"It's our mutual responsibility to share": The Evolution of Account Sharing in Romantic Couples

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While most online accounts are designed assuming a single user, past work has found that romantic couples often share many accounts. Our study examines couples' account sharing behaviors as their relationships develop. We conducted 19 semi-structured interviews with people who are currently in romantic relationships to understand couples' account sharing behaviors over the lifecycle of their relationship. We find that account sharing behaviors progress through a relationship where major changes happen at the start of cohabitation, marriage, and occasional breakup. We also find that sharing behaviors and motivations are influenced by couples' relationship ecology, which consists of the dynamics between the couples and the social environment they live in. Based on these findings, we discuss implications for further study to support couples' sharing needs at different relationship stages and identify design opportunities for technology solutions to facilitate couples' sharing.

CCS Concepts: •Human-centered computing ~ Collaborative and social computing ~ Empirical studies in collaborative and social computing •Security and privacy ~ Human and societal aspects of security and privacy ~ Social aspects of security and privacy •Human-centered computing ~ Collaborative and social computing ~ Collaborative and social computing theory, concepts and paradigms ~ Computer supported cooperative work

KEYWORDS: Account Sharing; Romantic Relationships; Collaborations; Cybersecurity; Interviews

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1 INTRODUCTION

Romantic partnership is an important type of social relationship and aspect of human experience. For example, according to the US General Social Survey, in 2018 65% of adults 18 or over were in a partnered relationship [50]. A majority of digital platforms and systems, however, are designed for a single user, and there has been limited research into designing for the information sharing needs of romantic partners.

Sharing online accounts is one way people connect activities and share resources in social groups [43, 45, 51]. Individual account design does not account for this, leading to problems when accounts are shared. For example, personalized recommendations on Hulu or Amazon are based on a single user or a single device's actions.

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As another example, Spotify will cut and switch the music if two people access one account to listen to music at the same time. Account security design guidelines also only make provisions for individual account holders [27], making it hard for a group of people to use two-factor authentication.

In intimate relationships, as with other social groups, sharing accounts seems to be a way of managing shared resource and information needs and a workaround for accomplishing relationship level goals [43]. However, while this behavior is fairly commonplace, relatively little work has been done to understand romantic couples' account sharing behaviors as distinct from other intimate groups. Examining account sharing behavior more closely across the lifecycle of a relationship may provide a window into the information needs of romantic partners and inform technology design for better supporting the needs of romantic relationship partners.

Previous studies on interactions among couples indicate that romantic partners need to connect in more substantive ways beyond normal intimate interactions [8, 10, 32, 33, 40, 41, 42, 52]. Account sharing may help couples fulfill such needs. Park et al. conducted an empirical survey study [45] on romantic couples to examine different sharing behaviors at different stages of relationships, and found that partners share accounts to convey trust and for convenience. However, the survey was only able to capture limited information about exactly how and why people shared accounts with their partners. For example, it is not clear what people were doing with their accounts when sharing or how sharing related to different relationship statuses.

To fully understand the landscape of sharing behaviors among romantic couples, we need a more contextualized view on what people are doing with their shared accounts and their higher-level goals. A holistic understanding of account sharing motivations, behaviors, and challenges can help in designing technology that better supports couples as their relationship develops. In addition, research on the security and password management behaviors of couples can help improve account security design to take into account social motivations for joint access.

In this paper, we focus on account sharing in romantic relationships as a means to understand romantic partner information sharing and interaction needs more broadly. We define *account sharing in a romantic relationship* as any situation in which relationship partners use a single digital account, either at the same time or taking turns. An example is one partner creating an individual account and providing the other partner access by sharing account credentials such as the password and login. We pose the following research questions to understand account sharing in romantic relationships:

RQ1: How do account sharing behaviors evolve over the course of a relationship?
RQ2: What are the motivations for couples to start sharing accounts?
RQ3: What practices do romantic partners use to share accounts?

To address these questions, we interviewed 19 people engaged in a romantic relationship for at least seven months and sharing more than one account with their partner. We used a timeline mapping exercise to walk through our participants' account sharing histories and used this map as a reference throughout the interviews to discuss their motivations and strategies for sharing different accounts. We found that different relationship periods are associated with consistent changes in sharing patterns that we can inform design for people at different relationship statuses. We also found couples choose different sharing mechanisms to control information access and maintain privacy in the shared accounts. The major contributions of our work are as follows:

1) we observe progressive changes in sharing motivations and sharing behaviors during different relationship periods marked by three major relationship events - cohabitation, marriage, and occasional breakups, which offer a new lens for technology providers and designers to understand couples' sharing needs;

2) we introduce the concept of an evolving relationship ecology inside romantic relationships influencing couples' sharing behaviors over time. The relationship ecology includes two levels: the dynamics between members of a couple such as the changes in personal privacy perception, and the social context in which they live which includes family and cultural norms;

3) we describe how password and account security behaviors are influenced by couples' perceptions of privacy and relationship boundaries, which could inform the design of the security features for couples' sharing.

2 RELATED WORK

Our work builds on previous studies about account sharing in romantic and non-romantic contexts [7, 11, 37, 43, 45, 49, 51, 55], and offers a more detailed and holistic picture of account sharing in romantic couples with a focus on relationship evolution. We discuss the related work in more detail below.

2.1 Account and device sharing in intimate relationships

Early work [11, 43, 55] on device and account sharing treats closed social groups as study objects to understand how individuals share physical resources such as devices and furniture, and digital resources such as accounts. They identified convenience as a major motivation for sharing, and level of trust as a major influencer that affects sharing behaviors. Hue et al. [55] conducted group interviews and a supplementary diary study with nine social groups where six out of nine were intimate groups such as family, and close friends to understand groups' security decisions about their shared digital and physical resources. They found borrowing, mutual use, and maintaining digital connections are the major reasons for these groups to share their resources. However, this study focused on resource sharing but not account sharing.

In more intimate groups such as households, Matthews et al. conducted an interview and diary study to examine how and why households share devices and accounts [43]. Their study objects involved a shared physical setting and an extended family unit which may include a couple. It also found two cross-cutting themes, namely trust among sharees and convenience, highly influenced whether, why, and how people shared devices and accounts. These studies focused on household and group sharing and did not distinguish what aspects of sharing were unique to romantic couples versus families or other close social groups as a whole. In addition, they presented their results without detangling the role of the device from account. In contrast, we focus on the couple as a unit rather than the household and account sharing specifically, meaning we can examine how account sharing unfolds in a relationship, and contextualize the meaning of convenience and trust in the romantic setting.

There were some studies distinguishing romantic couples' devices and account sharing behaviors from other social groups [36, 45]. Jacobs et al. [36] studied device sharing behaviors among the couples. They conducted interviews and diary studies where they found both intentional and unintentional device sharing and identified a difference in public content and private content sharing in the shared accounts. Park et al. [45] specifically focused on account sharing in romantic relationships. They conducted a survey study on the motivations behind

sharing accounts, the types of accounts that are shared, and related account security behaviors. However, both studies lacked details about the contexts of account sharing and they did not examine changes in romantic relationships over time and the participants' behavioral changes in account sharing as relationship progress. An understanding of the contexts of sharing and the lifecycle of sharing will help technology providers develop better services that stay connected with the users at different stages of their relationships. In our study, we aim to understand sharing in the progress of romantic relationships while considering time and other factors that affect the relationships. We also develop a dynamic understanding of how, what, and why couples share accounts in romantic relationships.

2.2 Password sharing for shared accounts

Several studies suggest password sharing is a common practice among co-workers, households, and people in close relationships [37, 49, 51]. In the workspace context, Bartsch and Sasse [4] found sharing passwords to access documents helped colleagues to circumvent long wait times for official authorization. Inglesant and Sasse found password sharing in the workplace [35] was the de facto method among their participants of controlling access to password-protected shared files. In a household context, Matthews found family created and shared common passwords known by the family members to easily access mutually owned accounts. Among romantic couples, Kaye conducted a diary study in 2011 to understand password use in the context of everyday life [37]. It showed self-reported password sharing strategies among partners and spouses, family, and friends, etc. The study found that married couples are more likely to share passwords compared to unmarried couples. It also discovered that many couples can memorize or guess the other's passwords. Although previous studies have identified different password sharing strategies, it is not clear how couples choose their password sharing methods. Our study expands the understanding of couples' rationales behind using different sharing methods.

2.3 Factors that affect sharing behaviors

Previous studies on the evolution of relationships map out romantic relationships change over time, and these changes could influence account sharing behavior. For example, in *Stages of Development in Intimate Relationships* [20], David identified four stages where couples normally will experience the progress of relationships, from a new relationship (normally less than 6 months) to relationship harmony. Clark and Mills [13, 14, 15] found that the level of interdependence and trust among relationship partners is enhanced over time. As trust and interdependence increase, people move from viewing their relationship as an exchange, where one person expects to receive a comparable benefit when offering help to the other, to communal, where self and other are viewed as one entity and one partner offers help or resources to their partner with no strings attached. Such changes might lead to a difference in how couples share their accounts, as well as the specific tasks couples, complete using their shared accounts, which we have found in our study.

As relationships evolve, couples' sharing behaviors are subject to change over time. The level of trust is a common factor that affects people's sharing behaviors as identified in previous studies on social group sharing [48]. In a study of device and account sharing in households [43], researchers analyzed the sharing stories and found more than half of the stories described trust in sharees significantly influence whether and how they share accounts and devices. In the context of romantic relationships, Park et al. [45] found married and cohabitating couples share more accounts compared to unmarried couples. However, the study did not find significant differences

in terms of the numbers of accounts being shared between the cohabited couples and the married couples.

Our work extends the understanding of common sharing influences such as trust and digs deeper into the psychological and behavioral changes of sharing with consideration of relationship development over time. We also identify differences among physically separated, cohabitating, and married couples in terms of how and what accounts couples are sharing. Our goal is to understand how relationship development may account for variations in account sharing behaviors over time, so technology design can better support users considering their various sharing and security needs in different romantic statuses.

3 METHOD

We conducted a series of IRB-approved semi-structured interviews to obtain a detailed understanding of why and how accounts were shared and used in romantic relationships. We asked people to self-report on their account sharing behaviors as they unfolded within their relationship, and probed for details about the relationship itself and other aspects of account sharing. We conducted 19 in-person interviews between December 2019 and January 2020 with individuals in a romantic relationship for at least seven months to examine account sharing attitudes and behaviors in romantic relationships.

3.1 Interview protocol

We conducted 19 one-hour semi-structured interviews with participants discussing their relationship, account sharing behaviors with their partner, and general security practices. Our goal in the interviews was to gather details about the accounts that were shared between the partners, including when and how the account sharing began, how the account was used, and any challenges associated with shared use. Interviews were audio-recorded for analysis.

Our interviews consisted of three parts. First, we asked our participants about their current relationship status, how they normally spend time with their partners, and the accounts they shared with their partner. We also conducted a timeline mapping exercise where participants drew a timeline representing the length of their relationship and mapped the key milestones and the start time of account sharing for each account on the timeline. *Figure 1* showed one of the mapping results.

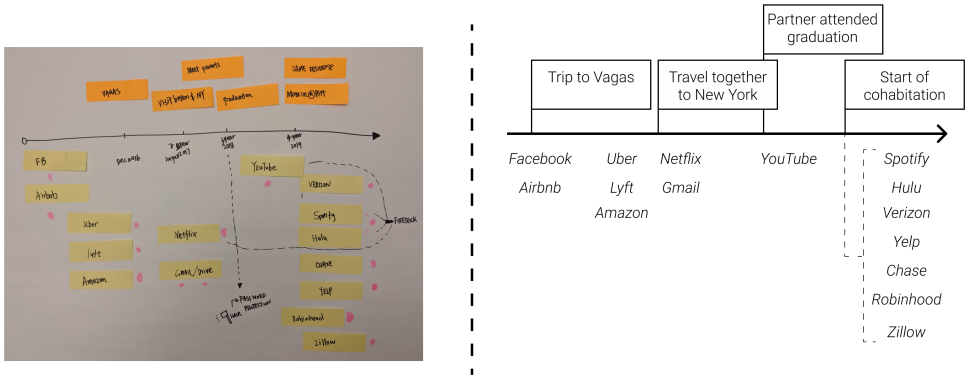

Figure 1: A picture of the original mapping results(left), and the digitized version(right) transcribed from the original file. In the digitized version, black dotted lines represent major relationship events (i.e. start of cohabitation) that have a direct influence on participants' sharing behaviors.

If any milestones on the timeline have a direct impact on the participant's motivations to start sharing a certain account, a dotted line is drawn to connect the account with the milestone.

Second, we discussed why and how participants shared the accounts listed in the timeline created in the first part of the interview. We further explored the key events that affected sharing for each account. After going over all the accounts, we discussed the benefits, challenges, and concerns of sharing. At the end of the second part of the interview, we ran another mapping exercise, where participants ranked the likelihood of sharing accounts using the cards (which specified the account categories) we created. Participants were given 27 account categories developed based on the 17 account categories used by Park et al. [45] We also included an "other" option, where participants could point out any accounts that were not included in the 27 types.

Third, we asked our participants about their password management behaviors and security practices for their shared accounts.

3.2 Recruitment and participants

We interviewed participants across two rounds of interviews. The first round of 10 interviews was conducted in December 2019. Participants were recruited from the Pittsburgh area through physical flyers and online Craigslist postings. We conducted some preliminary analysis on the first set of 10 interviews to inform updates in our protocol and recruiting strategy. The second round of interviews was conducted in January 2020. Participants from the local community were again recruited via Craigslist and the university's participant pool website accessible to the local community. Participants were required to be 1) aged 18 or more, 2) currently in a relationship, and 3) sharing one or more digital accounts with their partners. Our participants were English speakers residing in the U.S. Selected participants were compensated $15.

We also carefully chose our participants based on their gender, age, ethnicity, and education level. Although our results may not be generalizable to the entire population, we did not want to limit our scope. The 19 interview participants included 11 women, and 8 men across the age spectrum. Of these 19 participants, two were in a relationship with each other but they were interviewed separately. A majority of participants (n = 12, 63.1%) were cohabitating in the same residence with their partners, while three lived in different residences less than 25 miles apart, and four lived in different residences more than 25 miles apart; 12 were married, and 7 were in a serious relationship. Relationship lengths varied, from 7 months to over 10 years. Our sample also included a range of different educational levels, from high school to doctorate, and nationalities (see Appendix 1 for more details).

Participants in our sample shared a range of account types: entertainment (n = 19, 100%), shopping (n = 14, 73.7%), utility (n = 8, 42.1%), transportation (n = 8, 42.1%), travel (n = 8, 42.1%), and finance and investment (n = 8, 42.1%) were most commonly shared. Other shared account types included chat and social, work collaboration, and emails, etc. Table 1 summarizes our participants based on the duration of their relationship and their living situation, as well as the number of accounts they reported sharing.

3.3 Analysis

To analyze the interview data, we created transcripts for each interview based on the audio recordings. One researcher went through all 19 transcripts to ensure consistency in the analysis and identified sharing stories within the transcript, which comprised our primary unit of analysis.

Table 1: A summary of our participants based on their different living situations, relationship lengths, and the number of accounts they are sharing with their partners

	Relationship lengths			
Living situation	7 -11 months	1 – 5 years	6 – 10 years	11 – 20 years
Cohabiting		P5 (14 accounts) P7 (5 accounts) P8 (8 accounts) P11 (8 accounts) P12 (9 accounts) P14 (3 accounts) P17 (9 accounts) P18 (10 accounts)	P3 (10 accounts) P4 (11 accounts) P13 (8 accounts) P15 (10 accounts)	
Different Residence	P2 (7 accounts) P16 (5 accounts)	P1 (5 accounts) P19 (7 accounts)	P6 (8 accounts)	P9 (7 accounts) P10 (8 accounts)

A sharing story was any time the participant described sharing an account with his or her partner. We also conducted an analysis on the sharing stories contrasting them in terms of two key attributes based on our original research questions:

Evolution in sharing as relationships develop (RQ1, RQ2). We used the responses from the timeline mapping exercise to contrast sharing stories at different points in the relationship history. We also compared account sharing behaviors between relationships of different duration to identify the differences in the sharing behaviors over time. We identified in a bottom-up way from the stories, unique sharing motivations, and behaviors associated with different relationship periods, which are marked by three major relationship events - cohabitation, engagement or marriage, and break-ups.

We identified characteristics of romantic relationships that were influencing the couples' sharing behaviors overtime. These factors result from either couples' interactions or the social environment they live in. We summarized them as couples' relationship ecology, a concept we developed based on the social ecology theory [9].

Sharing strategies to manage personal digital territories (RQ3). We used categories from the workplace cybersecurity study [51] and applied those categories to the sharing stories to help us classify different sharing methods from our participants. Within those examples, we looked for variation and special behaviors uniquely related to the relationship context. We summarized different sharing methods based on different perceptions of privacy and boundaries, including sharing the account credentials, sharing one account but having different log-ins, and so on.

4 RESULTS

We first discuss how account sharing evolves over the course of relationships (**RQ1**) and why account sharing happens at different periods of the relationships (**RQ2**). We next present details of how couples' dynamics and their social contexts influence their sharing behaviors, including the different sharing strategies they choose (**RQ3**).

4.1 Progressive changes in couples' account sharing as relationships evolve

We were interested in how the dynamics of account sharing might change over the course of a romantic relationship. Our analysis of the 19 mapping results showed that people in our study

progressively share their account and information with their partners: they started out sharing a few simple accounts such as entertainment accounts, and as relationships developed, they were willing to share more private accounts, like a bank account. We discovered that changes in sharing behavior over time were associated with different periods of a relationship. The different relationship periods influence the reasons for couples to share certain accounts.

From our participants' stories, we summarized three major relationship events, cohabitation, engagement or marriage, and occasional breakups, that marked different relationship periods. Our mapping exercise showed our participants' perceptions of sharing change as relationships develop, and therefore, lead to a difference in the type of account they were sharing and the tasks they complete in the shared accounts. Although Park's survey study [45] found cohabitation and marriage might be conflated reasons for a couple's sharing behaviors, our interview results reveal different sharing behaviors uniquely associated with cohabitation and marriage. In addition, we extend Park's taxonomy of reasons for sharing, identifying more detailed and different sharing motivations and associating account sharing motivations with distinct relationship stages (*Figure 2*).

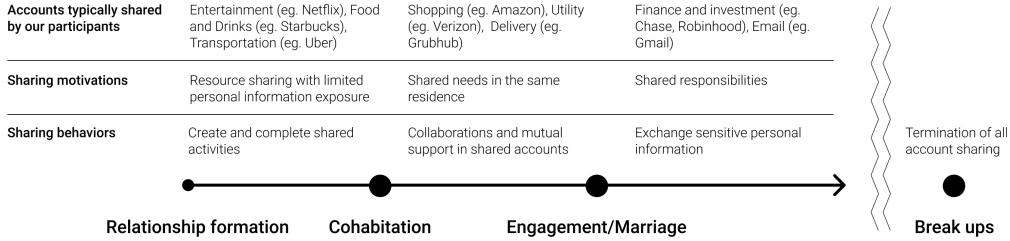

Figure 2: Progressive changes in account sharing across major relationship events. We observed changes in the kind of accounts our study participants are sharing and the evolving sharing motivations and sharing behaviors as their relationships developed.

The figure (*Figure 3*) below shows differences in sharing behaviors at different relationship periods from two of our participants each in couples at different stages. They both started out sharing some accounts with limited risks of exposing personal information such as entertainment accounts (i.e. iQiyi Video and Tencent Video, Netflix, and Hulu). After moving to the same residence, P8 started sharing accounts that both of them needed to carry out household-related tasks, such as utility and delivery services (i.e. AT&T and Grubhub). After engagement and marriage, P10 felt more comfortable sharing more private accounts such as email or personal data cloud (i.e. Baidu Cloud) and decided to manage shared finances with her partner through a joint bank account. In the following session, we discussed how sharing behaviors and sharing motivations varied across different relationship periods in more details.

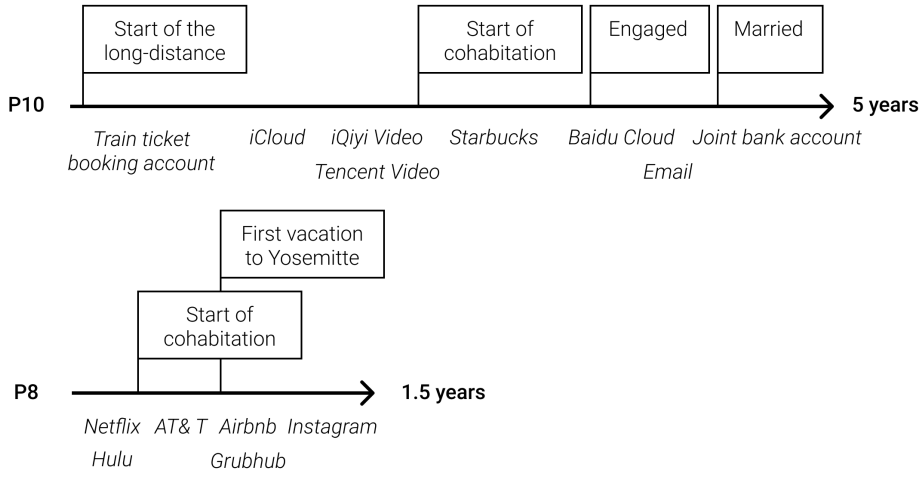

Figure 3: An example of timeline mapping results from P8 and P10, which showed a difference in the type of account they shared with their partner at different periods of their relationship.

4.1.1 Before cohabitation

Before moving into the same residence, we found participants normally started sharing accounts to save costs from having separate accounts or accumulate rewards in one shared account with lower risks of exposing too much personal information.

Sharing motivations: resource sharing with limited personal information exposure

We found our participants mostly started to share accounts that have subscription services or reward systems such as entertainment accounts, food and drinks accounts, and transportation accounts at this stage. Such sharing allowed them to share resources. For example, 10 out of 19 (52.6%) participants first started sharing entertainment accounts such as Netflix, Hulu, or Spotify with their partner. These sharing behaviors normally persist after the account owner gives access to the sharee. As P7 described:

> "*I didn't have Netflix at that time and I wanted to watch some shows, so I just asked her to share with me… We have been sharing it since then.*" (P7)

In the card sorting exercise, all participants (100%) identified entertainment accounts as one of the categories they were most likely to share with their partner because sharing these accounts were perceived to have the least risks of exposing personal information. As P8 put it *"these accounts are not very concerning (to share), the information is not very personal."* (P8)

Participants also decided to share one account to accumulate rewards in exchange for discounts or other benefits. These accounts include transportation accounts such as Greyhound, Uber, and Lyft, and food and drink accounts such as Starbucks and Dunkin. Greyhound was one of the first accounts P1 started to share with her partner because they both started to use Greyhound frequently. They shared the account to accumulate rewards for free trips:

> "*They have a reward system. The more money you spend, the more free stuff you can get like free bus tickets or something like that, so I started asking her if we can share that account…*

When I take a bus to see her, I can give her rewards, and when she comes to see me, she can use those rewards when she takes her trip to see me." (P1)

These sharing carried low risks of exposing private information but still created benefits for the partners at the early stage of a relationship. Our examples provided more details to support Jacobs' study [36], which found the sharing of public content including media content as the most frequently shared information among the couples.

Sharing behaviors: creating shared activities

Early on in a relationship, we found participants created shared activities in their shared accounts, which the couples completed together. For example, in shared entertainment accounts like Netflix or Hulu, participants or their partner deliberately found shows for the couple to watch together. P16 and her partner were both working in the medical field. Her partner introduced her to Scrubs, a TV show about medical students on their shared Hulu that they watched together regularly:

"*We used it to watch Scrubs together. Sometimes, I fell asleep during the show, so I would watch it on my own to catch up before we watch the next episode together."* (P16)

P1 told us a similar story about their shared Instagram. She and her partner opened a Finsta account, where they documented their lives together and shared with their friends and family members:

"It's like a funny account. We usually post things like memes that will make our friends laugh." (P1)

Both sharing behaviors described above helped P1 and P16 have more joint activities with their partner in the early relationship stage.

4.1.2 Start of cohabitation

When comparing different timeline mapping results, we found living in the same residence led to couples sharing services both of them needed in their shared living space. Examples included utility accounts such as internet services and shopping accounts for purchasing household appliances.

Sharing motivations: shared needs in the same residence

We found participants Out of our 12 cohabitating couples, all of them (100%) started to share at least one entertainment account after cohabitating in the same residence. When P5 started to live in the same residence with her partner, they purchased a TV where they consolidated the entertainment accounts they both needed to access into one place. This led them to start sharing Spotify and Hulu accounts.

Seven out of twelve cohabitating participants (58.3 %) started to share utility accounts such as Verizon and Xfinity with their partner after they started living in the same residence:

"*Verizon is our home internet, so it doesn't make sense to have two accounts in the same home."* (P10)

Participants also started to share shopping accounts to purchase household appliances for their shared needs. For example, P14's partner started to share his Amazon account with her when they started to live together in order to purchase appliances they would both use:

> "O*nce we started staying together, there were a lot of things we needed on and off. We needed some home appliances, which we needed quite often… So he set up passwords and his account on my laptop… so we won't miss out on stuff."* (P14)

Our examples showed cohabitation led to many new account sharing activities and helped couples manage their shared needs in the same residence.

Sharing behaviors: collaborations and mutual support in shared accounts

As couples start to spend more time together, especially among cohabiting couples, they have more shared tasks such as purchasing household items, managing shared utilities and the internet, and so on. We found participants collaborated with their partners on these tasks. Take purchasing household appliances, for example, P12 worked with his partner to complete purchases. P12's wife had more time flexibility because she didn't have a full-time job, so when they started sharing an Amazon account to purchase stuff for their new house, they took on different roles in this shared Amazon account:

> "*She stayed at home most of the time, so she would look at what to buy and put them into the shopping cart… I would make the final payment."* (P12)

As couples spent more time together in the same place, they were more likely to share more responsibilities and took on different roles in their relationship. Dainton and Aylor [17] found that couples who have more face-to-face interactions normally have higher levels of trust and are more willing to share tasks with their partners compared to couples who have very little face-to-face interaction, such as in long-distance relationships. The tendency to share tasks affected *how* couples use shared accounts such that different people divide the work and take different portions of shared tasks when sharing accounts. A study [53] of cohabiting and married couples found the division of labor was a common practice in romantic relationships as couples had more information about each other when they started living together. We observed shared accounts playing a special role in supporting division of labor among the cohabiting couples in our study.

We also found that participants were more comfortable asking for help from their partner through sharing an account or one person voluntarily offering to help the other after identifying a need through their shared account. In the case of asking for help, the person who initiated the conversation trusts his or her partner and decides to let the partner help them handle their work or personal events. For example, P5 trusted her partner and asked for his help in an emergency situation, which led to sharing emails. This sharing behavior persisted and became a continuous sharing routine in P5's life:

> "*I need to get on a flight, but I really need to submit a paper, so I told him (the credentials to the email address) because it (the paper) was in my drive, so he can download it and submit it… Neither of us are really private people, so then it naturally happened that we helped each other to respond to emails."* (P5)

In case of giving help, participants sometimes voluntarily offered to help their partner complete tasks in their shared accounts. For example, P10 knew her partner was really busy during work, so she offered to help him using his shared email to book flights for travel, which helped relieve pressure on her partner:

"*I started to use his email because I used the email to buy the airline tickets for him. To check the updates from the airline, I asked him to get access to this email… He has a really busy job, and I think I have more free time to do this, so I helped him with this."* (P10)

4.1.3 Engagement or marriage

Engagement or marriage was associated with our participants sharing more personal accounts that contained sensitive and identifiable information such as visa portals, bank accounts, and insurance accounts. Participants also described an increase in their shared responsibilities and being more open to each other as a family. In Park's survey study [45], the results suggested that marriage and cohabitation may be confounding factors that influence couples' sharing behaviors. Their results showed that the sharing behaviors after cohabitation and marriage may not be significantly different. Our interviews, in contrast, reveal sharing motivations and behaviors uniquely associated with engagement and marriage.

Sharing motivations: shared responsibilities

We found that married couples more often shared finance-related and more personal accounts than cohabitating couples. P9 explained why marriage motivated her to consider starting a joint bank with her partner. "It's our mutual responsibilities to share, and I don't think we should hide from each other." The sense of increased mutual responsibilities in a relationship is one result of getting married. Both P4 and P10 also described marriage as a major milestone to start sharing financial responsibilities, in part because it was a tradition in Chinese culture:

"*After we get married, we think we have become a family. It's a traditional idea in China to share a bank account to show that the couple is bundled together.* " (P10)

As relationships developed, normally after marriage, we found that some participants decided to open a joint bank account where they would both deposit and have digital access to funds. The money in such an account was viewed as joint funds, and the couples used the account for making co-investments and paying for utilities or loans together:

"*I initiated the idea to have a joint PNC Bank account because we were planning on getting married and getting a new apartment… It made sense to combine finances to make life less stressful.*" (P11)

Such joint financial accounts create shared responsibilities for the couples to maintain and plan their finances together. Similar to sharing financial responsibilities, couples may share other household responsibilities through sharing accounts such as managing a co-owned e-Car through shared accounts (P4), sharing a Zillow account to find a house they plan to purchase together (P5), and so on.

Sharing behaviors: exchange sensitive personal information

At this stage, couples opened more of their personal spaces to each other. As a result, we found participants were more willing to share more personal information with their partner in the shared account to ask for help. For example, after their engagement, P4's partner gave P4 access to her 401K retirement plan to let him help her manage the plan:

"*We have got engaged at that point. Because she got engaged, she preferred not to handle the stress of the money. Once we have made that step in our relationship, she was willing to ask for my help for these more sensitive topics.*" (P4)

P9 shared with us a similar story that marriage made her feel more comfortable sharing more private information with her partner, which included her personal visa application account:

> "*We were both applying for a visa, so I shared my accounts with him to ask him to check whether my information was correct. For his account, he let me fill out all the information for him.*" (P9)

According to P9, this kind of information sharing will not happen before their marriage: "*I would have concerns to share my Visa with him (before marriage)… I won't share accounts with serious information about myself with him before marriage.*" Marriage, as a key relationship event, in this case, led to a change in P9's perceptions on personal information. This change made her feel more comfortable sharing more personal information with her partner.

4.1.4 Break-ups

Relationship termination and the end of account sharing

Break-ups dramatically affected account sharing. At this stage, we found participants or their partner quickly terminated sharing activities to build up boundaries around their private information. Three of our participants experienced break-ups with their current partners. Two of them immediately terminated sharing or lost access to shared accounts. When P17 broke up with her partner, she decided not to use any of the shared accounts she previously had access to:

> "*I was the one who cut everything off.*" (P17)

P19 broke up once with her partner and then got back together. After the first break up, she immediately found she could no longer access any of the shared accounts that were owned by her partner:

> "*I immediately lost all access to our shared accounts.*" (P19)

P19 were using her partner's Netflix, YouTube, and Amazon before the breakup. This sudden termination did cause trouble to her that she had to start using her mother's Amazon. In break-up moments like this, account owners in our study had terminated account access for their ex-partners. If they forget to terminate sharing, their accounts would be in danger of data leakage. This issue shares similarities to employee turnover as reported in past work about workplace account sharing [51].

4.2 Couples' relationship ecologies develop and influence account sharing

As relationships progress, a couple's relationship ecology (*Figure 4*) evolved and influenced their account sharing. We define a couple's relationship ecology as the dynamics between partners and their social contexts. This concept is drawn from social ecology theory, a framework developed by Bronfenbrenner, which concerns the evolving and complex relationships between humans and the social environment [9]. One of the assumptions social ecology theory makes is that social relationships among people are changing and the external influences such as social contexts and cultural contexts shape these relationships. The theory also proposes a multi-level framework to study social relationships, where the micro level concerns individuals and small groups, the meso level includes relations among family and social life, and the macro level considers cultures or ideology. Romantic relationships are one of the social relationships that can be studied through social ecology theory.

In romantic sharing, we found factors at different levels shape couples' sharing. At the couple level, couples' dynamics influenced the shape of personal digital territories. *Personal digital territory* is defined as a person's own space that stores their personal information online such as bank information, chat history, and so on. For example, P10 chose to share certain information such as preferences for TV shows with her partner, but not to share some information like purchasing history or personal finance information. We found couples reveal personal information to each other through sharing accounts, changing the shape of their personal territories. Gradually, their shared information forms the information space that both members of a couple can access. At a higher level, factors outside the couple's relationship such as cultural influences or family norms have an impact on the couple's relationships, and therefore, influence their sharing behaviors.

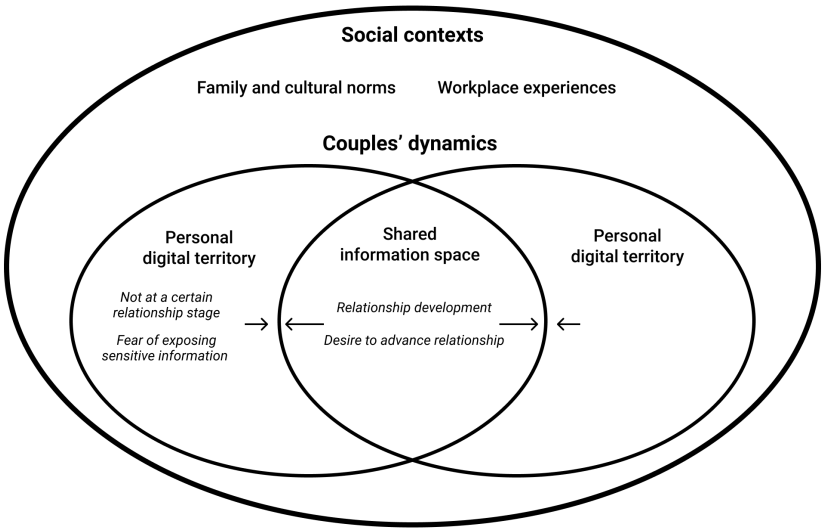

Figure 4: Figure illustrates a two-level relationship ecology of a couple, which evolves and changes a couple's sharing behaviors over time. At the couple level, the desire to advance relationships opens more personal digital territory and expands the shared information space, while the fear of exposing personal information and concerns with the stage of relationships create opposite forces. At the social environment level, social contexts such as family and cultural norms are also influencing couples' sharing.

4.2.1 Couples' dynamics influence the shape of personal digital territories.

Hanamsagar et al. [31] estimated people own an average of 80 online accounts in 2018. We found that when couples entered a relationship and started sharing accounts, they had to navigate which of their numerous accounts to share, and which to protect. Our participants tended to be more open in sharing accounts later in their relationships, as they granted their partners access to some of their personal spaces or opened shared accounts together. As relationships developed, couples blurred the boundaries of their personal territories as they became more open to each other. The shape of the territories, therefore, evolved over time.

Certain sharing behaviors reflect couples' increased knowledge of each other resulting from the openness. Nevertheless, in some cases, couples still had boundaries. They were more protective when sharing accounts, and express the need to protect personal information, or choose not to share certain accounts.

The difference between open and protective sharing leads to two themes that are in tension with each other in the evolving relationship: *shared information from increased transparency*, and *protection over personal privacy*. This tension was also discovered by Baxter, where she found two third of the couples in her study experience the tension of communicating more openly with their partner while keeping certain things closed from sharing [5]. In our study, to manage such tension and the evolving dynamics in the relationship, participants choose different password sharing strategies to navigate their personal digital territories (*password sharing to manage personal digital territories*).

Shared information from increased transparency

Throughout a relationship, we found participants gradually shared more information with their partner. The couples increased transparency to each other, which created more shared information they both knew. We identified two reasons that may lead to this phenomenon. First, the development of relationships could make the participants feel more comfortable to share certain information when they reach a certain relationship stage. P16 reflected on her increased openness to her partner in information sharing:

> "*I am more willing to share more about my personal work and lives with him., I thought of him as more of a support person in my life rather than just an accessory boyfriend.*" (P16)

The increased information transparency helped P16 find out she had more experiences in the medical field compared to her partner. She then decided to share a Dropbox account with him where she put useful PowerPoints and research articles to help him improve his medical knowledge. When relationships hitted certain milestones like key relationship events identified in 4.1, participants also became more transparent and shared more information with their partner. For example, P9 and P10 both decided to start a joint bank account only after they get married, which they would have concerns to share before the marriage.

Second, participants expressed a desire to advance their relationship through sharing information and accounts. For example, P14 decided to share more utilities and financial accounts like Venmo and Verizon with her partner because she wished to get her partner more involved in the relationship as they planned to get married. P17's partner used to be against the idea of sharing accounts or too much personal information, so P17 decided to slowly penetrate the idea to make them be more opened to share information through sharing an Instagram:

> "*I consciously started to share this with my partner... He likes beer and I like drawing, so I thought I could draw his beer can collection. I talked to him to start this collaboration in a shared Instagram account.*" (P17)

This intentional sharing made P17 and her partner felt closer to each other. that P17 told us *"We both found it super fun… now he is the one who constantly updates the posts"*.

The examples above showed couples' attempts to proactively open up some parts of their personal territories to create shared information space, which helped them enhance and advance their relationship.

Protection over personal privacy

During the exercise mapping the likelihood of sharing different types of accounts, nearly all of our participants mentioned certain accounts that they were not comfortable with or willing to share with their partners. We identified two scenarios they were most concerned about: *fear of exposing*

personal sensitive information and *not comfortable with sharing at a certain relationship stage.* Jacobs' study [36] also identified several reasons that couples explicitly choose not share certain information. Our results support some of their findings and add more details about the relationship influences that make couples reluctant to share.

First, some participants expressed concerns about exposing too much personal information to their partners, such as chat history on social media or personal photos. P10 told us her concern about sharing iCloud with her partner because she could see her partner's photos in the shared iCloud, which made her worried that her private photos or screenshots of private conversations might get exposed to her partner and cause potential conflicts:

> "*His photos will appear on my phone, and I can't control myself not to see his photos. Sometimes, I see some photos or screenshots of chat records that make me unhappy. So, I think it's better not to share the iCloud account.*" (P10)

P9 expressed a similar concern that she was afraid that her private conversations with her friends would get exposed someday since her partner knew the account credentials to her social media account. She originally wasn't concerned when sharing WeChat, the most popular messaging and social media app in China, with her partner, but became more concerned about potential information leakage as she had more conversations with her friends about her relationship, which she didn't want to disclose to her partner:

> "*(After our marriage)… Sometimes, I talked with my friends about my husband, and our conflicts. I don't want my husband to know this, so I am considering to change my password for WeChat.*" (P9)

In this example, P9 was thinking about creating a new boundary around her privacy after the marriage. Her concerns echoed with the Park's findings [45], which found that many participants express the need to hide certain information from their partner when sharing accounts.

Second, some of our participants were uncomfortable sharing certain accounts because they were not yet at a certain relationship stage. Four of our participants who were not yet married expressed unwillingness to share their more personal accounts like finance and investment accounts. P16 who had only been in their current relationship for 7 months felt it would be weird to share financial information without being married or more formally committed:

> "*It will be weird to share more personal accounts like finance and investment. It will get messy because we are not in a super committed relationship, like fiancé, or married.*" (P16)

These stage specific expectations around certain accounts underline the power of social expectations regarding normative sharing behaviors.

Password sharing to manage personal digital territories

We found couples used different account sharing strategies to negotiate personal territories versus shared space and retain privacy for certain information. Our participants described three major strategies that varied in the amount of privacy protection given to the shared accounts, from the most protective to the least protective: 1) mediated access, 2) unique logins, and 3) shared logins.

1) Mediated access to control personal information. In this scenario, account owners gave their partners access to shared accounts without sharing login credentials. This kind of account sharing ensured that only one individual had control over the passwords and log-in information,

and the sharee needed to go through the account owner to access the shared account. It also enabled the account owners to have more control over their personal privacy and account uses.

We found the account owner was normally the one who initiated the idea to not give the log-in information to the sharee. We identified two ways of managing passwords based on the couple's different living styles. First, for couples who were cohabiting in the same place, account owners could help set up the shared accounts on the other's device in person. Second, for couples who were physically separated, we found account owners use screen-sharing to monitor the other's device to log in the shared accounts, which was a novel account sharing behavior we have found out through this research. Account owners could remotely use screen sharing software to access the sharee's device and input the log-in information for the shared accounts. P19's partner as the account owner initiated the idea to have only one person controlling the account credentials and use screen sharing software to change the passwords for her as because her partner has financial information attached to the shared account and he wished to ensure the security of the account, and they are living in different residence:

> "*He uses TeamViewer (a screen sharing software) to give me access to Netflix and Hulu… He has control over my computer for a few minutes, and he will type in the passwords to let me in… he didn't share the logins with me because there's a billing account on it, and his family is using it.* " (P19)

This type of sharing is different from the direct sharing that the account owner and the sharee don't have equal access to the shared accounts. Account owners can manage their relationship boundaries with their partners by deciding what, and when to share their accounts with their partners.

2) Unique logins to maintain individuality. This approach granted couples equal access to shared accounts but kept different login credentials. A person could choose not to share some of their personal territories such as their commonly used passwords or some of the account activities. This sharing method requires explicit support from the online service that not all services would be able to support this kind of login approach. For some accounts in our sample, partners were able to have unique logins, acting as co-owners with similar levels of access and privileges. This type of account sharing only happened with financial accounts in our sample. Examples included Chase, Marcus, and PNC Bank, which allow users to have one joint bank account but have two independent and distinct log-ins to their digital account portal. In such cases, partners don't need to exchange passwords or login information:

> "*We have separate logins to our Chase account, she has hers, and I have mine… when you log-in, you see the same thing.*" (P11)

3) Shared logins for openness. Under this method, partners had equal access to shared accounts and used the same account credentials (login and password). Couples have the least control over their account activities and personal privacy under this method. This sharing method allowed couples to know each other's account activities and gave the least protection over personal privacy compared to the other two methods.

Many of the methods we observed couples using to facilitate shared login (see Appendix 2) were similar to those observed in previous work on workplace account sharing [51]. We identified one unique way for couples to memorize the shared account credentials: password co-creation. Couples in these cases, collaborated with each other to create a new password for the shared accounts that both of them can remember. P14 used her partner's Netflix for shows and movies

because she spent more time at home. After she got logged out once, P14 and his partner co-created the password for the account:

> "*He and I together created it, so we created it using some related aspects (related to our experiences)… So I remembered it.*" (P14)

A previous study on collaborative problem-solving in relationships suggested that spouses and married couples are frequently working together to create solutions to problems [6]. Creating a password that's easy for both to remember showed how couples work together to help each other better memorize the account credentials. The creation of such passwords became part of the couple's transactive memory [34, 56, 57], such as their understanding of who knows what, which they could easily help each other recall.

4.2.2 Couple's social contexts shape account sharing dynamics

Outside of the relationship, the couple's social environment also influenced their perception about personal territories, and sharing behaviors. We found two subcategories - *family and cultural norms* and the *partner's occupation* - that affect account sharing behaviors over time.

Family and cultural norms

One external influence on account sharing is family or cultural backgrounds. We discovered account sharing patterns associated with family norms, where participants referred to their parents' and family members' behaviors or opinions when sharing accounts. Take P2 for example, she shared an email with her boyfriend, which she found natural based on her parents' sharing behaviors:

> "*cause my dad and my mom did the same thing (sharing emails).*" (P2)

Three participants (P4, P9, and P10) mentioned sharing bank accounts as a family expectation when they get married, which we consider both a family influence and cultural norm in Asia. For example, in P4's family and the culture he grew up with, marriage is considered as a milestone for couples to share financial responsibilities. Sharing finance-related accounts are expected in this case:

> "*I grew up in a family where this type of thing (sharing bank accounts after marriage) was just the norm, so it's like a norm when you hit the milestone.*" (P4)

Studies [16, 29] have found family rituals are a common influence on couples, which affect their relationship quality and relationship attachment. Besides the influences from the family, we also found couples' sharing behaviors were influenced by social trends related to national culture. When a couple gets into conflicts or arguments, one person might need to give the other compensation to solve the problem afterward. In Chinese online culture, there's a norm that requires one person to help the other purchase all the items in the online shopping cart if they get into arguments as a compensation for the mental stress caused by the arguments. One of our participants was influenced by such cultural meme, and therefore, decided to share an online shopping account with her partner:

> "*I gave my partner access to my Taobao (Chinese online shopping portal) in case we got into arguments that he has to help me buy all the stuff in the shopping cart… This is a cultural norm in China."* (P9)

In this paper, we only have a few examples of family and cultural influences on account sharing, as we did not set out to explore this issue explicitly. We believe that a compelling area for future work is to look more into these influences to understand the social context of the couples and their related sharing behaviors.

Partners' occupations

Occupations of partners also influenced couples' account sharing behaviors in terms of providing access to knowledge about account security practices or helping to develop new sharing methods. We found participants brought account-security knowledge from the workplace to their romantic sharing. For example, P4 used to work in software engineering where he was exposed to cybersecurity-related knowledge and became an early adopter of password management tools. He then introduced the password manager to his partner to help both of them improve account security:

> *"It made me look at his passwords management behaviors and finally made the leap to adopt a password manager, I then became an advocate for password managers and told her to get one… Now, we are communicating password change using the Last Pass."* (P4)

Workplace knowledge sometimes gets transferred to romantic sharing. We found participants adapt their task management practices from the workplace to manage passwords in account sharing with their partners. P15 documented his passwords including the shared accounts' in a Google Doc, and shared the doc with his partner because he started to use Google Doc a lot during his previous job in Hawaii:

> "*As I started to use Google doc more, that system became more prevalent in my life. I thought about other uses of the application, and decided to use it for password management."* (P15)

All these social environments are parts of the couples' everyday life, however, most account designs fail to consider these factors' influences on couples' account sharing. We identify specific design opportunities for technology providers and designers in the following *Discussion*.

5 DISCUSSION

5.1 Systemic perspectives on account sharing in romantic relationships

Previous works [36, 45] on account and device sharing in romantic relationships have offered an overview of couples' information sharing behaviors, for example, the types of information or accounts that are shared and couples' sharing strategies. Our study sought to connect the dots from previous work and understand couples' sharing motivations, behaviors, and strategies over the lifecycle of a relationship. We introduce frameworks to help the CSCW community understand and design for romantic couples' information sharing needs. Here, we discuss two new lenses from our study results for technology providers and system designers to approach account sharing in romantic relationships.

5.1.1 Progressive sharing in romantic relationships

Our results reveal a difference in sharing motivations and sharing behaviors at different periods of a romantic relationship. All participants from our study shared more accounts with their partner as their relationship progressed. Park et al. [45] in their survey study found cohabitation is a confounding factor positively associated with marriage and sharing. They also identified the types

of accounts that were commonly shared among their population. Our participants' sharing stories revealed sharing behaviors and motivations uniquely associated with cohabitation and with marriage. We also found specific types of accounts our participants started sharing at different relationship stages. In terms of the sharing motivations, before cohabitations, most participants shared accounts for saving costs or collecting rewards such as sharing Netflix or Starbucks, which can benefit both people without exposing too much personal information. The start of cohabitation makes many participants start to share accounts that are related to their shared needs under one roof, such as shared utilities. Engagement or marriage saw our participants decide to share certain accounts for shared responsibilities. Examples include a shared bank account for future investment on a kid, shared housing-related account for a potential purchase of a new house, and so on.

As the types of accounts couples were sharing changed over time, the behaviors they performed in their shared accounts also progressed. The details of these sharing behaviors explain how some of the themes from Park's study [45] such as convenience and household maintenance specifically look like during couples' interactions in shared accounts. Before cohabitation, many of our participants tended to use shared accounts for shared entertainment or collecting rewards, which they could complete without being physically together. The start of cohabitation witnessed participants start using shared accounts for tasks that both of them need when living together such as using the shared shopping accounts for the household's grocery purchases. Some couples also started to help each other in an ad hoc way such as helping partners respond to emails. Couples who had engaged or married shared more tasks and information through shared accounts compared to the period before this stage. They were willing to exchange more sensitive information for mutual benefits such as taking care of one's partner's visa application or 401K plan. Many married participants ran joint finance management and financial investment with their partners through joint bank or investment accounts.

The progression in couples' sharing motivations and behaviors suggest technology providers to consider the different sharing needs of couples at various relationship stages. It can also help designers predict couples' sharing behaviors during the development of a relationship. For example, for cohabiting and married couples, they may share more tasks with each other compared to couples who just got into a relationship or live in different residences. Task management tools like Trello could help couples keep track of various tasks in their shared accounts and support their information sharing. We offer more detailed design suggestions in 5.2.

5.1.2 The evolution of relationship ecology

The relationship ecology concept offers another lens to understand couples' sharing needs and behaviors. Relationship ecologies include two nested levels, couples' interaction, and their social environment, which evolved and influenced their sharing behaviors and motivations. Park et al. [45] and Jacobs et al. [36] found that trust and relationship maintenance influenced couples' sharing. The relationship ecology explained the dynamics among these themes and how they jointly shape couples' sharing behaviors. Additionally, we found external social factors such as occupations and family norms' impact couples' sharing.

Couples' relationship ecology changes as the relationships progress. At the couple level, the perception of personal privacy influences sharing. At the early stage of relationships, we found participants shared accounts with a lower risk of exposing personal information. Similar to what Jacob et al. [36] has found, couples tend to tailor the kind of information they share with each other as they are developing trust. As relationships develop, we found evidence couples learn about their partners through sharing accounts, such as knowing the other's family better when

sharing Facebook. The line between personal and shared information, therefore, gradually changed as couples get to know each other more. As relationships develop, we found couples open up more of their personal space to each other and more personal information is being shared, such as bank information or personal health records. The increased openness with couples also influenced how they share their accounts. The early-stage account sharing saw more mediated access where one partner controlled the password and login information for personal privacy, while the later stage saw more examples of having joint accounts that both partners have the same login and password to. The evolution of couples' interaction suggests technology providers should consider the changes in the openness of personal privacy in between the couples and design features to support them.

The social contexts that couples dwell in also influence what and how couples share. Park et al. [45] found dynamics among couples influence their sharing behaviors but they didn't capture examples of how social environments outside couples' relationships shape couples' sharing. We found examples of sharing behaviors influenced by social factors such as one's cultural background and family expectations. For example, sharing financial accounts was described by two of our participants as a norm in Asian culture when couples got married. We also found that some participants brought what they have learnt from the workplace account sharing to their sharing behaviors with their partners. An example was that one participant learned 2FA from workplace account use and decided to convince his partner to use 2FA for their shared accounts. These social factors are implicitly influencing couples' sharing behaviors as their relationships develop, which should be considered by technology design when creating tools or features to support couples from different social and cultural backgrounds.

The relationship ecology lens offers a two-level view to look at both the evolution of personal privacy perception and the influences from family, social connections, and cultures. This framework suggests the technology design to both zooming in to study the information sharing by treating couples as a unit and also zooming out to consider the social system's impact on couples.

5.2 Design opportunities and gaps to support couples' sharing

Our research has suggested several benefits of sharing accounts in romantic relationships that could help maintain a healthy relationship and improve the overall account security behaviors of the couples. Nevertheless, most accounts are designed for single users, which makes it hard for romantic partners to share. Based on our research findings, we identify three design opportunities and gaps for technology providers and designers. We also suggest some potential design directions.

5.2.1 Couples' collaborations through account sharing

In our study, many participants collaborate with their partners through shared accounts. Examples include collecting and sharing rewards in Uber, Airbnb, and Starbucks, and sharing Amazon to collaborate on grocery and household appliance purchases. These behaviors revealed that couples function as a team to optimize mutual benefits. We identified the potential opportunity to better support couples' collaborative account and information sharing. Bales et al. [3] and Griggio et al. [28] found couples used shared intimate data such as location information to coordinate on tasks like grocery shopping, especially among cohabiting couples. Our results expand the understanding of how account sharing couples coordinate in everyday activities. One area could be facilitating task management in shared accounts. Many collaborative behaviors in shared accounts can be broken down into specific tasks. In a shared Amazon account, for example, the tasks can be adding

items to the shopping cart, making the final payment, and renewing a subscription. In P12 and P19's cases, both couples took on different tasks in their shared Amazon accounts. We imagine a centralized task management tool like Trello or Notion, which enables couples to create and track shared tasks in different shared accounts in one place could help improve couples' current collaborations in multiple shared accounts.

5.2.2 Flexibility of profile management in shared accounts

We found couples have the need to open up some parts of personal spaces while keeping some individuality when sharing accounts. An example is that when sharing Netflix, participants found themselves enjoying watching shows with their partners, but also voiced the concerns about partner's messing up their recommendations when they use the shared account at different times. Shared profiles and purchase history on a shared Amazon account made it hard for couples to purchase surprise presents for each other. Most current designs offer one login with multiple profiles like Netflix Hulu, or Spotify Duo, which doesn't give people full control over their individual profiles. We, therefore, suggest account design offer both a joint profile for sharing and individual profile that users can keep private under one account. Following such design, the account management mechanism may also need to be re-designed so that one person has control over his or her login information to the individual profile, while both people have shared access to the joint profile.

5.2.3 Shared accounts' privacy and security monitoring.

Our results also suggested that sharing accounts carry potential privacy and security risks for couples. First, sharing information in a shared account carries the risk of exposing too much personal information to one's partner. For example, both Jacobs et al. [36] and our study found that some people felt uncomfortable being judged by their partners when their partners see their account activities such as purchase history. In extreme situations, previous studies [25, 44] found intimate partner abuse in the digital world, which could result from a privacy breach from one's partner. Technology design needs to take this into consideration and allow certain privacy settings to support personal privacy and security protections in the romantic relationship, which is essential to many individuals.

Our results also showed that couples might have different levels of security knowledge, which can make the shared accounts vulnerable to security threats. One example was with P4 who had 2FA for most of his shared accounts, was not sure if his partner was using multi-factor authentication for their shared bank account. For cases like this, we observed couples acting like security shepherds and guiding their partners to adopt better security practices based on observations gleaned through access to a shared account. For example, P3's password creation habit inspired his partner to create strong passwords. P3's partner returned the favor, and reminded him to be careful about account use. Das et al. found people learn security practices from social learning that they learn security knowledge from observing their friends or family members' practices [19]. We, therefore, suggest technology providers offer security tracking tools for the shared account where couples can have a sense of their shared accounts' security risks and take individual actions to minimize the chances for hacks or information leakage. Technology design may also think about leveraging couples' collaborative mechanisms mentioned like the case of P3 to help couples work together to improve their shared accounts' security.

6 LIMITATIONS AND FUTURE WORK

6.1 Limitations

Our study has some limitations. First, our participants are living in a medium-size urban area, which is not necessarily representative of the U.S. population. We also used Craigslist [1] as a major recruiting channel, where female users are overrepresented and individuals 65 and older were hard to recruit. Although our results may not be generalizable to the entire population, we did not want to limit our scope. We also carefully chose our participants based on their gender, age, occupation, ethnicity, and education level. The majority of our participants are young or middle-aged adults, we lacked data of older people. We also lacked data on non-binary and non-heterosexual couples. Second, we relied on self-reported data, which is subject to bias. Participants might have an inaccurate recall or intentional information hiding. It might be helpful to interview both individuals in the relationship at the same time to minimize the bias. Third, the number and trends we included in this study are based on our interview data, which might be different from the larger population. Thus, while we have documented a range of behaviors with respect to account sharing, the specific numbers associated with account sharing should be interpreted with caution. Last but not the least, our work is exploratory, so our design recommendations might be speculative. In general, combining our work with a more quantitative study such as the previous survey study on romantic account sharing would help extend the understanding of the sharing patterns in romantic relationships.

6.2 Future work

We identified four areas where future work can build on our study to improve our understanding of account sharing. First, our research identified the development of relationships can influence account sharing behaviors over time, but we based this finding on the qualitative study. Quantitative studies focusing on variation in the nature of relationships, such as different attachment styles, levels of satisfaction, and personal autonomy in the relationship and how such differences affect account sharing, would help extend the understanding of the lifecycle of account sharing behaviors. Second, many of our participants learnt about account security knowledge from the interviews and indicated possible changes to their current account management behaviors. A follow-up study with romantic couples can explore ways to support security behavioral changes in the process of sharing. We imagine design interventions or games as potential mediums to interact with couples. Third, among our 19 participants, 18 are heterosexual and one is lesbian, we expect there might be different account sharing behaviors among the same-sex couples as a previous study found gay and lesbian couples have some unique relationship maintenance behaviors [30]. Lastly, our study focused on people in a romantic relationship as a special social group, that have unique account sharing behaviors. Study on other social groups such as co-workers and students would help extend the understanding of account sharing and benefit technology design.

7 CONCLUSION

We presented results from qualitative interviews on account sharing in romantic relationships that build on and extend findings from previous survey research on this topic. We interviewed 19 people who are currently in romantic relationships about their relationship status and account sharing behaviors. We described different account sharing behaviors at different stages in a relationship. We highlighted the evolution of relationship ecology and how it affected romantic account sharing over time. In the context of account security, we discovered password management and account security protection methods that are unique in romantic relationships.

Based on these findings, we offered technology providers system lenses to think about couples' sharing needs, and we identified four design opportunities for technology to support information sharing in romantic relationships.

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APPENDICES

A.1 Detailed participant profile

ID	Age	Gender	Education level	Relationship duration	Relationship status	Living style
P1	18 - 24	Female	High school	1 – 5 years	Serious relationship	Different residence more than 25 miles apart
P2	35 - 44	Female	Bachelor	7 – 11 months	Serious relationship	Different residence more than 25 miles apart
P3	25 - 34	Male	High school	6 – 10 years	Serious relationship	Cohabitating in the same residence
P4	25 - 34	Male	Masters	6 – 10 years	Married	Cohabitating in the same residence
P5	18 - 24	Female	Doctorate	1 – 5 years	Serious relationship	Cohabitating in the same residence
P6	45 - 54	Female	Doctorate	6 – 10 years	Married	Different residence more than 25 miles apart
P7	18 - 24	Male	High school	1 – 5 years	Engaged	Cohabitating in the same residence
P8	25 - 34	Male	Masters	1 – 5 years	Serious relationship	Cohabitating in the same residence
P9	25 - 34	Female	Doctorate	11 – 20 years	Married	Different residence more than 25 miles apart
P10	25 - 34	Female	Doctorate	11 – 20 years	Married	Different residence more than 25 miles apart
P11	18 - 24	Male	High school	1 – 5 years	Serious relationship	Cohabitating in the same residence
P12	25 - 34	Male	Masters	1 – 5 years	Married	Cohabitating in the same residence
P13	35 - 44	Male	High school	6 – 10 years	Married	Cohabitating in the same residence
P14	25 - 34	Female	Masters	1 – 5 years	Married	Cohabitating in the same residence
P15	25 - 34	Male	Bachelor	6 – 10 years	Married	Cohabitating in the same residence
P16	25 - 34	Female	Bachelor	7 – 11 months	Serious relationship	Different residence less than 25 miles apart
P17	25 - 34	Female	Doctorate	1 – 5 years	Married	Cohabitating in the same residence
P18	45 - 54	Female	Masters	1 – 5 years	Engaged	Cohabitating in the same residence
P19	25 - 34	Female	Bachelor	1 – 5 years	Serious relationship	Different residence less than 25 miles apart

A.2 Password communication methods reported by our participants

Password communication

Type	Behaviors	*Examples*
Direct Sharing	Tell others via emails, text message, or verbally	*"I texted the login information to my partner." (P16)*
Shared System	Use a password manager to share it	*"Universally, we are using Last Pass for our shared accounts.. She can know the change of passwords through Last Pass or email notifications." (P4)*
Common Location	Update it in a shared spreadsheet or word doc	*"I documented his passwords (for the shared accounts) in a Google doc... She has the link to the doc." (P15)*

Password storage

Type	Behaviors	*Examples*
Dedicated Location	Store passwords in digital location, such as password managers or word doc, or a physical location, such as notebooks	*"I have a little dedicated notebook of all my passwords... I am a big note person." (P6)*
Auto-save	Save passwords using auto-save functions on browser or one's devices	*"I used auto-save on my iPhone to save the passwords when he told me." (P10)*