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The Interplay of Financial Exchanges and Offline Interpersonal Relationships through Digital Peer-to-Peer Payments

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ABSTRACT

Financial transactions play a critical role in people's interpersonal relationships since money is a sensitive and complex component of everyday life. In particular, emerging digital peer-to-peer (P2P) payment applications further complicate how people deal with each other regarding money. Yet, there is a lack of empirical evidence on how and why such technology may lead to new and more complex influences on people's offline interpersonal relationships. Using 23 in-depth interviews, this paper explores the influences of using digital P2P payments on people's experiences of interpersonal financial exchanges and their offline interpersonal relationships. Our findings show that using digital P2P payments helps reduce awkwardness and ensure a stronger sense of fairness in financial exchanges. In addition, though digital P2P payments can relieve tension and reduce distrust in users' interpersonal relationships, they also result in loss of emotion and increase peer pressure. We extend existing studies on computer-mediated interpersonal relationships by highlighting the important role of the complicated technology-mediated financial exchanges in perceiving, shaping, and approaching today's offline interpersonal relationships. We also propose potential design implications for designers and developers to take such an interplay of financial exchanges and interpersonal relationships into consideration to design more supportive and socially satisfactory digital P2P payment platforms in the future.

1. Introduction

Financial activities, such as the exchange of money between individuals, have long been playing an im portant role in how people build and approach their interpersonal relationships (i.e., a strong, deep, or close association/acquaintance between two or more people). For example, psychologists found that money could positively change people's motivation and their behavior toward others (Vohs et al., 2006). Wood et al. (Wood and Riffkin, 2015) further revealed that people's perceptions of their social relationships improved as their financial well-being improved. Furthermore, strong financial well-being may strengthen relationships because not worrying about money avoids a significant potential source of conflict (Wood and Riffkin, 2015). In particular, over the past decade, how people conduct, manage, and experience such financial exchanges and processes (e.g., how to pay other individuals) has dramatically transformed due to the increasing popularity of digital peer-to-peer (P2P) payment applications (e.g., Venmo, Zelle, and Cash App), which further complicates how people interact with each other regarding money.

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In addition to traditional payment methods such as cash, check, and credit/debit cards, these P2P payment apps allow people to easily make instant and precise financial transactions without being limited to location and time, making them effective ways to manage interpersonal financial transactions (Newlove, 2018). In addition, though these P2P payment applications are often used on mobile devices such as smartphones and tablets, they are significantly different from mobile payments in general. Mobile payments are broadly defined as any payment through a mobile device, which can include initiating, authorizing, and confirming both consumer-to-business payments or payments between individuals (Au and Kauffman, 2008). While this definition primarily focuses on the affordance of the financial technology (e.g., mobility and electronization), digital P2P payments focus on the purpose of the payment and who can be involved in the transaction, regardless of platforms (mobile or Web): they are specifically used for personal affairs between individuals, such as splitting a bill between friends or acquaintances (Fuscaldo, 2019). Compared to traditional payment methods and mobile payments in a broad sense, digital P2P payments thus show the potential to affect how people pay each other and interact regarding money, an important impact factor on various forms of interpersonal relationships (Grilli, 2017; Caceres-Santamaria, 2020; Zhang et al., 2017), due to the focus on direct financial transactions between individuals through computer-mediated channels.

Therefore, a growing body of research has focused on social implications of using digital P2P payment apps. For example, Acker et al. analyzed how Venmo supported sociality, payment earmarking, and the use of emoji (Acker and Murthy, 2020). Unger et al. further discovered that new users of Venmo only tended to interact with those who initiated such interactions and no one else (Unger et al., 2020). Others identified factors that affected the behavioral and use intention of P2P payment apps, including perceived trust, perceived usefulness (Kalinic et al., 2019; Heijting, 2020), and the role of social relationships (Zhang et al., 2017). Collectively, these studies highlight the dual functionalities of popular digital P2P payment apps - for both making transactions and socializing (Zhang et al., 2017).

However, this small body of research tends to only focus on the influences of using P2P digital payment apps on online social patterns. Despite the fact that using digital P2P payments may complicate how people deal with those whom they know in the offline world regarding money, as we mentioned above, there is a lack of empirical evidence on how and why such technology may lead to new and more complex influences on people's offline interpersonal relationships. For example, a 2018 survey conducted by Zelle indicated that more than half of the general population (54%) would keep following up with their friends until they got money back if their friends did not pay the share of a group gift (Zelle, 2018). Yet, how the use of digital P2P payments may affect the ways and social consequences of handling such financial exchanges in people's offline interpersonal relationships is understudied.

To address this gap, we interviewed 23 users of popular digital P2P payment apps to explore the following two research questions:

RQ1: *How does using digital P2P payment apps affect people's experiences of interpersonal financial exchanges?*

RQ2: *How does using digital P2P payment apps affect people's offline interpersonal relationships?*

For RQ1, in this paper, we understand that interpersonal financial exchanges through digital P2P payment apps include requesting, receiving, and sending money from friends, family members, or acquaintances. For RQ2, interpersonal relationships refer to a strong, deep, or close association/acquaintance between two or more people, which can include close acquaintances, friendships, relationships with family members, and so forth.

We thus contribute to better understanding new and more complicated social phenomena and dynamics emerging in today's digital economy. First, we offer empirical evidence to unpack and explicate the multidimensional influences of digital P2P payments on both experiences of peer-to-peer financial exchanges and offline interpersonal relationships, which is understudied in prior scholarship. Second, we extend existing studies on computer-mediated interpersonal relationships by highlighting the important role of the complicated technology-mediated financial exchanges in perceiving, shaping, and approaching today's offline interpersonal relationships. Third, we also propose potential design implications for designers and developers to take such an interplay of financial exchanges and interpersonal relationships into consideration to design more supportive and socially satisfactory digital P2P payment platforms in the future, which may help people feel more comfortable and connected with financial technologies.

2. Related Work

2.1. *Digital Peer-to-Peer Payment*

Digital peer-to-peer (P2P) payment is a type of digital transactions that allows the transfer of funds between two individuals using their banking accounts or credit cards through an online or mobile app (Thompson, 2019). This payment method is often considered to be easy, convenient, and swift. It is easy to set up: users sign up for an account and then link a bank account or credit or debit card to it. It just needs a few seconds and clicks to send money: users choose a receiver, type the amount of the funds, then submit the payment (C. R. C. of Discover, 2019).

With the increasing growth of today's digital economy for more convenient and secured financial transactions as well as the fast spreading of a cashless lifestyle, digital P2P payments have become a popular and widely accepted way to make online financial transactions between friends, family, and co-workers (Fuscaldo, 2019). According to Advance Market Analytics, the global P2P payments market is expected to see a growth rate of 9.76% and may see market size of USD 3217.34 million by 2024 (Analytics, 2021). It is predicted that 52.5% mobile phone users will have made at least one P2P payment within the past month by the end of 2022 (Cakebread, 2018). Many P2P payment apps are nonbank providers of electronic P2P payments between individuals, such as Venmo, PayPal, Facebook Messenger Pay, Cash App, WeChat Pay, Apple Pay, Google Pay, Samsung Pay and so forth (Bradford, 2017). In particular, Venmo, WeChat Pay and Facebook Messenger Pay enable free P2P payments integrated with sociability through a mobile app or their websites. In this case, Messenger Pay has a huge potential user base from Facebook Messenger's more than 1 billion active monthly users (Bradford, 2017) and WeChat Pay has more than 800 million monthly active users worldwide in 2019 (Tencent, 2019). It was also reported that Venmo had 60 million users at the end of July of 2020 (Venmo, 2020). In the second quarter of 2020, Venmo's net payment volume amounted to 37 billion dollars, representing a 52 percent year-on-year growth (de Best, 2020). Digital wallet platforms including Google Pay, Apple Pay and Samsung Pay allow users to make P2P payments on mobile Android, Apple or Samsung devices as well. Financial institutions are also creating their own P2P payment platforms such as JPMorgan Chase QuickPay, Wells Fargo SurePay, Zelle and so on (Bradford, 2017).

This wide range of P2P payment apps have been extensively used for a variety of interpersonal financial exchanges including splitting bills, sharing rent, and transferring between friends (He, 2019; Grilli, 2017; Fuscaldo, 2019). Especially for millennials, mobileP2P payments have been so seamlessly integrated with their daily lives that "Venmo" and "PayPal" have even become a verb (C. R. C. of Discover, 2019; Chung, 2017). With such a prevalence of digital P2P payment apps in people's everyday lives, how they affect the ways through which people build and maintain relationships with each other not only financially but also socially, therefore, becomes an important research area.

2.2. *Computer-Mediated Interpersonal Relationships*

Hassenzahl et al. (Hassenzahl et al., 2012) suggested that the Beatles' song "All You Need is Love" summarizes typical psychological studies of human needs for relationships in the past 60 years: the general feeling of being related to others, in other words, establishing interpersonal relationships, is crucial to people's life satisfaction and happiness. Most traditional social science studies appear to agree that an interpersonal relationship refers to a strong, deep, or close association/acquaintance between two or more people, involving experiences that range from the mundane to the aesthetic (Rooney, 2014), and as a specific sort of knowing, loving, and caring for a person (Jamieson and Ekerwald, 1998). Such relationships are demonstrated as various forms such as friendship (a freely chosen association), family (which establishes roles and identities), and romance (based on passion, intimacy, and commitment).

Nowadays, the question becomes: how do computing technologies affect interpersonal relationships? A large body of literature in computer-mediated communication, human–computer interaction, and psychology has explored how diverse social technologies have dramatically transformed how people interact, socialize, and build relationships with one another. Collectively, they have pointed out the complicated nature of computer-mediated interpersonal relationships and social technologies as a double-edged sword in supporting and facilitating online interactions. For example, in social psychology, electronic communication presents a paucity of social cues and context information (Kiesler et al., 1984), which leads to various debates and negative perspectives on the relationship among the Internet, digital devices and interpersonal interaction. Prior studies have shown that individuals tend to be less emotional and more detached in front of monitors or phone screens, making communication more task-orientated and less personal (RICE and LOVE, 1987). Others also highlighted that with the increased use of the Internet, social presence and social affection is diffused or missing (Rogers, 1986). In particular, mobile technology may gradually decrease the communication of intimate feelings and emotions (Lengacher, 2015).

On the one hand, technology increases the ease of forming relationships around common cultural interests (Parigi, 2014). On the other hand, the lack of nonverbal and environmental cues also makes people feel less burdened and anxious when interacting with others in a computer-mediated context rather than a face-to-face interaction scenario (Pierce, 2009; Munoz, 2013). This may promote and support healthier and emotionally fulfilling interactive experiences. For example, Lenhart et al. have found that Instant Messaging provides people with a better environment to discuss topics that are uncomfortable to talk about in face-to-face situations (Lenhart et al., 2001). Besides, even sharing and browsing news feeds on social media have become a way to maintain a friendship in the digital era (Shklovski et al., 2015). In this sense, social technologies both promote intimate interpersonal connections and make people more insecure and vulnerable (Turkle, 2017).

2.3. *Financial Transactions in Interpersonal Relationships*

Financial transactions play a critical role in people's interpersonal relationships since money is a sensitive and complex component of everyday life. In fact, every financial transaction, including spending, lending, borrowing, changing, and giving, is a form of interpersonal communication that involves various currency and financial instruments in social interaction (Kaye et al., 2014).

Such financial transactions have the potential to both hinder or support the establishment and development of close interpersonal relationships (Mead et al., 2014). For example, Wherry et al. revealed the possible awkwardness, obfuscation, and negative reciprocity associated with behaviors of lending money to friends and kin and/or refusing lending (Wherry et al., 2019). Similarly, Zelle's 2018 survey showed that regardless of their different ages, more than half of participants would keep following up with their friends who owed their money at least weekly until they got their money back (Zelle, 2018). Jiang et al. also found that money can predispose people to think of themselves as being in a business-like relationship. Therefore, money-primed individuals present less emotional expressions, which are considered inappropriate and not objective (Jiang et al., 2014). On the flip side, financial provision (e.g., donation) in the field of streaming serves as important social support from viewers to streamers (Wohn et al., 2018). In addition, red packet (lucky money) through WeChat has evolved a unique way to manage and strengthen group dynamics in interpersonal relationships in China (Wu and Ma, 2017).

With rapidly evolving financial technologies, the ways people interact with money in their interpersonal relationships are becoming more diverse (Kaye et al., 2014). Therefore, a growing body of research has explored the functional design (Tyler et al., 2017; Carminati et al., 2013; Acker and Murthy, 2018; Khanna, 2015) and technical principles (Singh and Jasmine, 2012; Kraft et al., 2014) of digital P2P payments. These studies also investigated factors that may affect the behavioral and use intention of P2P payment apps, including perceived trust, perceived usefulness (Kalinic et al., 2019; Heijting, 2020), and the role of social relationships (Zhang et al., 2017). Some others also tended to the emerging new online social patterns afforded by digital P2P payments apps. For example, Acker et al. analyzed how Venmo supported sociality, payment earmarking, and the use of emoji (Acker and Murthy, 2020). Unger et al. examined Venmo transactions to identify its online community structure, which revealed that new users of Venmo only tended to interact with those who initiated such interactions (Unger et al., 2020). It is also reported that people from different cultures may also perceive and handle financial exchanges and how such exchanges affect their social lives differently (Lynn, 1991).

These studies highlight making transactions and socializing online as the dual functionalities of popular digitalP2P payment apps (Zhang et al., 2017). Yet, little is known about how the emerging digital P2P payment methods change people's understandings and experiences of interpersonal financial exchanges in more nuanced ways as well as the increasingly important role of digital P2P payments in their interpersonal relationships offline. Therefore, in this paper, we focus on 1) nuanced experiences of interpersonal financial exchanges mediated by digital P2P payments (RQ1); and 2) the unique role of digital P2P payments in people's offline interpersonal relationships (RQ2).

3. Methodology

Due to the exploratory nature of our research questions, we conducted an interview study to investigate people's rich and in-depth personal experiences with digital P2P payments. We chose interviews as the study method to be able to obtain more detailed and thorough information from a small number of people (Adams and Cox, 2008). In particular, we used semi-structured interviews to make participants feel at ease and reveal more important and relevant issues (Adams and Cox, 2008) to help explain, better understand, and explore their opinions, behavior and experiences. Moreover, in-depth information collected from interviews will help us to design a large-scale survey for future research. We posted recruitment messages on social media (e.g., Facebook) to recruit interviewees who had used any digital P2P payment apps and who were willing to be interviewed as voluntary participants. A snowball sampling was also used. All respondents who agreed to participate were interviewed. As a result, 23 semi-structured in-depth interviews were conducted via text or face-to-face chat based on interviewees' preferences of modality from February to March 2020.

Out of the 23 participants, 10 self-reported as female and 13 as male. Participants aged from 18 to 43 years with an average age of 24.9 years. One self-reported as African American, 8 as Asian (including Indian, Chinese, Korean), 4 as Middle Eastern (including Arab and Persian), 5 as White, and 4 as Hispanic and Latino. The average length of interviews was 32 min. Participants also reported that they used diverse digital P2P payment apps: Venmo (N = 15), Zelle (N = 11), PayPal (N = 4), Cash App (N = 4), WeChat Pay (N = 2), Apple Pay (N = 1), Google Pay (N = 1), Chase QuickPay (N = 1), Monzo (N = 1) and Bancolombia App (N = 1). Table 1 summarizes demographic information of interviewees, popular digital P2P payments apps they used, and experiences/frequency of their use.

In each interview, open-ended questions regarding participants' financial interaction through different P2P payment apps, payment habits, and perceptions and experiences of impacts of using these apps on their daily social life were asked. Examples of interview questions include "*Do you think using P2P payment apps is a positive or negative experience for maintaining/building your interpersonal relationship? Why?*" "*When you use P2P apps, how did you often initiate the transaction process?*" Inspired by the research of Kim et al. on pettiness in exchanging resources (Kim et al., 2019) and media coverage on manners and etiquette of P2P payments (Stanger, 2018; Wayne, 2017), we also asked questions such as "*Do you send an exact amount of money or round it via P2P payment apps? Do you pay*

Table 1
Demographic information of interviewees.

ID	Gender	Age	Country	Self-Reported Ethnicity	Apps	Experience (years)	Frequency
P1	Female	31	USA	White	PayPal	10	Twice a month
P2	Male	23	USA	White	PayPal	6	3 times a year
P3	Female	25	USA	Chinese	Venmo, WeChat Pay	2	Once a month
P4	Male	22	UAE	Persian	Venmo, Zelle	4.5	4 times a week
P5	Male	24	South Korea	Korean	Monzo, Venmo	2	N/A
P6	Female	24	USA	African American	Venmo, PayPal	4	Once a week
P7	Female	25	China	Chinese	WeChat Pay, Venmo	6	Everyday
P8	Male	28	Jordan	Arab	Zelle	1	N/A
P9	Female	36	Iran	Persian	Zelle	1.5	3 times a week
P10	Female	25	China	Chinese	Chase QuickPay	3.5	Once a month
P11	Male	43	USA	White	Zelle	N/A	N/A
P12	Male	28	Iran	Persian	Venmo, Cash App, Zelle	3	3 times a week
P13	Male	24	Columbia	Hispanic/Latino	Cash App, Bancolombia App	2	N/A
P14	Female	24	India	Indian	Zelle, Venmo	2	Every 2 weeks
P15	Male	30	N/A	White	Venmo, PayPal	3	Once a month
P16	Male	20	Italy	Latino	Venmo, Zelle	2	3 times a month
P17	Female	19	N/A	Latino	Venmo, Zelle	2	Twice a month
P18	Male	20	N/A	Indian	Venmo, Cash App, Zelle	1	Several times a week
P19	Female	N/A	N/A	N/A	Apple Pay	2	3 times a week
P20	Male	19	N/A	Latino	Venmo, Cash App, Zelle	1.5	Every 2 weeks
P21	Female	18	USA	White	Venmo, Google Pay	1.5	Several times a week
P22	Male	20	India	Indian	Venmo	2	3 times a week
P23	Male	20	India	Indian	Venmo, Zelle	3	Twice a week

Note: N/A – participants preferred not to answer.

people the exact number of money or round it in cash? Why do you tend to round it or pay the exact amount?"

We then used an empirical, in-depth qualitative analysis (Strauss, 1987) of the collected data to explore the unique role of using digital P2P payment apps in people's experiences of interpersonal financial exchanges and interpersonal relationships. A qualitative approach is appropriate to answer our research question because qualitative methodologies are well-suited for investigating questions about "how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences" (Merriam and Tisdell, 2015). Based on McDonald et al.'s (Forte, 2019) guidelines for qualitative analysis in HCI practice, our analytical procedures focused on eventually yielding concepts and themes (recurrent topics or meanings that represent a phenomena) rather than agreement – because even if coders agreed on codes, they may interpret the meaning of those codes differently (Forte, 2019). Therefore, we did not seek inter-rater reliability in our analysis but endeavored to identify recurring themes of interest, detect relationships among them, and organize them into clusters of more complex and broader themes. In doing so, our analytical procedures were: 1) we closely read through participants' narratives to acquire a general understanding of the whole picture in regards to how people perceived and experienced P2P payment app in their experiences of interpersonal financial exchanges and interpersonal relationships and identified thematic topics and common features in the data; 2) we carefully examined and reviewed the thematic topics and developed sub-themes; 3) we collaboratively engaged in an iterative coding process to combine and refine themes and subthemes to generate fundamental aspects and synthesized narratives of how people experienced digital P2P payment apps in their financial exchanges and interpersonal relationships.

4. Findings

In our study, all participants used digital P2P payment apps to conduct financial exchanges with their friends, family, or acquaintances rather than with strangers. Using quotes from participants' own accounts, we present our findings as two parts: overall positive interpersonal experiences of financial exchanges through digital P2P payment apps (RQ1); and digital P2P payment apps as a double-edged sword for offline interpersonal relationships (RQ2).

4.1. Overall Positive Experiences of P2P Financial Exchanges

Overall, participants considered that digital P2P payment apps facilitated positive experiences when conducting financial exchanges such as requesting, receiving, and sending money from friends or family members. They especially highlighted two themes emerging in such positive experiences: reduced awkwardness when managing money with people whom they knew; and a stronger sense of fairness. However, participants also mentioned that digital P2P payments could lead to a perception of pettiness, which would negatively affect their experiences when conducting financial exchanges.

4.1.1. Reduced Awkwardness

Interpersonal financial exchanges such as splitting bills, paying rent, and transferring tickets are now prevalent in people's everyday lives. Yet, these exchanges sometimes cause unwanted awkwardness and potential embarrassment among relatives and friends. One of the typical scenarios is that when splitting bills, one pays for all first and then others should pay back to him/her later but forget to do so. For example, P13 (male, 24, Columbia, Hispanic/Latino) described:

"Usually people remember paying in the near future but not always and it is awkward to ask for that."

In this case, people who paid for the bill often faced a dilemma: whether the other party intentionally or unintentionally forgot to pay them back, they may either lose their money unwillingly or cast shadows on their friendship by insisting on asking for their money back. Using digital P2P payments, thus, was considered by many participants an effective solution to reduce awkwardness and embarrassment when dealing with money with relatives or friends in three ways.

First, it is instant and convenient without time lag. P17 (female, 19, N/A, Latino) and P8 (male, 28, Jordan, Persian) both pointed out:

"*All you have to do is to search up the person, type the amount, do a caption if you want and then send. And it's really, really easy. Because of how easy and quick it is, this makes me skeptical of people who claim to take a while to pay someone back.*" (P17)

"*I think it makes hangouts more friendly, for example when we finish dinner everyone can pay very quickly without having to stress […] It makes splitting the bill easier. For me I don't feel comfortable asking for money back especially when less than $10.*" (P8)

For P17 and P8, using digital P2P payment apps created positive experiences of interpersonal financial exchanges because all parties who involved in casual payments (e.g., splitting a dinner bill) could make an instant transaction at the moment without any excuses. This significantly reduced or even avoided the potential embarrassment of having to discuss finances, such as splitting bills and explicitly request financial transactions (e.g., asking for repayment after some time or asking for a small amount of money back), especially with people whom they knew.

Second, the electronization of digital P2P payments offers a less personal and more neutral way to communicate finance-related information (e.g., to ask for money back), which helps reduce the sense of embarrassment. P19 (female, N/A, N/A, N/A) and P23 (male, 20, India, Indian) shared,

"*It might be awkward to call up somebody and say 'Hey! Send me my money!', but it's easy to send a little cash reminder through the application. You never have to talk to them. There's no awkward tone in your voice. It's just an electronic reminder.*" (P19)

"*It's a positive influence on building relationships because there's no boundaries or walls to not ask for money back anymore […] Now, with Venmo with a click of a button, they can just send you your money like that. There's no reason for the transaction to be delayed.*" (P23)

In both P19′s and P23′s stories, digital P2P payments made financial transactions between people less awkward because it reduced interpersonal communication as much as possible – e.g., no need to have face-to-face or voice chat but just click a button through an app. In this sense, financial transactions seemed to be somehow separated from interpersonal interaction, thus reducing the potential impacts of sensitive feelings about money and financial transactions on interpersonal relationships.

Third, as a type of electronic money transfers, digital P2P payment apps allow users to look up their transaction records easily and quickly. In P3′s (female, 25, USA, Chinese) opinion, this affordance led to positive financial experiences, especially when family and friends often took turns to pay: "*We don't have to keep track of who owes who.*" P10 (female, 25, China, Chinese) also added: "*The clear records help avoid money troubles.*" In this sense, an extra benefit of using digital P2P payments for managing interpersonal financial exchanges was to automatically document the amount, time, and other related information of a certain financial transaction. With such evidence, it is less likely for different parties to engage in arguments and disputes over everyday financial exchanges, which would prevent potential awkwardness and embarrassment.

4.1.2. A Stronger Sense of Perceived Fairness

Another reason why participants found the use of digital P2P payments positive was a stronger sense of perceived fairness in their financial transactions compared to traditional face-to-face transactions – e.g., the financial transactions are more accurate, the cost-sharing is more effective, and people are less likely to be taken advantage of. For example, P3 (female, 25, USA, Chinese) explained that it was challenging to ensure fairness in traditional face-to-face transactions, which often required tremendous efforts and certain strategies:

> "*Me and my friends have sort of a tacit understanding to split the bill. I pay for a meal, they can buy me boba […] So it's boba plus dessert to make up for my meal, or if we're going to watch a movie later, they pay for the ticket.*"

As P3 suggested, in order to make everyone pay their fair share, friends often had to navigate through costs of different events and estimate an average final payment. This process was often time-consuming and subjective, which may be subject to arguments and disputes.

In contrast, P13 (male, 24, Columbia, Hispanic/Latino) believed that using P2P payments helped achieve fairness in interpersonal financial transactions easily:

"I always try to be fair with money issues and have an easy way to pay others and get paid, which is very good to avoid worrying about fulfilling obligations."

According to him, digital P2P payments provided a precise and fast way to transfer money with few physical restrictions. This helped him fulfill his obligations in financial exchanges with little effort – he would not worry too much about nervously waiting for others to repay nor feel sorry about forgetting to repay others in time. In particular, P11 (male, 43, USA, White) believed that with exposing shirkers and leaving few places for people to hide, using digital P2P payments would significantly reduce the psychological and social pressure on the very one person under some circumstances:

> "*Using P2P could be better for me because I rarely have cash in my wallet. So I'm usually the guy that puts on the card and everyone pays me back. Now thinking about it from that standpoint, so having P2P payment, if everyone else uses the same one, is nice. It takes the pressure off that I don't have to be the one to do it.*"

For P11, the greatest benefit of using digital P2P payments was to avoid the burden and stress of paying the bill for everyone and then chasing people to pay him back. As P11 noted, it was often a stressful experience for him to hang out with friends because he was always asked to pay for the entire bill first via card. The rationale was that he did not carry cash and thus could not repay others at the moment. With digital P2P payments, he no longer needed to shoulder this responsibility simply because of his own personal preference to handle money (e.g., carrying cash ornot). Therefore, for P11, this was a fair way to track and manage financial exchanges with multiple people: no one would bear the financial responsibility or owe anyone money.

However, participants also commented that the endeavor to make excessively precise and fair transactions might lead to a feeling of pettiness, which may negatively affect their experiences of financial exchanges. For example, P4(male, 22, UAE, Persian) explained:

"It gets annoying when people are super super precise, like if we buy a $3 snack and everyone shares […] this looks a little bit petty. It gets too annoying at that point."

According to him, the ability to conveniently transfer precise payment was definitely a benefit of using digital P2P payments positively. Yet the overemphasis on precise or fair payment can be counteractive - making the experience of financial exchanges negative and "annoying." In this sense, absolute fairness in financial exchanges may actually make people feel less comfortable. This may even eventually affect their offline interpersonal relationships, which we discuss in the next section.

4.2. A Double-Edged Sword for Offline Interpersonal Relationships

While many participants agreed that using digital P2P payments generally played a positive role in their financial exchanges, they tended to consider it a double-edged sword for their offline interpersonal relationships. On the one hand, using digital P2P payments helped build trust among friends and relieved tensions in close interpersonal relationships. On the other hand, it heightened peer pressure and caused the loss of emotion in communication.

4.2.1. Promoting Trust

Many participants highlighted how using digital P2P payments benefited their social lives by promoting trust between friends due to its affordance of instant money transactions. For example, P20 (male, 19, N/A, Latino) noted,

> *"I feel like it makes me closer to my friends because I don't have to worry about paying them back since it is instant. So there is more trust. It's like a guarantee right there. You know they paid you or they know you paid them. There is no interference or misconnection."*

For P20, digital P2P payments made him more confident about his connections with his friends - all transactions were instant and recorded in the system, which left no room for arguments or misunderstandings. In this way, people became closer because they could effectively avoid awkward experiences of financial exchanges, which naturally built trust and promoted their friendship. In addition, P9 (female, 36, Iran, Persian) explained that how using digital P2P payments helped her maintain her existing friendships:

> *"By using digital P2P payment, I won't forget to pay and my friends won't be upset about me. But if I need to pay in cash, I have to remember it and maybe I will forget. I don't mean that I don't want to pay but sometimes I just forget. So in this way, P2P payment helps to maintain the relationship."*

According to P9, a significant benefit of digital P2P payments was to reduce the potential distrust (e.g., forgetting to pay) and cognitive load (e.g., remembering to pay) when dealing with money with friends. This made it easier to build and foster friendships – both parties involved can maintain a healthy, positive, and sustainable attitude towards a traditionally sensitive topic - financial transactions between friends. In this sense, the immediacy and convenience of digital P2P payments seem to effectively prevent the emergence and growth of distrust due to intentionally or unintentionally delayed or forgotten payments in people's social interactions. P8 (male, 28, Jordan, Arab) and P4 (male, 22, UAE, Persian) summarized:

"I don't like to keep hanging out with people who don't pay back, so having P2P will leave no excuse." (P8)

"If I keep reminding [my friends] but they keep forgetting, it will get very annoying to ask them to give the money back. This will make me trust them less. So the digital payment apps solve this problem pretty well." (P4)

For both P8 and P4, both waiting for others to pay them back or constantly "annoying" friends to repay their money would undermine the credibility and sincerity of a friendship. Unless the Internet or their digital devices failed, digitalP2P payments made it difficult for people to refuse the request to solve financial exchanges at the moment. As such, digital P2P payments created convenience for financial transactions and thus curbed the possibility of distrust caused by money in interpersonal relationships.

4.2.2. Relieving Potential Tensions in Interpersonal Relationships

As we mentioned earlier in this paper, in our study, all participants used digital P2P payments to conduct financial exchanges with people whom they already knew. Despite their established interpersonal relationships (e.g., friends or family members), dealing with money may still cause potential tensions. P4 (male, 22, UAE, Persian) shared an example:

"People usually round it down when they use cash, which can be annoying. If they don't do it a lot then it's fine. But I don't hang out with people who consistently give $5 instead of $7."

For participants like P4, traditional payment methods such as cash, in fact, introduced unnecessary tensions to their interpersonal relationships: some tended to round the payment down all the time in the name of trying to pay in cash easily, which made people like P4 feel being taken advantage of. While normally the amount was small, some considered this attitude unacceptable and offensive. In contrast, digital P2P payments make financial transactions smoother and more accurate (e.g., paying the exact amount easily rather than rounding it down), thus relieving potential tensions and negative impacts on one's offline interpersonal relationships. P14 (female, 24, India, Indian) shared:

> *"I think it's a positive experience for maintaining relationships! Because as young people, we are low on money and would like to get it immediately before people forget! We want to keep our friendships as well."*

P14 did not want to ruin her friendship because of money. For her, using digital P2P payments effectively loosened both the stress on tight finance and social pressure on maintaining a friendship. Such financial pressure may even make people feel more anxious about socializing with their friends. Using digital P2P payments helped her effectively avoid the behavior of asking for money back, which was likely to create embarrassment and even confrontation in a close relationship. P3 (female, 25, USA, Chinese) echoed this opinion:

> *"Using P2P apps is more positive to my relationships with others. I guess it's just like a 'I owe you/ you owe me' list that gets resolved ASAP, which is nice. Cuz after time, sometimes we forget who owes who."*

P3 believed that digital P2P payments allowed people to focus on social activities and interactions that foster friendships rather than being too concerned about money issues. For her, only focusing on money inevitably distracted people from actually spending time and interacting with friends, which may eventually damage the established relationships.

In addition, P11 (male, 43, USA, White) pointed out that compared to cash, digital P2P payments helped to avoid making negative first impressions and conversations about money when initiating and developing a new relationship:

> *"For example, some new friends and I went out to dinner. They paid and I didn't have cash with me and I forgot to pay them back cuz I was busy. They may bother me and have to ask 'Hey, do you have money? You owe me.' This may have a negative impact on our new friendship. I think it could be awkward. I think using digital P2P payments is beneficial especially at the beginning of a friendship."*

According to P11, using digital P2P payments was not only useful for maintaining established relationships but also effective for building a new relationship by making a better first impression. For him, active and timely payment avoided possible awkward scenes that might make people unwilling to keep developing friendships. It also served as a valuable foundation to evaluate a promising new friendship.

4.2.3. Increasing Peer Pressure

Despite the above-mentioned benefits for people's social lives, digital P2P payments also pose challenges for people's offline interpersonal relationships. One example is the heightened peer pressure. For example, a prerequisite for both parties to use digital P2P payments is to download the same P2P payment app. This sometimes increases peer pressure on using smartphones, downloading apps, and being open to online payments. P2 (male, 23, USA, White) reflected such conflicts between his preferences of payment and the current social trend:

> "*I dislike P2P payments compared to cash. I'm a bit archaic. I have no social media. I didn't grow up with WiFi. I don't have that on my phone. So there's a lot of those things that some people consider normal for the 21st century that I do not do. So it probably causes issues when everyone wants to do digital P2P payment but I just cannot.*"

However, the increasing popularity of digital P2P payments inevitably made these people run into requests from acquaintances, friends, family, or colleagues "forced" them to start using such apps regardless of their own willingness. P15 (male, 30, USA, White) shared his story:

> "*When my friend asked me to use the app to transfer money, there was a little social friction because I didn't have the app. I wasn't really comfortable downloading the app just for this one transaction. I didn't understand the utility of having the app long term. I didn't want to give someone my bank account information. I eventually did it for my friend but it was not a good experience.*"

According to P15, he only downloaded and used the digital P2P payment app because his friend asked him to. From his perspective, digital P2P apps are more like one-time use. It was not worth the effort to download and to shoulder the risk of providing highly private and important information such as bank information. Therefore, he felt being forced to give out his own preference and privacy (e.g., bank account), which might negatively affect his friendship.

4.2.4. Losing Emotion in Communication

Traditional payment methods such as cash transactions often involve face-to-face interaction and potentially more personal communication in addition to the transaction itself. DigitalP2P payments, as a computer-mediated payment method, allow users to operate financial exchanges remotely without limitation of time and space but eliminate such personal interaction and communication. As P1 (female, 31, USA, White) and P18 (male, 20, N/A, Indian) pointed out, it "*loses the personal touch of the face to face*" (P1) and "*takes out the factor to talk with the community or with other people*" (P18). P1 was also worried that digital P2P payments tended to purely focus on the money transaction itself but lose rich sociocultural information embedded in the transaction:

"*We wouldn't know the context of the transaction, the pressure of what's going on, what's the need, and what's the reason why I'm giving them money or receiving the money.*"

For P1, exchanging money could also be a potential way to build relationships with people whom she cared about. Although digital P2P payments are much faster and more convenient, such methods do not facilitate communication and interaction surrounding the behavior of financial exchanges itself. In contrast, traditional payment methods such as face-to-face cash transactions often provide room for more personal and emotional communication – e.g., for people involved to share their experience and express their feelings. For users like P1, a financial exchange is more than a simple money transaction but an opportunity to reinforce a relationship and deepen emotional attachment. Some participants even noted that digital P2P payments made the experiences of interpersonal financial exchanges meaningless. P1 (female, 31, USA, White) and P16 (male, 20, Italy, Latino) described,

"*To me, giving someone money in person is more personal and it means more when someone hands me a hundred dollar bill. It's going to mean a lot more versus someone's sending me a message: Hey, someone's giving you money on your PayPal account […] It's going to be more meaningful to me because they took time out of their day to hand me the cash. So I probably won't ever stop doing cash face to face if I can.*" (P1)

"*But if you just Venmo someone, if you're looking at a screen and a number changes, you don't appreciate getting paid back as much.*" (P16)

Both participants mentioned the important feelings of attachment, care, gratitude, attention, and even a sense of ritual associated with face-to-face financial transactions. For them, money transfer was socially meaningful not because of money itself but due to the emotions and close personal interactions involved in the process of transfer. Such emotional self-expression made their financial transactions less business-like and more personal, sincere, and earnest, which promoted mutual respect, understanding, and empathy in their relationship in the long term.

However, the formalization and standardization of digital P2P payments do not afford such feelings for both parties, thus hindering the emergence and development of more personalized and emotional relationships. P15 (male, 30, USA, White) explained:

> "*I like when my people who owe me money know that I'm not happy about it. I think having that process be automated, the enforcement of the payment, the automated kind of would create a diffusion of responsibility. Now people are ignoring the system instead of me, but it's affecting me.*"

According to P15, while creating convenience, digital P2P payments removed the human component from the human-centered financial transactions - for example, sending automated standard reminder messages rather than interacting with real human beings. For him, this not only made people less responsible but also sacrificed the valuable contextual cues and emotional expression when conducting financial exchanges with others.

5. Discussion

To answer our research questions, we have highlighted the following findings. First, digital P2P payments not only help reduce awkwardness but also strengthen the perceived fairness to facilitate positive experiences of financial exchanges (RQ1). Second, digital P2P payments also serve as a double-edged sword for people's offline interpersonal relationships: they promote trust and relieve potential tensions in interpersonal relationships but also increase peer pressure and remove the rich social and emotional elements from communication (RQ2).

In this section, we discuss how our findings contribute to the existing literature on computer-mediated financial transactions and interpersonal relationships. We also propose potential design implications for designers and developers to design more supportive and socially satisfactory digital P2P payment platforms in the future by taking the interplay of financial exchanges and interpersonal relationships into consideration.

5.1. Nuances of Technology-Mediated Financial Transactions

Digital P2P payments inherit the features of modern web and mobile technologies: they simplify the process of traditional ways of payment and support remote operation at any time. In our study, participants took advantage of these characteristics to make precise, fair, and instant financial transactions. This is consistent with findings in previous literature on the usefulness and easiness of mobile payment (Zhong et al., 2013; Hillman et al., 2014). However, our findings also highlight the nuances of today's technology-mediated financial transactions.

First, the instant and smartphone-based digital P2P payments make interpersonal conversations and communication in traditional physical activities of financial exchanges no longer necessary. This tendency is in direct response to an emerging modern financial lifestyle: saving efforts and time as well as avoiding social pressure to manage interpersonal financial exchanges. In this sense, technology increases the ease of forming friendships around common cultural interests (Parigi, 2014). For example, existing research has found that on social occasions, it is important to check if everyone has a payment app that they are comfortable using and ask people to articulate exactly when they want to be paid back – the so-called "Frientimacy" (Nelson, 2016). In this way, digital P2P payments may reduce awkwardness and increase the sense of fairness in people's experiences of modern financial transactions. As our findings show, the overall positive experiences mediated by digital P2P payments align with previous study's emphasis on the comfortable social distance without seeming rude or uncongenial but still supporting a sense of friendly connection (Lampinen et al., 2017). Our participants even considered such experiences more positive than traditional face-to-face financial transactions. Further, the reduced awkwardness and increased sense of fairness from financial actions between individuals may help lay the foundation for trust and respect in building and maintaining friendships.

Second, digital P2P payments also reveal several challenges emerging in today's technology-mediated financial transactions. Digital P2P payments also apply to face-to-face situations. For example, it usually serves as a useful split-the-bill-and-transfer tool in face-to-face social events. In these situations, sometimes using digital P2P digital payments can be felt somehow negative - leading to a sense of pettiness and loss of emotion.

Obviously, when people's payment habits shift from cards or cash to digital P2P payments, how people conduct, manage, and experience financial exchanges is also changing, which involves the reconstruction of payment scenarios, methods, and networks. In this sense, advanced financial technology such as digital P2P payments not only makes interpersonal financial transactions more convenient and instant but also increasingly plays a unique role in how people perceive, build, and approach their relationships with each other, which we will discuss in the next section.

5.2. New Perspectives of Computer-Mediated Interpersonal Relationships through Digital P2P Payments

In contrast to previous studies that focus on digital P2P payments users' online social patterns (Acker and Murthy, 2018, 2020; Unger et al., 2020; Zhang et al., 2017), our findings highlight that using digital P2P payment serves as a double-edged sword for people's offline interpersonal relationships. This thus provides new perspectives of how novel financial technologies such as digital P2P payments extend and (re)shape computer-mediated interpersonal relationships.

As we have shown, digital P2P payments facilitate effective and accurate financial exchanges from which people reap benefits of their precision, rapidness and convenience. Such timeliness, simplicity, and fairness may also help promote interpersonal relationships involved in these financial exchanges by increasing trust and relieving potential tensions. However, meanwhile the important social clues and emotions in traditional financial patterns are also eliminated, which makes such transactions all about money transfer but less about people themselves. As some of our participants have highlighted, the context of the financial transaction, relationships with people who are involved in the transaction, and the e motions associated with the transaction are more important to them than the transaction and money itself. Previous studies have suggested that there tend to be less social affection, less communication of intimate feelings, and more detachment when engaging in computer-mediated financial transactions (RICE and LOVE, 1987; Rogers, 1986; Lengacher, 2015). As a result, P2P digital payments users may become less emotionally involved with each other, which gradually undermines their interpersonal relationships.

This may be one reason why our participants considered paying the exact amount owed via digital P2P payments negative, petty, and annoying, which is consistent with previous studies (Kim et al., 2019). In this sense, payment behaviors through digital P2P payment apps are also social behaviors, which are examined by the hidden rules of interpersonal communication (Stanger, 2018). Such financial exchanges directly influence people's impressions of each other and how they perceive and manage interpersonal relationships because people believe that how one deals with money reflects his/her personality and behavioral patterns. In turn, one's payment behavior and manners are based on his/her perceptions of the other side of the transaction and the relationship. It is worth noting that some participants' use of digital P2P payment also depends on the closeness of their relationship with the other party. If the other party whom they are interacting with in a financial transaction is just an acquaintance or someone who they do not know well, they feel reasonable to make precise transactions. In contrast, if they have a close relationship with the other party (e.g., as good friends), they usually round up the amount when paying to the person or round down when the person needs to pay back without negative feelings.

In summary, such wrestle suggests the importance of the complex interplay of financial transactions and offline interpersonal relationships when perceiving and understanding computer-mediated interpersonal relationships. While existing studies on computer-mediated interpersonal relationships tend to focus on relationships formed, maintained, or fade in diverse online social spaces such as social networking sites (Burke and Kraut, 2014; Chung et al., 2017; Liebman and Gergle, 2016), online dating sites and applications (Tong et al., 2016; Zytko et al., 2015), and forums (e.g., (De Choudhury and De, 2014; Parker et al., 2013) through communication affordance (e.g., textual chat), this study points to a clear need for taking contexts and activities beyond just social networking platforms and computer-mediated communication modalities (e.g., exchanging money) when investigating how people build and foster such relationships in today's digital society.

5.3. Design Implications for Supporting Interpersonal Relationships through Digital P2P Payments

There has been a trend towards combining social networking with payment: Facebook Messenger Pay, WeChat Pay, Venmo's transaction feeds, and so forth. Such an integration raises privacy concerns as well as points to important questions when developing future financial technology: to what degree should designers and developers take aspects of interpersonal relationships and emotional expressions into account in addition to developing more secure and convenient payment methods? And would such deep and direct integration lead to greater social pressure, especially considering the sensitivity of money in interpersonal relationships? With these considerations and grounded in our findings, we propose the following suggestions for designing future digital P2P payments. We suggest that designers and developers of future digital P2P payments should take possible peer pressure and avoidance of awkwardness into consideration to help people better manage the interplay of financial transactions and offline interpersonal relationships when using P2P payments.

The Ability to Send Direct Messages via P2P Payment Apps. Our findings highlight the less personal and more neutral way digital P2P payments offer when communicating finance-related information. Yet our study also reveals increased peer pressure to use P2P payments, such as downloading the same apps. Therefore, we suggest that users should be able to send mobile phone messages via P2P payment apps to prompt people who owe them. In this way, people who need to pay money back do not need to download the same app but will still receive the reminder of the requested payment. Since the reminder will come through the app instead of users themselves, it may tone down the awkwardness in situations where people need to request money from others.

Taking Local Cultural Values regarding Money Exchange into Account. Our findings also point out that some people were reluctant to use digital P2P payments due to the tensions between one's preferences of how to exchange money and the current trend of using financial technologies, leading to uncomfortable peer pressure on using P2P payments. Therefore, local cultural values regarding money exchange should be taken into account to serve as an appropriate entry point to invite people to accept P2P payments better. For example, the success of WeChat P2P payment may partially lie in its appropriate first introduction - P2P payment as red envelopes (monetary gifting) for the Chinese New Year, which is not only seamlessly interwoven with daily lives but also deeply embedded in the traditional Chinese culture that most users are familiar with (Wu and Ma, 2017; Xu, 2017). As a result, WeChat Pay not only becomes the most popular digital P2P Payment app in China but also serves as an important way to socialize and build interpersonal relationships (e.g., by gifting each other money). Therefore, making P2P payment apps fit target users' cultural expectations for financial exchanges should be a critical direction for future design and marketing strategies.

Framing Financial Transactions as Social Experiences. Our findings show that people were concerned about the lack of emotion in current digital P2P payments. Therefore, we suggest providing an option of framing a financial transaction more as a social experience (e.g., adding a context of the transaction; associating the transaction with the particular social event as valuable memories such as birthday parties) and less as a business-like transaction. Specifically, original memo function can be expanded and open to multimedia input including voice, memes, short video clips, bitmoji and so forth to allow users to express their emotion in a richer way.

5.4. Limitation and Future Work

This study has several limitations that may inform future work. First, most participants are in their 20 s or 30 s. How they perceived and experienced digital P2P payments might differ from people of the other age groups. Future work is needed for recruiting people from more diverse age groups and exploring different patterns of financially and socially interacting with others through digital P2P payments. In addition, the study did not differentiate how different digital P2P payment apps may affect people's experiences of financial exchanges and interpersonal relationships in various ways (e.g., Venmo allows using QR codes to initiate transactions without friending each other; and Facebook Messenger Payment integrates payment with instant messaging and social media). More work should be conducted to compare diverse experiences mediated by different payment apps. Further, more research should be done to explore the cultural influences on the use of digital P2P payments as a unique lens. For example, different cultural expectations and interpretations of how and when digital P2P payments should be used may affect or shape interpersonal relationships in certain cultures. It is common that in some cultures, people do not expect their friends to pay the money back despite the convenience of digital P2P payment technology. Rather, they would consider it an important signal of trust and a necessary way to maintain a friendship. Therefore, to people with such cultural expectations, forcing the use of digital P2P payments may be considered as distrust and a violation of their social convention. Therefore, we also plan to conduct a cross-cultural study involving a larger sample with different cultural backgrounds to investigate how cultural expectations play a role in interpersonal relationships mediated by digital P2P payments.

6. Conclusions

Despite the increasing use of digital P2P payments in interpersonal financial exchanges, people may not realize that digital P2P payments are also playing an important role in how they perceive, build, and maintain interpersonal relationships with others. In this paper, we have explored digital P2P payments' influences on people's experiences of financial exchanges and their offline interpersonal relationships. Our findings show that paying via digital P2P payment apps helps reduce awkwardness at the moment and avoid possible awkward situations in financial exchanges. It also offers a stronger sense of fairness when conducting financial transactions. However, while digital P2P payments can relieve tension and reduce distrust, they also result in loss of emotion and increase peer pressure, which may undermine people's existing offline interpersonal relationships. We hope that our findings contribute to better understanding new and more complicated social phenomena and dynamics emerging in today's digital economy and inform future research about the role of financial technologies in social life.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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