making process, which helps with their moral growth and protects them from harm online [172]. Higher levels of controlling and monitoring of adolescents actually increased their risk of online victimization [68] and downplays adolescents role in the process [70]. Other work done by Wisniewski et. al. [168] has found that a balance between taking restrictive measures and being actively engaged in adolescents online activity would keep them protected while still allowing them to learn and benefit from their online experiences. It is worth noting that Wisniewski's interventions lowered the rates of high-risk online incidents for vulnerable populations such as foster teens [20].

In the context of online dating and courtship for Muslims and Arabs, young adults want to balance between keeping their parents involved and maintaining their autonomy and agency in the process [140]. Al-Dawood et. al. [51] found that Saudi Arabian young adults wanted to be able to communicate directly with their potential spouse online and only introduce the parents when appropriate. At the same time, Saudi Arabian young adults were not sure how to maintain their religious and cultural values to respect and honor their parents while maintaining their autonomy. This is especially challenging when parents and young adults have conflicting perspectives and finding a middle ground might seem impossible. While Muslim and Arab young adults try to discuss and negotiate their perspectives with their parents, they might choose to not inform their parents to avoid unnecessary conflict, especially when they are not sure about the prospects of a potential spouse. Taking the perspective of Muslim and Arab parents, Al-Dawood et. al. [50] found that parents are willing to negotiate and discuss differing perspectives as long as cultural and religious expectations are respected and maintained. It is worth noting that cultural and religious expectations can vary for Muslims and Arabs from different subcultures, religious sects, or religious doctrines. This means that the discussion and negotiation between young adults and parents is an ongoing and evolving process over time and across cultures.

In my work, I aim to understand how Saudi Arabian parents' perceived involvement in a marital matchmaking platform can have an effect on trust building between participants and their perception of privacy and autonomy. These topics would address **RQ3b** and **RQ3c**.

6.2.3 Preserving Privacy in Non-Western Collectivist Contexts

Privacy is a concern when using technology as sharing information helps people connect online and introduces risks of violating a user's privacy. The following paragraphs detail how the concept of preserving privacy is different in a collectivist context such as Saudi Arabia and how anonymity can play a role in it.

Privacy in Visual Representation

Using personal photos to express a user's online identity is the norm in Western individualistic contexts while it is more complicated for non-western collectivist contexts. A study conducted by Abokhodair et. al.[5] explored how Saudi Arabians and Qataris were cautious about sharing their personal pictures and being associated with them. They managed their online presence by omitting personal photos or controlling who had access to them to avoid violating their religious and cultural guidelines. This is more crucial for women as it relates to cultural norms of preserving honor and reputation[6]. Work done by Rashidi et. al.[138] shows how Saudi Arabian women express their identity while maintaining their norms and values by showing parts of their attire without their faces being present to convey their elegance. In addition, the study indicates that sharing more sensitive photos that show the face and the full body of women is acceptable if it remains private and only accessible to women who can be trusted. We chose to not allow photos on TBYAAN since it might create an imbalance and favor those who are willing to share personal images publicly.

Anonymity

While anonymity in online platforms is usually associated with harmful behavior, it is useful for maintaining privacy during honest self-disclosure between users. As mentioned in 6.2.1, anonymity can enable cyber-bullying, sexual harassment[128], and trolling [75] in anonymous social media platforms. On the other hand, work done by Ma et. al [104] has shown that users self-disclose more when anonymous as the risks of context collapse [111], privacy loss [30] and harming one's self-presentation are relatively reduced. In addition, work by Andalibi et. al. [16] indicated that anonymity had mostly a positive effect in support-seeking platforms for socially stigmatized contexts such as sexual abuse.

Andalibi also highlights that anonymity was not associated with aggressive behavior. Another study highlighted how anonymous content online was more likely to be honest compared to identified content [95]. This does not mean that anonymity eliminates the misuse mentioned earlier. Some measures to minimize misuse might be addressed by limiting the capabilities of users rather than banning them [106] or de-anonymizing (revealing the identity of an anonymous user) them [7]. This could also mean that providing a mechanism to "rehab" those who misuse technology is worth considering to create better online communities. TBYAAN has chosen to limit users' interactions to minimize misuse.

My work has taken into account privacy considerations for Saudi Arabians and explores how being anonymous can help preserve privacy and build trust, especially when both parties are anonymous. We aim to utilize anonymity to provide a better space for transparency that would help build trust between participants. We provide more details on how privacy is preserved and how we minimize anonymity misuse in TBYAAN in section 6.3.6. With these privacy considerations in mind, we address **RQ3c** through my work.

6.3 TBYAAN System Design Requirements

TBYAAN is a marital matchmaking platform that is based on answering questions anonymously as a method of building trust with strangers while maintaining privacy through anonymity. The following subsections discuss design requirements that are required to address **RQ3a,RQ3b,andRQ3c** and explain their implementation in more detail.

6.3.1 Overview of TBYAAN

TBYAAN allows participants to share their information and discover other profiles by answering questions. Answers are only viewable by other participants who have answered the same question. This means answering more questions will allow participants to discover more profiles and increase their visibility to other participants. Another way to discover other participants is through a dashboard of top matching profiles that are ranked by the percentage of shared answers. The dashboard also

shows suggested questions for a participant to answer based on their answers and other participants' answers. Lastly, the questions are relevant to Saudi Arabian values and common marriage topics in general. Figure 6.1 shows the basic features of TBYAAN.

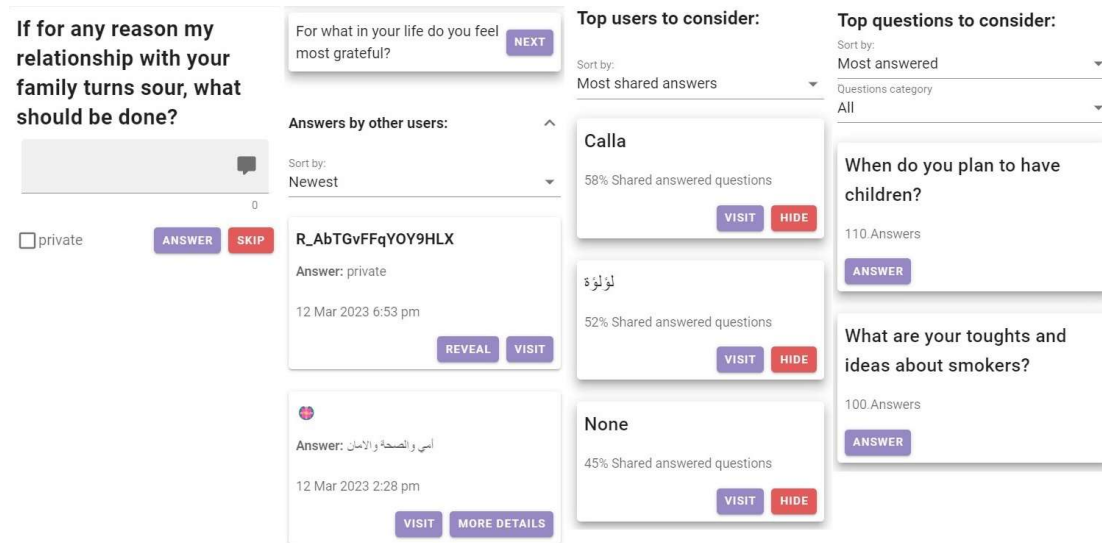


Figure 6.1: Answering questions and Top recommendations

Private Answers: Participants can also manage their privacy through private answers that require approval to be viewed. This is meant to give participants more control over their privacy to choose who gets to view their private answers while also indicating that they have answered a specific question.

Requesting Answers: Participants can also see questions that they have not answered on other participants' profiles and have the option to answer them. Conversely, they can request from another participant to answer a question they have answered. Figure 6.2 shows different methods to interact with unanswered or private questions.

Proposals: In addition to interacting with questions, participants can send a "proposal/engagement" request, which is limited to one participant at a time, which is shown in figure 6.3. For the proposal to be complete, it requires a participant to initiate it and another to accept it. A proposal can be rejected or canceled at any time. While the proposal is waiting for approval or is accepted, both participants involved in

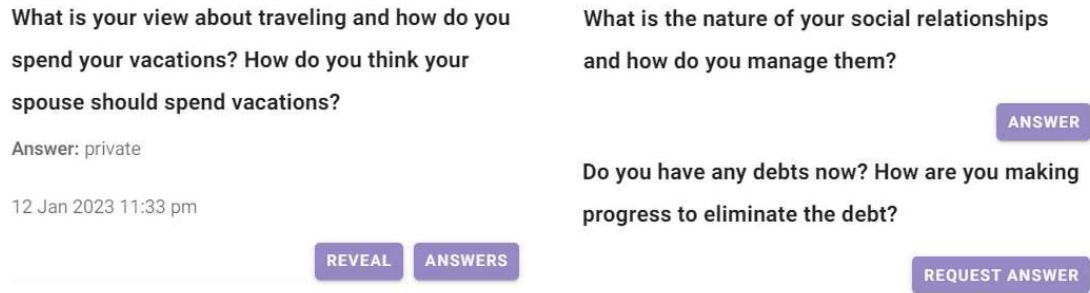


Figure 6.2: Different ways participants can interact with questions on TBYAAN

the proposal are no longer visible on the TBYAAN until the proposal is rejected or canceled. This aligns with Saudi Arabian and Islamic values which prohibit multiple proposals from simultaneously occurring and also eliminates the concern of being overwhelmed with too many proposals. If the proposal is accepted, both participants are directed to contact the researchers to arrange a way for them to communicate outside TBYAAN. This also means they can no longer interact with TBYAAN until they cancel their proposal. If the proposal is rejected, both return to being visible on the platform, and subsequent proposal attempts will show previous rejections and confirm the participants are aware that they have proposed before.

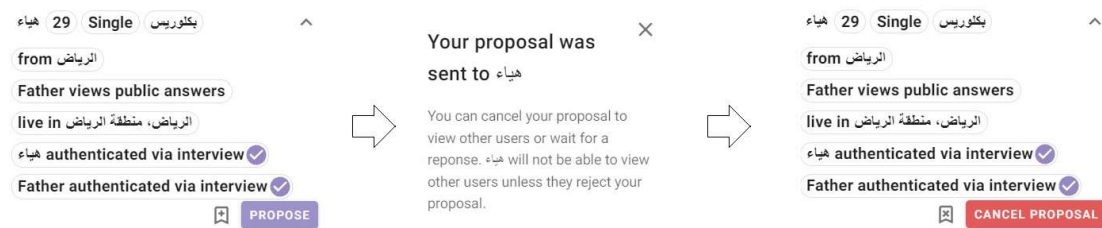


Figure 6.3: How a proposal occurs in TBYAAN

We did not implement a way for participants to contact each other after a proposal was accepted in TBYAAN as it was outside the scope of this study.

6.3.2 TBYAAN's source of questions

The questions in TBYAAN were collected from different sources. Most questions were from a pre-marital questionnaire made by a Muslim Imam [108]. Other questions were

selected from the well-known 36 questions to fall in love by Aron et. al. [17], a Kuwaiti experienced in family affairs and marriage in the GCC region [1], and common questions that are addressed in Saudi Arabia when it comes to selecting a potential spouse traditionally. The purpose is to focus on questions that are crucial when deciding on a potential partner but also provide some variety such that participants can evaluate similarities and differences more accurately. These questions will range from facts such as a participant's tribal affiliation and personal opinions such as hobbies and interests. I do not aim to measure the effectiveness of these questions as much as to provide enough variety for participants to choose from.

6.3.3 Building trust between participants in TBYAAN through Authentication

Trust has been mentioned as a concern when addressing **RQ1d** and **RQ2a** in chapters 4 and 5. Participants have also mentioned how governmental authentication is considered trustworthy when addressing **RQ1f**. TBYAAN aims to provide three levels of authentication. First, the participants can choose not to authenticate their account, which provides a baseline. Second, they can choose to authenticate their phone number, which is the most similar to governmental authentication. Since Saudi Arabian national IDs are linked to their legally registered phone number, I decided to use phone number authentication with a one-time password (OTP) with the perception that it is matched with their national ID to be as similar as possible to governmental authentication. I also ensured that a national ID is valid [11] to prevent random entries and create a better perception of an actual authentication process. Third, arrange an in-person or virtual meeting with the research team to authenticate the participant. The meeting consists of asking the participant for a form of identification to confirm their identity. I worked with a female collaborator to authenticate female participants that are not comfortable with showing their face to a male. After being authenticated, an authentication badge appears on the participant's profile to indicate what type of authentication they have completed, as seen in figure 6.4.

This design requirement addresses **RQ3a**. It is important to note that none of the information used for authentication will be stored in the participant's profile or anywhere else in TBYAAN after authentication is completed to preserve their privacy,

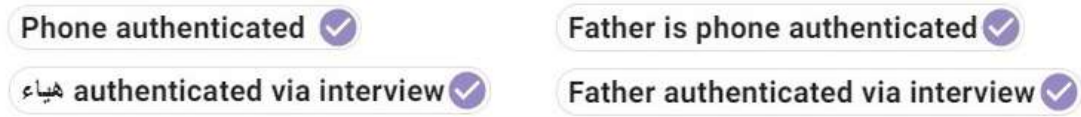


Figure 6.4: Examples of different authentication badges.

which partially addresses **RQ3c**. While this makes the authentication somewhat incomplete, the goal is to measure the perception of authentication and not to build a complete authentication process, which is beyond the scope of this dissertation.

6.3.4 Building trust between participants in TBYAAN through authenticated parental involvement

Saudi Arabian parents wanted to remain involved in the matchmaking process (**RQ2b**, chapter 5) while young adults wanted more autonomy (**RQ1d**, chapter 4). Parents were authenticated similarly to the young adults and have different modes of involvement depending on what level of involvement is selected by their young adults. Parents' involvement levels are explained in Table 6.1 and different combinations of authentication and involvement are shown in Figure 6.5.

1. Not involved	2. Partially involved	3. Fully involved
No involvement.	View public answers.	View public & private answers.

Table 6.1: Parental Involvement levels

It is important to note that parents in TBYAAN do not have a profile that allows them to be involved. Their involvement is based on what type of physical access is granted by their young adults to view content on TBYAAN. After parents are authenticated and their involvement is indicated by their young adult, a parental authentication badge and involvement description appears on the participant's profile to indicate what type of authentication they have completed, as seen in figure 6.5. This design requirement addresses **RQ3b**.

6.3.5 Supported combinations of authentication and parental involvement in TBYAAN

There are restrictions on what type of combinations of participants' authentication and their parental involvement and authentication are possible in TBYAAN. This is due to the dependency of parental involvement and authentication on the participant's authentication. Unauthenticated participants cannot authenticate their parents and parents need to be involved to be authenticated. The total possible combinations without these restrictions would have been 27 ($3 \times 3 \times 3$). From those combinations, 6 are eliminated when the participant is not authenticated, an additional 4 are eliminated when parents are not involved while the participant is authenticated, and lastly, 2 eliminations because parents cannot authenticate in person when the participant is authenticated by phone. This leaves 15 possible combinations for authentication and parental involvement that address **RQ3a**, **RQ3b**, and **RQ3c**. Figures 6.5 and 6.6 show some examples of different parental and authentication combinations in TBYAAN and the distribution of participants over them.

6.3.6 Preserving participants privacy in TBYAAN

To preserve privacy, which was shown to be an important feature in **RQ1f**, participants control the type of content they share on TBYAAN by indicating it as public or private, as shown in Figures 6.1 and 6.2. Public content can be viewed by other participants (and their partially or fully involved parents) and private content can be viewed by other participants that are explicitly approved by the content author (and their fully involved parents). To avoid context collapse of approved private content, all private content approval is automatically retracted when a participant changes their parental involvement to fully involve their parents. In addition, we have decided to omit the use of photos to maintain participants' privacy. We also decided to limit the possible interactions between participants to minimize bullying and abuse that might occur with anonymity [128]. This design requirement mainly addresses **RQ3c**.

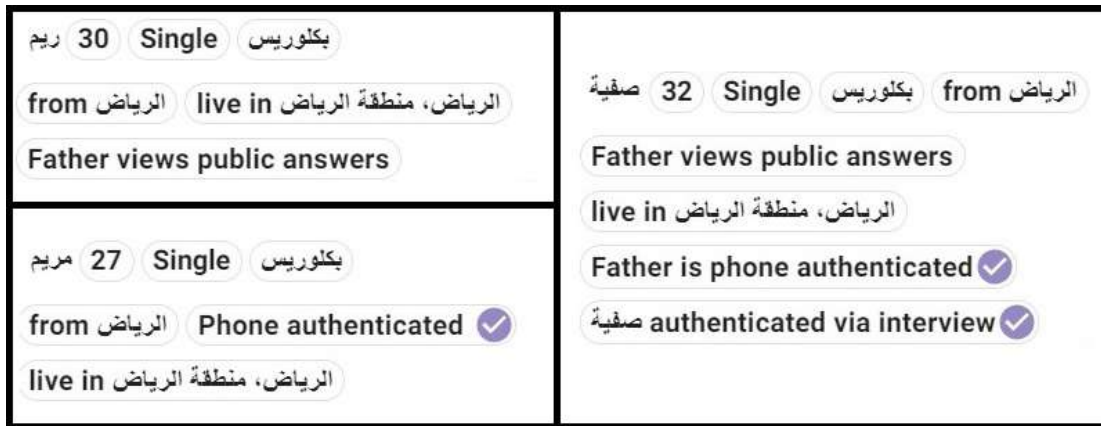


Figure 6.5: Examples of different authentication and involvement combinations

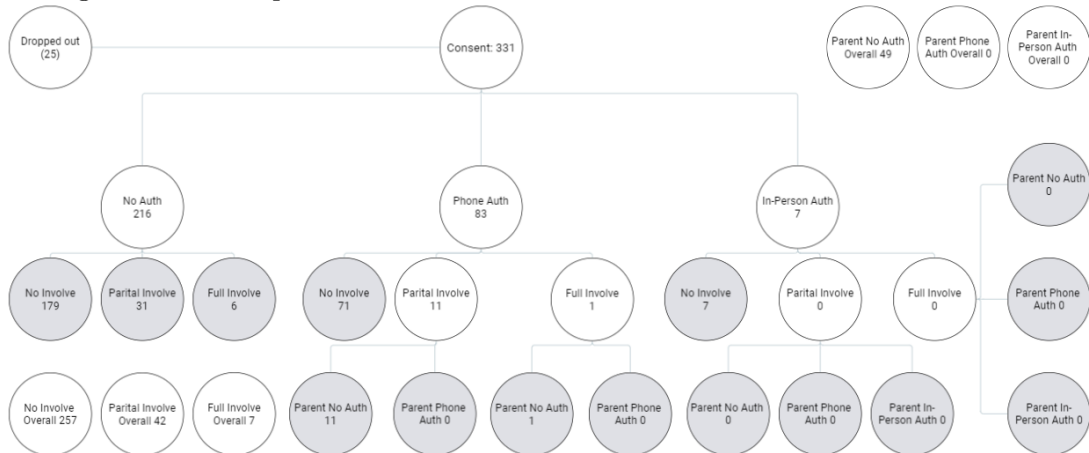


Figure 6.6: Participants by Involvement and Auth levels

6.4 Study Design

The field trial study ran between February 2023 and July 2023. Each participant used TBYAAN for 4 weeks before completing an exit questionnaire with an option to sign up for a follow-up interview.

6.4.1 Participants

For participants to qualify for the study, they would have to be Saudi Arabian nationals who are single, at least 18 years old, and lived in Saudi Arabia for at least 10 years. I

recruited a total of 331 participants (103 men and 226 women). 7 Participants (1 man, 4 women, and 2 had no gender listed) withdrew from the study and . This brings the final participant count to 324 participants (102 men and 222 women). Participants were recruited through Twitter and Bayan Inc., a local Saudi Arabian tech company. by filling out a Qualtrics screener survey to determine if they qualify for the study. Most of the participants were from Riyadh (118, 36%), Makkah (70, 22%), Qassim (40, 12%), and Eastern (30, 9%) regions. So, 79% of the participants only represent 4 regions out of 13 (31%) regions in Saudi Arabia. For age groups, most participants were between 25 and 35 (232, 71%), followed by those between 18 and 25 (64, 20%) and between 35 and 45 (28, 9%). This is not surprising as most Saudi Arabians consider 25 to 35 an ideal age to get married. After participants are determined to be eligible, their consent is collected electronically after they activate their account in TBYAAN using a unique ID that they receive at the end of the screener. This is to ensure that only participants who qualify are allowed to access TBYAAN. The screener also detects multiple submissions to prevent unauthorized access to TBYAAN. 47 out of the 331 participants completed the exit questionnaire and 12 out of the 47 conducted the follow-up interview. While these drop-out rates seem high, it is worth noting that about one-third of the participants logged into TBYAAN as guests, which makes it hard to get in touch with those participants and easy to lose access to TBYAAN. In addition, since the study lasted for 4 weeks, it is consistent with expected dropout rates based on work done by Georges [67] that found dropout rates increased when the study period was longer. Figure 6.7 provides participant dropout rates and how many were.

6.4.2 Procedure

Participants took part in a 4-week field trial study using TBYAAN, which was followed by a Qualtrics exit questionnaire. After participants were recruited, they set up their profile in TBYAAN, as seen in figure 6.8, and began the 4-week field trial study. During the field trial, participants were prompted to rate how much they trust a profile [122] in TBYAAN when they view it for the first time as shown in figure 6.9. In addition, participants' metadata during the field trial were collected for analysis. After the field trial is concluded, participants were asked to rate any remaining profiles they did not rate during the field trial to cover all possible combinations of profiles mentioned in section 6.3.5. After rating

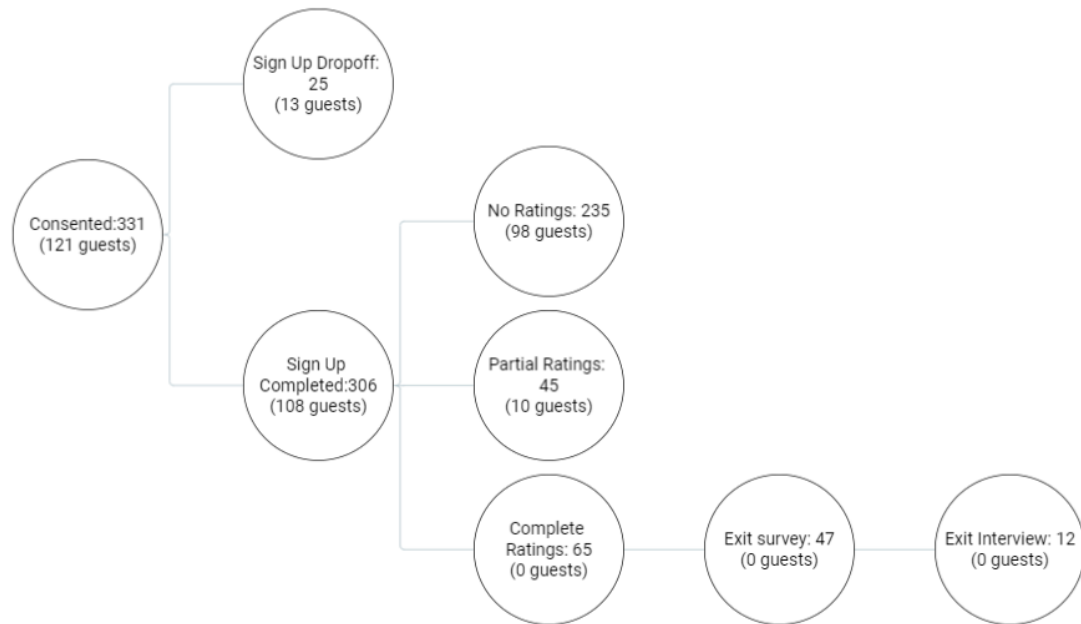


Figure 6.7: Participants by dropout rates

profiles, participants were directed to a Qualtrics questionnaire to fill out trust [48] and privacy [19] measures for TBYAAN, Absher (a Saudi Government platform), and Twitter or Bayan Inc. Absher, Twitter, and Bayan Inc. were used as a point of reference since participants were familiar with them. In cases where participants were recruited through Bayan Inc., the trust and privacy measures mention Bayan Inc. instead of Twitter. At the end of the Qualtrics questionnaire, participants were asked if they would like to take part in a follow-up interview and provide their contact information to arrange the interview.

Interviews ranged between 30 and 90 minutes in length. Participants were compensated for their participation with those completing the questionnaire receiving 75 Saudi Arabian Riyals (20 USD) and those who completed the follow-up interview receiving 150 Saudi Arabian Riyals (40 USD). Since the number of those who finished the questionnaire was higher, we had to limit it to compensating 40 participants that were picked at random.

Welcome to TBYAAN

Please provide the following to set up your account with us:

Username

Year born Month born

Youngest partner age Your age is Oldest partner age

Your current city

Gender Marital status

How would you like to authenticate your account?

I do not want to authenticate my account

Phone number

Virtual/In-Person meeting

What is your family's role in TBYAAN?

What type of involvement for your family?

What is your family's role in TBYAAN?

What type of involvement for your family?

Who plays this role?

What is your family's role in TBYAAN?

What type of involvement for your family?

Who plays this role?

Describe the other person

Figure 6.8: Examples of profiles that participants were asked to rate how much they trusted them.

6.4.3 Measures

During the field trial study, we utilized Naef et al's [122] scale to rate how much trust participants had in other profiles they viewed and Corritore et al's [48] and Ayalon et al's [19] measures to evaluate how much participants trusted TBYAAN and how it handled their privacy when compared to Absher, Twitter or Bayan Inc. Absher is a Saudi Arabian government platform that is assumed to be considered trustworthy and preserves privacy. Twitter and Bayan Inc. were my recruitment platforms and using them for comparison guaranteed that participants were familiar with them. We explain these measures in more detail in the following paragraphs.

Corritore et al's [48] measure was meant to measure trust of online websites. It had many scales and we chose to use the honesty, reputation, risk, and trust scales. These scales were more relevant to measuring how participants trusted TBYAAN, Absher, and

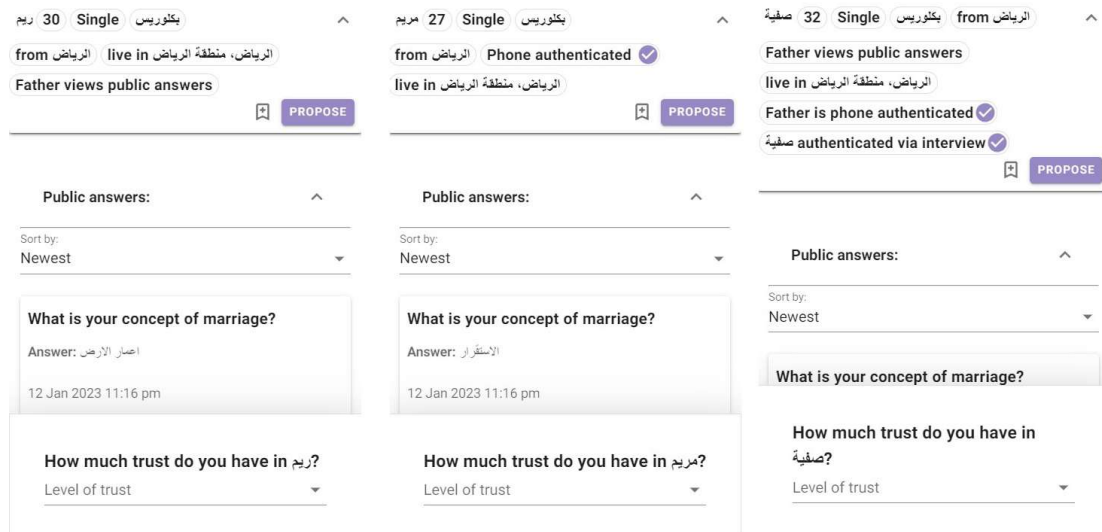


Figure 6.9: Examples of profiles that participants were asked to rate how much they trusted them.

Twitter or Bayan Inc. This resulted in a total of 24 (9 honesty, 4 trust, 4 reputation, 7 risk) items that participants had to complete. This measure was shown to participants as part of their exit questionnaire.

Ayalon et al's [19] measure was meant to measure user's perception of a system's privacy. We used all scales, which were institutional, risk, and social. This resulted in a total of 27 (12 institutional, 8 risk, 7 social) items that participants had to complete. This measure was shown to participants as part of their exit questionnaire.

Naef et al's [122] had many scales to measure trust and we chose a scale to measure how people trusted strangers by presenting other participants' profiles as a representation of a stranger since participants were anonymous. This scale had levels: No trust at all (1), Little trust (2), Quite a bit of trust (3), A lot of trust (4). Participants were shown the scale when they navigated to any other participant's profile during the field trial and were directed to rate any remaining profile combinations after the field trial concluded and before they started the exit questionnaire.

All measures and scales were translated into Arabic since participants were mostly native Arabic speakers.

6.4.4 Data Collection

Data was collected from TBYAAN such as participants' meta-data, and profile ratings, and from Qualtrics using the trust and privacy measures and from optional interview transcripts. Meta-data would include daily profiles viewed and questions answered by participants. Profile ratings will have a level of trust between 1 and 4 with 4 being the most trustworthy. In Addition, profile ratings will have an open text component for participants to optionally share their reasoning for their ratings. The privacy and trust¹ measures were on a 7-point Likert scale from strongly agree to strongly disagree. Interviews were recorded and transcribed after consent is collected from participants. Notes would be taken during the interviews if a participant did not consent to a recording.

6.4.5 Data Analysis

Quantitative analysis was conducted for participants profile ratings while qualitative analysis was conducted for interview transcripts. Profiles ratings were analyzed using a repeated measures ANOVA with the trust rating being the dependent variable and user authentication, family involvement, and family authentication as the independent within-subject variables Trust and Privacy Measures were analyzed using paired t-tests be averaging the score for each subscale and comparing the averages between Absher, Twitter and TBYAAN. Interview transcripts and profile ratings open text explanations were qualitatively analyzed to generate themes about how participants perceived their usage of TBYAAN and how they rated other participants' trustworthiness.

6.5 Results

The findings of my study were both qualitative and quantitative. I will start with qualitative findings for divergence and use quantitative findings to provide some convergence.

¹ Attempted to reach out to authors and track down what type of Likert scale it was with no success

6.5.1 Qualitative findings

After open-coding my interviews and applying those codes to an affinity diagram, I have generated a couple of themes that will be discussed in the following subsections.

Enhancing the Traditional Marriage Process

Many participants have highlighted that the traditional marriage process needs to be enhanced and mentioned both positive and negative aspects of the traditional marriage process. To start, many believed that the traditional marriage process gives too much control to parents and minimizes young adults' autonomy as P5 finds "It's hard to find the girl that you want and your family does not give you the perspective that you want" and he also adds that "engagement is hard...like if you got engaged, you follow through with marriage". He is concerned that he cannot evaluate his potential spouse appropriately through his family and that getting engaged to know her better makes it hard to back out if she turns out to be not suitable.

I had an idea about how guys, and what ideas they had in Saudi Arabia, but it was not based on something real...it was interesting how I could know more about a person through questions only. Even if it was knowing more because they wrote less...you can know more by the things they are omitting, or things they request answers for. - **P2**

In addition to the limitations of the traditional process, some participants expressed their desire to marry non-traditionally. P1 says "The reason I chose technology, I want to look for people different from my tribe...so I decided to search non-traditionally." Even then, marrying non-traditionally comes with the challenge of managing familial expectations. This could include understanding other family's expectations and being able to accept them as the norm going forward. P4 says "If I want someone from outside, he has to know about our background" and hopes that technology allows others to understand what her family expects from her spouse and why she wants to marry out of her local community. This is supported by P1 when he says "I saw that TBYAAN gave me an authenticated and easy way to reach others with transparent information, precise details, and a variety of cities." Even when participants expressed their opinions about utilizing technology to find a spouse, they still believed that certain aspects of

traditional marriage are important. This is highlighted by the following quote by P3 which considers TBYAAN to be successful because it is similar to the traditional process. It is worth noting that P3 actually found someone she was interested in but decided to end it because they could not agree on living in the same city.

I felt that TBYAAN was a little, close to traditional marriage. Such that in traditional marriage you would know the person. Know his commitments, his family, his relationship with his mother when he comes...TBYAAN was transparent like that. Such that [participants] wrote, I am talking when their responses in TBYAAN are truthful, they were all truthful. Even when we got in touch, their responses were truthful. It was the closest to a traditional marriage. It was the most serious thing. - **P3**

I would like to conclude by quoting two participants who provide a positive and negative perspective on utilizing technology to find a spouse. P12 highlights that technology allows him to explore and decide early on, which is not available in the traditional process. P4 argues that TBYAAN might attract outcasts who were not able to find a spouse traditionally and do not have valuable information to offer about themselves besides cliché traditional expectations.

The nice thing in TBYAAN is that it ensures privacy well such that I can know information about a certain person without them knowing who I am and I can filter those who I like for any reason early. This is not found in normal traditional marriages. You discover later, after engagement and marriage, etc. - **P12**

P4: They are real, but you feel they are outcasts. Nobody accepted them and TBYAAN was their last resort.

Researcher: What do you mean outcasts?

P4: We could say there is a small percentage that seem defeated. He says he just wants a life, normal wife like anyone, create a family and that is it.

Parental Involvement

Participants had varying opinions when it came to parental involvement. Some view it as restricting young adults' autonomy while others view it as an indicator of seriousness. The level of parental involvement and the gender of the young adults played a role in shaping these opinions.

Many participants viewed parental involvement as an indicator of seriousness, which increases trust between young adults. Parents being involved "makes getting married easier" according to P1 since young adults do not have to worry about figuring out how to transition their interactions offline without raising suspicions that would cause parents to disapprove of their marriage since it was done behind their backs. As a result, young adults usually take measures that would paint their marriage in a traditional light. For example, "his mom would talk to my mom and it would seem as if they came through my mother or someone who knows me" as mentioned by P9. P9 also mentions that It is preferred that parents are involved because it would be "considered more trust-worthy" and that "It means they are ready and accepting". In addition, P11 states that "I would not mess around" when parents are involved as he believes it keeps him in check and serious about marriage. Even when parents are involved and supportive, they are mainly worried about how the community would react if they knew a marriage started online. As a result, involved parents might approve of a marriage that started online while hiding its origin from the public.

P9: But if they are serious, like, my mom would like for me to get married, she would be silent. She will not say anything.

Researcher: Even if it was through a website?

P9: Definitely, she would say 'do not tell anyone.' No one else would know besides her.

While trust increases with family involvement, young adults have concerns about autonomy and transparency being affected. For example, young adults felt that they might not be able to communicate freely when are involved. P5 expressed that "I will not feel comfortable, [if her] father and mother knew, that I communicate with her". Besides being comfortable, participants believed that others' responses would be more truthful and transparent when parents' involvement is limited. Limited involvement

would provide a space for young adults to "answer freely" and those "answers might be more truthful" according to P6. On the other hand, P8 believes "They should make the decision [to marry]. They evaluate, trust, and choose [their potential spouse]." P1 feels that this is disrespectful to his parents as he believes "others might not accept" and "will say he is a mama's boy." He believes that his mother's wishes to be involved should be respected and that it does not equate to being dependant on her. Even though young adults' autonomy was questioned when parents were involved, the type and level of involvement might increase or decrease autonomy.

If involvement means they view his profile the same way it appears to him, they can see my profile. I am like, okay more critics. I do not like this. Yeah, I do not like the idea of parents viewing girls' profiles. Don't they already do it with matchmakers? what's the difference? I do not like the idea - **P12**

Young adults realize that their parents will eventually be involved in the marriage process and would like to have control over how the involvement will occur. They usually prefer that parents are not involved too early as it might complicate the process before young adults decide they are even suitable. It might be reasonable for young adults to share some public information with their parents while they make their decisions. For example, P7 believes that "he will choose at the end what is suitable for him" and that "there is no need to tell his mom everything." When deciding to involve parents, the participant's gender played a role. It would be considered much easier for men to involve their families compared to women. This is related to the traditional process being initiated by the man's family while the woman is expected to wait for a man to propose to her for marriage. Young adults do not want to exclude their parents completely but want to have some space when they first get to know their potential spouse and control how their parents will be involved if needed.

[Parents] will play a role in the decision. The issue is, should it be from the very beginning?...there is the sense that his mom will help him choose. [mother:]'Her? No not her!' In the end, [parents] play a significant role.

- **P10**

Building Trust Between Young Adults and TBYAAN

Young adults would require a minimal level of trust before they would consider getting married to someone they met online or even start using an online platform for marriage. I will start with how participants decided to trust TBYAAN and then cover how they decided if other participants were trustworthy or not.

Some were skeptical since the study left some parts of TBYAAN unexplained, but found it reasonable for a scientific study that was transparent about the involved researchers. They would have been more skeptical and never used TBYAAN if it was an actual commercial platform. While the consent form that was presented to them at the beginning of the study was informative, they required additional information about those who were behind the study to feel comfortable about it and trust them. For example, P3 said "I trusted [the researcher]. So, for sure participants would be from the same environment." It can be seen that participants were willing to trust other participants if they viewed those who ran the platform as trustworthy. Some participants believed that as long as there was no bad reputation associated with the platform, they were willing to trust it. They believed that a good reputation is not easy to verify while a bad reputation is hard to fabricate. This also meant that participants never actually fully trusted TBYAAN. They believed that they as individuals were responsible for managing their own risks online. P9 states that "no matter what, it will always remain that those who run the platform can see everything." It was important for participants that they are informed well about an online platform before they can trust it.

Even when participants were provided with information about the platform, they considered certain aspects as indicators that increased their trust in the platform. One of those aspects is the level of security standards that are followed, which are reflected through the type of available security providers or certifications. Another aspect is the technological expertise of those who run the platform and how that is reflected in how the platform is perceived by participants. For example, P7 states "I saw the questions were logical...I felt there were respectable people behind this platform...because I felt it had people who were sensible and caring." Overall, It is important to pay attention to small details that can make a difference in how users build trust with online platforms.

When it comes to building trust among participants, authentication and generated

content were mentioned as mediums for building trust. While authentication is an obvious way to build trust, some participants believed that content generated by others was a better measure when measuring trust, especially when it relates to choosing a potential spouse. They believed that it was more important to know and understand others' opinions than it was to know that they had authenticated their identity. An exception would be made if they believed others were bots or were misrepresenting their gender.

When it came to building trust through authentication, participants had mixed views about different types of authentication. While participants viewed in-person authentication as more rigorous, they believed phone authentication was more convenient. Phone authentication also helps preserve participants' privacy since it eliminates any middlemen in the process. On the other hand, in-person authentication may be viewed as "trying too hard" or as an indicator of seriousness and willingness to commit more time and effort to find a suitable spouse. An added value that was perceived by some participants is that in-person authentication might be able to authenticate more than just a person's identity. P9 States:

P9: If a person puts in-person authentication, it would be more trusted.

Researcher: Why? What is the difference between it and a phone number?

P9: Because who just puts their phone number is normal. No one will check if their information is correct. But you said in the interview you would check their name is correct, age is correct, residence is correct...there is no deception.

In the case of building trust through generated content, participants categorized content as useful or useless. Useful content allowed participants to understand each other better through sharing detailed and thoughtful public answers. Participants who had the majority of their answers private, short, vague, or idealistic were considered not trustworthy. Even though P8 believes it is important to meet in real life to "conduct a real assessment", P9 states that "your digital presence is a proxy and will be used to assess you." Participants prefer to have as much information as possible that would help them evaluate others, even if it is not aligned with their values. P8 believes that "even if it was against my point of view, I would consider them serious

and trust them more compared to someone that agrees with me and most of their questions are not visible." P9 Adds that "those who answer more questions will be more serious", but P4 interjects that it is important that "they answer most of them...like, clearly and understandably." Lastly, P10 believes that "answering questions that are considered sensitive, culturally or religiously, for me, increases trust.", which means that the type of content that is shared matters when building trust since "when they hide this type of question, which I consider to be, somewhat, highly sensitive, I get the sense that for me, trust decreases a bit." Participants believed it was possible to build trust through content generated by young adults if that content was useful and allowed them to understand each other better.

P4: There are people who I felt were real, but the rest were messing around.

Researcher: How can you differentiate?

P4: He has a clear answer, that he is talking about himself...some enter as if he is in an exam, just answering and moving on.

Managing Privacy

Young adults having control over their privacy was very crucial for them to successfully find a spouse online. This is one of the aspects that is borrowed from the traditional marriage process where it is secretive and limits the amount of people who are aware of it to a minimum. In this case, there would be another level of privacy the young adults would like to maintain between themselves and without their parents being involved, as mentioned in earlier subsections. Managing privacy consists of controlling how and what content is shared and who has access to it to minimize negative consequences.

Young adults are cautious about who can access their information online, which may result in a context collapse that would limit their ability to express themselves freely online. P2 recounts a previous experience where "one of my cousins, found my account...Suddenly, my mom says such and such said you wrote on Twitter." While she understands that her cousin did not mean harm, she is bothered that she is held accountable for simply sharing publicly. That is why P9 manages different credentials for different platforms to avoid being easily detected across platforms. Even when participants were interested in communicating with others after accepting a proposal, they preferred using Telegram as a medium that would keep their information private.

Participants also preferred if TBYAAN had similar features where they could exchange content privately without leaving a trail like private answers. This would help participants by having more control over their privacy and managing it appropriately. For example, P6 states that "maybe I should not share very private things" and that she should "be secretive about it." Young adults were very concerned about who had access to the data they were sharing as it could affect their reputation and ultimately prevent them from utilizing technology to find a spouse altogether. They were especially protective and selective about what access their family had to information that they shared online.

If my family saw it, maybe there is a high chance that I will not express it. Because of that, I say, if there were, like, levels. That, first thing, public questions. Maybe, a generally interested person will read it. Then, the second level is requested by the person who...saw everything was okay. They were accepting...of everything. They may ask for a second level and the questions would appear, and their answers. I do not know how it happens, but I feel like this, it might work, that it limits viewing and exposure. - **P4**

Young adults were worried about their privacy being preserved within the platform when it compromises their privacy outside of it. They generally believe that the information they provide does not make them easily identifiable, especially when the number of users is large and whoever is viewing it does not know them personally. They did express their discomfort about the platform being able to view their content and would have preferred if it was encrypted. P1 states "I do not prefer that private information is viewable" and that "maybe it should appear encrypted." On the other hand, some participants were worried that a local platform might be more vulnerable when compared to international platforms. P2 voices her concern if "it is possible that someone knows someone personal?" She also compares this to government platforms where she states "I trust the entity...but I do not trust the people that work in it because there are many people who have access." Maintaining privacy within a platform relies heavily on who has access to information in it and if that access may lead to negative consequences outside of the platform. Participants would rather play it safe and maybe even not participate if there was any hint that their privacy might be compromised.

Researcher: If one of your acquaintances worked for TBYAAN...

P9: So, he knew about me?

Researcher: He might not know you are registered but you know that works for TBYAAN...

P9: I will not register. No no, I will not register. If he knew, I would not register.

Young adults had conflicting opinions about sharing photos online. Generally, participants believed it was better to not share photos online as it may violate privacy or change the premise from marital matchmaking to dating. While sharing photos helped them evaluate and build trust with others, they were reluctant to share to preserve their privacy. It was preferred to share a visual representation that would preserve their privacy while setting expectations. Participants provided examples of visual representations such as "a blurred photo" by P2 and "Bitmoji" by P1. Another alternative was delaying sharing photos or simply evaluating appearances offline, which is similar to the traditional marriage process. Some believed that photos were important when they did not have enough information about others and that photos would be less important when they had more information about others. This is also aligned with how P6 believes that it is better to "focus on the personality [first] and then their appearance or photo" and that photos "might distract participants from the main goal" as stated by P10. As a result, participants believed they could preserve their privacy by delaying sharing photos and limiting their visibility by requiring approval or an initial agreement first. For example, P12 states that the "[photo] is by request...not available all the time." On the other hand, P11 believed that "who puts their photo is giving up part their privacy to increase their acceptance." Even when participants were willing to share photos, they were very protective that it must be secure, verifiable, and provide a fair exchange.

So, I don't mind that I put a photo of my face, but I do not want to put a photo of my face and not see the face of someone. It is either all of us putting our photos or all of us removing photos.

6.5.2 Quantitative findings

The quantitative findings are split into profile ratings of how much participants trusted others and exit survey responses to trust and perceptions of privacy measures for TBYAAN as a website.

Trust of Profile Ratings

I would like to start by listing some descriptive stats for all the possible combinations of profiles rated to give a general overview of how participants trusted others on TBYAAN. Table 6.2 shows the average rating for all profile combinations and tables 6.3 and 6.4 group ratings by user authentication, family authentication, and family involvement.

User Auth.	Family Involve	Family Auth.	Count	Avg. Rating	Median	SD
None	Full	None	81	1.024	1	1.000
None	Partial	None	84	1.155	1	0.912
In-Person	Full	In-Person	69	1.203	1	1.119
Phone	Full	None	74	1.297	1	1.030
Phone	Partial	None	94	1.308	1	1.027
Phone	Full	Phone	75	1.333	1	1.070
In-Person	Partial	In-Person	69	1.333	1	1.209
In-Person	None	-	73	1.342	1	1.017
In-Person	Full	None	68	1.353	1	1.062
In-Person	Partial	Phone	70	1.400	1	1.082
None	None	-	131	1.412	1	1.059
Phone	Partial	Phone	76	1.421	2	1.086
In-Person	Full	Phone	69	1.507	2	1.079
In-Person	Partial	None	72	1.556	2	1.047
Phone	None	-	125	1.568	2	1.073

Table 6.2: Profile Combinations sorted from lowest average rating to highest

Family Authentication	In-Person	None	Phone	-
Count	139	473	290	330
Average Rating	1.273	1.275	1.414	1.451
Median	1	1	1	2
Standard Deviation	1.160	1.019	1.076	1.057

Table 6.3: Average profile ratings by family authentication

User Auth.	None	In-Person	Phone	Family Involve	Full	Part	None
Count	296	491	445	Count	437	465	330
Avg. Rating	1.233	1.387	1.400	Avg. Rating	1.281	1.355	1.451
Median	1	1	2	Median	1	1	2
SD	1.013	1.087	1.059	SD	1.063	1.059	1.056

Table 6.4: Average profile ratings by user authentication and family involvement

It is somewhat clear that some trends appear in the descriptive statistics that address my hypotheses. For example, less family involvement increases trust overall. Regardless of the type of user authentication, it increases trust somewhat equally. Family authentication is somewhat complex. Overall, phone authentication has the highest trust. Interestingly, the family not being authenticated is slightly trusted more than the family being authenticated in person. This only applies when the user is authenticated in person. To have more confidence in these findings, we ran a repeated measures ANOVA with the results shown in Table 6.5. As we can see, only user

Factor	DF	F Score	p-value	Partial η Squared
User Authentication	2	3.157	0.043	5.00e-03
Family Authentication	2	1.570	0.209	3.00e-03
Family Involvement	1	0.946	0.331	7.99e-04
U. Auth. * F. Auth.	1	0.203	0.653	1.71e-04
U. Auth. * F. Involve	2	0.015	0.985	2.53e-05
F. Auth. * F. Involve	2	0.236	0.790	3.99e-04
U. Auth. * F. Auth. * F. Involve	1	1.312	0.252	1.00e-03

Table 6.5: ANOVA measuring the effect of user authentication, family authentication, and family involvement on trust ratings

authentication has a significant effect on trust ratings. It is important to note that my sample size is quite small. We only have 67 unique participants who completed at least 15 profile ratings. We also have some participants who completed more than 15 ratings.

Trust in TBYAAN

When looking at the descriptive statistics in Table 6.6 for trust measure rating averages across TBYAAN, Absher, Twitter, and Bayan Inc., we found some interesting trends.

We can see that TBYAAN is always trusted less than Absher and trusted the same or more than Twitter and Bayan Inc. It is important to note here that Bayan Inc. has only 3 ratings, while Twitter has 49. Also, the Risk scale is negatively phrased where a low number means less risk.

Scale	TBYAAN Avg. (Count)	Absher Avg. (Count)	Twitter Avg. (Count)	Bayan Inc Avg. (Count)
Risk	2.742 (52)	2.190 (52)	3.294 (49)	3.762 (3)
Reputation	4.707 (52)	6.418 (52)	4.724 (49)	4.667 (3)
Trust	5.255 (52)	5.889 (52)	3.638 (49)	5.917 (3)
Honesty	4.720 (52)	6.156 (52)	3.274 (49)	4.593 (3)

Table 6.6: Trust measure ratings averages for TBYAAN, Absher, Twitter, and Bayan Inc.

Running pairwise t-tests has shown that the comparison of trust between TBYAAN and Absher is significant for all scales. For Twitter, the reputation scale was the only one not to be considered significant. Bayan Inc. surprisingly was the opposite of Twitter, showing that there was a significant difference only in the reputation scale. From this, we can conclude with some confidence that TBYAAN is generally considered to be more trustworthy than Twitter while being less trustworthy than Absher. This partially supports hypothesis **H3**. Table 6.7 shows the result of running pairwise t-tests.

Perceptions of Privacy in TBYAAN

For the descriptive statistics of the perception of privacy measure ratings across TBYAAN, Absher, Twitter, and Bayan Inc., there were conflicting findings in Table 6.8. For institutional scale, Bayan Inc. was the highest, followed by TBYAAN then Absher then Twitter. When it came to the Risk scale, Absher was in the lead and TBYAAN came second, which left Bayan Inc. at 3rd and Twitter far behind. For the Social scale, Absher came first and was followed closely by Bayan Inc., TBYAAN, and Twitter. Generally, Absher is considered to be more private in general, and Twitter was always considered less private. Bayan Inc. was mostly considered more private

Groups	Scale	95% Confidence Interval	T-value	DF	p-value
TBYAAN	Risk	-1.040<->-0.064	-2.244	97.603	2.71e-02 *
X	Reputation	1.398<->2.025	10.824	93.396	< 2.20e-16
Absher	Trust	0.204<->1.065	2.929	92.405	4.28e-03 **
	Honesty	1.082<->1.790	8.048	101.380	1.66e-12 ***
TBYAAN	Risk	-1.121<->-0.150	-2.598	91.996	1.09e-02 *
X	Reputation	-0.399<->0.409	0.025	94.582	9.80e-01
Twitter	Trust	1.157<->2.098	6.882	84.74	9.59e-10 ***
	Honesty	1.061<->1.842	7.373	93.973	6.45e-11 ***
TBYAAN	Risk	-2.618<->1.951	-0.409	3.908	7.04e-01
X	Reputation	0.006<->0.660	2.8284	4.000	4.74e-02 *
Bayan Inc.	Trust	-1.657<->3.324	1.2127	2.453	3.29e-01
	Honesty	-0.405<->0.331	-0.353	2.560	7.51e-01

Table 6.7: Trust measure pairwise t-tests for TBYAAN, Absher, Twitter, and Bayan Inc.

than TBYAAN, even though TBYAAN was considered less risky. As was mentioned before, Bayan Inc. has only 3 ratings and Twitter has 49. The same applies to the Risk scale here, which is negatively phrased to mean a low number is less risky.

Scale	TBYAAN Avg. (Count)	Absher Avg. (Count)	Twitter Avg. (Count)	Bayan Inc. Avg. (Count)
Institutional	4.545 (52)	4.195 (52)	3.643 (49)	4.750 (3)
Risk	3.228 (52)	2.562 (52)	4.423 (49)	3.333 (3)
Social	3.599 (52)	4.228 (52)	3.294 (49)	3.952 (3)

Table 6.8: Privacy measure ratings averages for TBYAAN, Absher, Twitter, and Bayan Inc.

T-test results in Table 6.9 helped solidify these observations by highlighting that significance was only found for comparisons with Twitter and Absher. This means that we cannot be conclusive that Bayan Inc. and TBYAAN are more private than Absher. We can conclude with some confidence that TBYAAN is perceived to be more private than Twitter and less private than Absher. This partially supports hypothesis **H4**.

Groups	Scale	95% Confidence Interval	T-value	DF	p-value
TBYAAN	Institutional	-0.838<->0.139	-1.424	79.511	1.58e-01
X	Risk	-1.241<->-0.091	-2.302	84.961	2.38e-02 *
Absher	Social	0.123<->1.135	2.473	81.847	1.55e-02 *
TBYAAN	Institutional	0.466<->1.316	4.165	86.701	7.33e-05 **
X	Risk	-1.714<->-0.704	-4.756	90.625	7.41e-06 **
Twitter	Social	-0.166<->0.690	1.218	90.285	2.26e-01
TBYAAN	Institutional	-1.577<->1.633	0.062	2.465	9.55e-01
X	Risk	-3.072<->2.822	-0.118	3.985	9.12e-01
Bayan Inc.	Social	-3.096<->2.429	-0.390	2.919	7.23e-01

Table 6.9: Perception of privacy measure pairwise t-tests for TBYAAN, Absher, Twitter, and Bayan Inc.

6.6 Discussion

This study has explored some interesting findings related to building trust and preserving privacy in online platforms for the case of marital matchmaking technologies in a conservative culture. Being able to trust others and preserve privacy online is important. Even then, these concepts are nuanced and depend heavily on each person's circumstances. While my quantitative findings have indicated that TBYAAN is considered more trustworthy than other online platforms, how trust was built varied in my qualitative findings. The same applies to preserving privacy. It is also important to note that my findings have some limitations and cannot be generalized without further work that would help minimize these limitations.

6.6.1 Building Trust Online for Saudi Arabian Young Adults

While my study aimed to measure how authenticating users and their families and indicating family involvement helped build trust, my participants surprised me with other reasons that helped them build trust with others. One way participants built trust was through information sharing and gathering. Ensuring that information shared by participants aligned with both the individual's and traditional values increased trust. This might be related to participants hoping that transitioning offline would be smoother and minimize possible obstacles that may occur according to Bajnaid et. al. [23]. Some participants viewed the content shared by others as a better indicator of trust than if

the others had any form of authentication. This could be related to participants viewing TBYAAN as an enhanced traditional process that made it easier to reach and know about others. While this enhancement did not guarantee that everyone could be trusted online, some participants felt that indicating family involvement increased trust in others. Family involvement was considered a double-edged sword. It was considered an indicator of seriousness since those who involve their parents are less likely to be fooling around. At the same time, this questioned a participant's autonomy and whether their decisions and interactions with others represented them or their parents. Participants favored parents being involved but did not want to end up interacting with parents, even if it was indirectly. While the quantitative findings indicate that authentication did increase trust, it is clear that it was not the only factor. While authentication was an easier factor to evaluate and build trust, analyzing content over time helped deepen the trust-building process.

6.6.2 Levels of Privacy for Saudi Arabian Young Adults

When designing TBYAAN, we provided different levels of privacy for content generated by participants which interacts with family involvement. Participants were allowed to make an answer public or private and choose levels of familial involvement that may include access to private answers. This created a concern as participants wanted more control over their privacy. They wanted to have control over what was public and private for their families to create different privacy spaces between participants, participants with their own families, and participants with other families. This means participants would decide who exactly gets to view their content and interact with it to manage their different aspects of privacy [4]. Unfortunately, this is hard to control as participants may break these expectations by sharing content meant for them with their families without informing participants who shared it with them as their perception of privacy differs and believe it is normal since it occurs in the traditional marriage process. This creates a challenge where a participant's need to have control over their content conflicts with how other participants perceive how they consume and share that content.

6.6.3 Limitations

This study was limited by time and recruitment constraints. We also suffered from high dropout rates that are common in studies that are conducted over a long period. Specifically for my study, my attempt to preserve my participants' privacy by providing a guest login option backfired, making it hard for me to reach participants and encourage them to complete the study procedures. As a result, the number of final participants limited my quantitative analysis and made my findings less conclusive. While it might have been possible to run the study for a longer period to increase participation, there is no guarantee that participation will increase and that high dropout rates can be avoided. We would encourage follow-up studies that would be able to address dropout rates or focus on short-term studies that would have lower rates of in-completion.

6.6.4 Implications for Design

From these findings, we believe that it is crucial to take into account how privacy and trust are perceived differently in the Saudi Arabian context when it comes to marital matchmaking technologies. While parental involvement may be viewed as limiting autonomy, it is also viewed as a form of trust-building when it comes to seeking a spouse online. At the same time, parents being too involved may compromise young adults' privacy and break trust with other young adults who would consider their privacy to be at risk. These findings are similar to work done by Wisniewski et. al. [172, 171, 170], which found that enabling adolescents and training them to use technology safely and handle risky situations was more fruitful than choosing to prevent and protect adolescents from risky online situations. Similarly, it is important to balance Saudi Arabian parents' involvement in building trust with preserving their young adults' autonomy and privacy so that trust is not broken with other young adults. One way to achieve that is by providing parents with a separate profile that allows them to interact with their young adults and other young adults to fulfill their role in the marital matchmaking process. This could be through parents suggesting or shortlisting potential spouses through a vetting process or approving and rejecting potential spouses chosen by young adults. This would also mean that young adults get to decide what content is visible to parents, which provides another level of privacy

and also provides more information for young adults when evaluating a potential spouse. Involving parents while preserving young adults' autonomy and privacy is key to the success of marital matchmaking technologies in Saudi Arabia and other Muslim and Arab cultures.

6.7 Conclusion

Building trust and preserving privacy is a constant concern when utilizing marital matchmaking technologies in Saudi Arabia. I conducted a field trial study with 404 participants using TBYAAN for four weeks and explored how they build trust and preserve privacy in marital matchmaking technologies in Saudi Arabia. I found that participants viewed TBYAAN to be more trustworthy and private when compared to other private platforms that they use. They also believed that TBYAAN could be considered an enhancement of the traditional marriage process. They believed it may give young adults more autonomy and make parental involvement more balanced. Building trust in TBYAAN had many forms, varying from trusting TBYAAN itself and trusting participants on TBYAAN and how those can be transitive. While they felt they had more control over their privacy in TBYAAN, they understood that it relied heavily on how others on TBYAAN respected and maintained their privacy and how perceptions of privacy varied between participants. More work needs to be done to explore how users of matchmaking technologies evaluate trust and maintain privacy as this study has some limitations and is exploratory.

Chapter 7

Discussion, Conclusion and Future Work

7.1 Summary: what did we learn about Saudi Arabians utilizing marital matchmaking technologies

In Chapter 4, we explored the perceptions Saudi Arabian young adults had about utilizing technology to find their potential spouse. This led to the discovering that young adults considered it important to involve their parents in the process, even when they were open to non-traditional methods. In Chapter 5, we aimed to understand Saudi Arabian parents' perspective on marital matchmaking technologies as secondary stakeholders. The aim was to find a balanced understanding that involved parents while maintaining young adults' autonomy. Chapter 6 operationalizes previous findings into an online prototype and conducts a field trial study. Overall, my thesis' contributions are:

1. Qualitative insights about how Saudi Arabians perceived and utilized marital matchmaking technologies or appropriate other technologies to seek their spouses.
2. Quantitative insights identifying that parental involvement is preferred over parental control in the design of marital matchmaking technologies.

3. A quantitative summary of what information and features Saudi Arabians preferred in the design of marital matchmaking technologies.
4. Defining "family anonymity" as a design requirement for marital matchmaking technologies, which allows Saudi Arabians to manage different levels of privacy with other young adults and their families.
5. Qualitative insights about how Saudi Arabian parents perceived their role in marital matchmaking technologies and how they balance it with granting their young adults more autonomy.
6. A private marital matchmaking system (TBYAAN) that aims to foster trust between young adults through authentication and parental involvement.
7. Quantitative insights on how authentication and parental involvement affect trust between young adults in TBYAAN.
8. A comparison of perceptions of privacy and trust across familiar systems and TBYAAN.
9. Qualitative insights on how young adults manage their privacy and build trust in TBYAAN.

While Saudi Arabians utilize technology in many aspects of their life, they have remained hesitant to utilize technology to find their spouse. The hesitance comes from concerns that the Saudi Arabian community is not willing to accept the introduction of technology into marriage, which leads Saudi Arabians to craft alternative narratives to conceal that a marriage occurred through technology and paint it as a traditional marriage. Another reason for the hesitance is that technology lacks the trust and privacy measures that are built within the traditional marriage process. My prototype TBYAAN has attempted to design for these considerations and view technology as an enhancement to the traditional process rather than a replacement. It focused on measuring how to build trust and preserve privacy that is taken for granted in the traditional process. While TBYAAN had its limitations, it showed promise on how technology can enhance the traditional process by being able to build trust and preserve privacy when compared

to other platforms that participants were familiar with such as Absher (Government Website) and Twitter (Social Media).

These findings barely scratch the surface of understanding how trust is built and privacy is preserved in marital matchmaking technologies. Trust is a nuanced concept as some build it easily by being more open to new experiences while minimizing risks that might occur. On the other hand, limiting interactions with strangers and only engaging when enough trust is built is another strategy to minimize risks beforehand and not after the fact. When it comes to privacy, perceptions of it vary from people who are very protective of the smallest details in their lives to those who are only concerned about protecting the most crucial information about themselves. This is further complicated when different perceptions conflict and one side feels violated while the other does not even realize a violation of privacy has occurred. This conflict is further intensified when context collapse occurs and future marital prospects are affected as a result. An example of this is when potential spouses share intimate details to build trust and it reaches other parties. These other parties may utilize the information to prevent potential spouses from getting married or damage their reputation and honor. For these reasons, Saudi Arabians are very careful about how they build trust with others online and manage their privacy meticulously to preserve their reputation and honor.

7.2 Marital Matchmaking Technologies in Saudi Arabia: opportunities and challenges

Friendman coined the term value-sensitive design decades ago [61] and concerns about technology being biased are still relevant. For example, work done by Alsheikh et. al. [15] shows how the design of communication technologies is mostly informed by Western values, which alienates users from Arab and Muslim cultures. Another concern that arises is building trust online. Al-Saggaf conducted a study to understand how trust is evaluated in marital matchmaking sites [145]. My work extends Al-Saggaf's by taking into account women's perspective on trust in marital matchmaking sites. When it comes to privacy, my work extends work done by Rashidi [138] and Abokhodair [3] to be more focused on the topic of marital matchmaking. Also, my work has been influenced by work done by Zytka et. al. [175, 184, 181, 35, 186] that explored how to improve

impression management in online dating and minimize risks when transitioning offline. I hope my work can be extended to explore how to manage impressions and minimize risks in the Saudi Arabian context.

7.2.1 Technology as a mediator between parents and young adults for marriage

My work assumes that technology can ease tensions between parents and their young adults and empower young adults to have more agency when deciding who they will marry. This can be challenging if both parties are not on the same page. For example, parents might believe that the current status quo is suitable, which may lead to young adults surrendering as they find it hard to oppose their parents while still upholding *bir alwalidayn*. Even if parents are open to changing the status quo, they still hold the higher ground when it comes to power dynamics. This may lead young adults to keep their parents in the dark while they explore potential spouses and orchestrate a social scenario that would fit their parents' expectations. This still poses a challenge when other potential spouses might have different approaches to how they involve their parents and managing conflicting expectations becomes crucial to avoid context collapse [5], which might end a potential marriage prospect that both young adults find compatible[23]. While involving parents along the way would be an ideal situation that would minimize risks and maximize benefits, I understand that this is not always a viable option for all Saudi Arabians. This somewhat explains why participants in the field trial study with TBYAAN rated others who were phone authenticated with no family involvement as the highest when it came to trust. It does not mean that parental involvement is not viewed as a source of trust. It means that parental involvement is nuanced as participants also viewed parental involvement as trustworthy in certain situations such as parents being partially involved or when participants were authenticated through an in-person interview. These findings remain under-explored as they are merely perceptions and assumptions and have not been tested in a real-world setting where we track participants until they involve their parents to understand when and how it is appropriate to involve parents and manage different parental involvement expectations across participants. While technology can help parents and young adults manage tensions between them and other potential spouses and their parents, it is

understandable that technology has to remain vigilant to account for conflicting circumstances between potential spouses and their families.

7.2.2 Privacy and Trust Beyond Technology

While participants did view TBYAAN as relatively more private and trustworthy, they realize it is limited to what is possible through technology. For example, no matter how much trust they can build through technology, they still have to deal with cultural and religious expectations offline which are mediums to build trust socially [23, 145]. In addition, building trust online usually entails compromising some form of privacy as being completely private would prevent trust from flourishing. Managing what forms of privacy are worth compromising can be challenging as it is hard to measure how the compromise will translate to an offline setting. For example, young adults may share intimate details about themselves to foster trust and measure compatibility. As a result, a concern may arise when the information reaches parents or any other family members who might find it inappropriate, or if young adults break up and worry if that information may be used against them in the future. While this is an extreme example, it is meant to relay how severe these privacy concerns can become, even when the initial intention was for a good purpose. This means that preserving privacy and building trust should not be limited to what occurs in the virtual sphere. It should take into account how it would translate to the public sphere, especially for a very sensitive topic such as marriage in a conservative culture such as Saudi Arabia. TBYAAN being perceived as more private and trustworthy by participants means that challenges relating to privacy and trust will evolve and require careful consideration to not take these perceptions by participants for granted.

7.3 Methodological challenges and opportunities

My work utilized interviews, questionnaires, and a field trial study, which came with their unique challenges and opportunities. Interviews helped me explore the topic in more depth rather than focus on confirming my assumptions and biases. That given, I was faced with some challenges when conducting interviews. The first challenge I faced was conducting interviews with Saudi Arabian women who might find it uncomfortable

to conduct an interview with a man or worry about the consequences that may occur if their Saudi Arabian guardians did not approve of their participation. Keep in mind this was before male guardianship laws changed in Saudi Arabia. I believe this concern is still valid as male guardianship has a cultural aspect that is still in effect, even with the laws changing. For questionnaires, I struggled with recruiting a representative sample as my sampling was based on convenience and those who were interested. This is understood as the topic is sensitive and not all Saudi Arabians are open to expressing their opinions about it. I hope that TBYAAN as a research platform can change that and be able to reach a more representative sample of Saudi Arabians. Questionnaires are meant to generalize findings and cannot make generalizations without a representative sample. Questionnaires were still helpful for exploratory findings that might have been hard to obtain through interviews that highlighted the opinions of participants who were willing to conduct an interview. It helped broaden the exploratory findings of interviews. Lastly, the field trial suffered from high dropout rates, which could have been minimized by having more frequent and robust communication with participants. TBYAAN had no external notifications or internal messaging mechanism that would increase engagement by participants while also maintaining their privacy. I hope to improve notifications to allow for an external option (e.g. emails) and also provide a way to internally communicate with participants, which may just be through internal notifications. Even with these limitations, the field trial allowed me to converge on my previous findings and operationalize them so that they are somewhat more practical. This would complete the cycle of divergent findings leading to convergent findings and also encourage starting a new cycle to explore how these findings can have divergent outcomes. I believe the methods I used were appropriate for my research study and my challenges arose from my ability to execute them and the limiting circumstances that I attempted to mitigate to minimize their effect on my findings.

7.4 Limitations

While I attempted to understand how trust is built and privacy is preserved for Saudi Arabians utilizing marital matchmaking technologies, I realized that my findings were

limited to the available resources. I mostly was successful at recruiting participants who supported using marital matchmaking technologies in Saudi Arabia and struggled to recruit participants who were against them. This means that my participants are most likely biased toward highlighting an optimistic perspective on marital matchmaking technologies in Saudi Arabia. This is coupled with my studies relying on convenience sampling as it is hard to find participants willing to take part in and express their opinions transparently on a sensitive topic like marriage in Saudi Arabia, even when they are anonymous. In addition, my field trial study had some shortcomings when describing parental involvement as participants perceived it differently, which may have generated misleading or non-conclusive findings. Lastly, my studies were short in nature and a longitudinal study would have provided more rich findings for a topic that can change over time for the same participant. It would be interesting to see how a participant's views would change when they transition from a young adult seeking marriage to a parent helping their young adults seek marriage.

7.5 Conclusion

Technology can help Saudi Arabian young adults find a suitable potential spouse. I explored how Saudi Arabians perceived marital matchmaking technologies and built a technological prototype to understand how Saudi Arabians can build trust and preserve privacy while searching for potential spouses. My dissertation contributes insights into how trust is built and privacy maintained in a conservative, Arab, and Muslim context such as Saudi Arabia.

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