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Financial Technologies in the Cycle of Poor Mental Health and Financial Hardship: Towards Financial Citizenship

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It is well documented that people living with mental health conditions are more likely to experience financial difficulties. When explaining this association, emphasis has often been placed on financial capability, i.e. the capacity of those living with poor mental health to manage their money. This paper challenges such capability-based explanations by reporting on a diary study and interviews with 14 people who self-identify as living with a mental health condition. We focused on their experiences of financial technology use, and explored the role technology played in their strategies to minimise the impact of mental health on their economic circumstances. Rather than lacking capability, participants' practices revealed shortcomings of existing financial technologies and how they sought to work around these. We conclude by providing a set of design directions for technologies that engage those living with poor mental health not as vulnerable targets for financial inclusion, but as full financial citizens.

CCS Concepts: • **Human-centered computing** → **Empirical studies in HCI**;

Additional Key Words and Phrases: Financial technology; Mental health; Financial hardship; Financial inclusion; Financial citizenship; Diary study

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1 INTRODUCTION

People living with poor mental health are more likely to find themselves in financial difficulties. These include relative poverty (i.e. disposable income well below median [29]), hardship (i.e. insufficient financial resources to cover basic needs [29]) and problem debt (i.e. *"seriously behind on payments for a range of bills and credit obligations"* [25]). This association between money and mental health has been called the *"double trouble"* [81], where financial difficulty and poor mental health feed into each other and trap people into a hard to break cycle [28].

Over the last decade, HCI research has started to address the ways in which digital technologies are starting to effect and impact on how people understand, spend and manage their money (e.g. [41, 47, 87]). However, thus far the

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intersection of money and mental health, and the role technology plays in supporting and burdening people with mental health concerns, has not been examined. This paper addresses this by exploring how people struggling with mental health use financial technologies to minimise the impact of their conditions on their economic situation. **Following the World Health Organisation, we understand poor mental health as a lack of well-being that affects individuals' capacity to realise their own abilities, cope with the normal stresses of life, work productively and contribute to their communities [62].** We use the expression "financial technologies" in a broad and encompassing way. We include in it new financial services built upon digital technologies ("fintech"), near field communication payment technologies such as "contactless", instant lending technologies such as credit cards, as well as digital forms of banking through web browsers and native mobile applications.

In our research, we conducted interviews and a diary study with 14 people self-identifying as living with a mental health problem, to understand how they used financial technologies in their daily lives. **Our goal was not to identify financial behaviours associated with certain mental health conditions, or to draw comparisons with the financial practices of neurotypical users. We aimed instead to inquire into the experiences of people living with poor mental health to provide a critical lense for the examination of technology-mediated financial products and services.** Our participants' experiences reveal the shortcomings of these technologies, and help us formulate new design sensitivities to address them. When doing so, we seek to move beyond the discourse of financial inclusion and its focus on "*access to appropriate financial products and services*" [68]. Although financial inclusion has inspired important and valuable work in HCI (e.g. [84–86]), in the realm of policy it has mostly resulted in the development of a simpler, less functional range of financial products designed to minimise the risk of service providers [4]. These products lead to a superficial and shallow engagement with the financial system [4, 56], and do not address the problems derived from financial inclusion itself, such as indebtedness [4]. Rather than financial inclusion, we take inspiration from the concept of "financial citizenship" [49], which demands that people not only have access to financial services, but also the "*opportunity and capacity to shape the way the financial system functions*" [4].

This paper makes three contributions to HCI research on financial services. First, it investigates and describes how technology is being integrated into the financial coping strategies of those living with poor mental health. Second, it advocates technology as an institution of opposition and resistance to financial exclusion. Third, it proposes a set of design directions that can steer technology beyond financial inclusion and towards contributing to a more participatory model of financial citizenship.

2 RELATED WORK

Our work builds upon research spanning three areas: literature on money and mental health, HCI research on financial technologies and moneywork, and work on the notion of financial citizenship. We introduce each of these in the following sections.

2.1 Money and Mental Health

The connection between poor mental health and financial difficulties is well documented (e.g. [24, 39, 50, 70]). Those in debt or experiencing financial hardship are significantly more likely to have a psychiatric disorder [38], and those in financial difficulty struggle to recover from their mental health conditions [25, 34, 79, 80]. Although the association is clear, the mechanisms of the relationship between money and mental health are complex, and causality is hard to establish [18, 28, 29, 44, 50]. There are two main theories that seek to explain the relationship between money and mental health: social drift and social causation [50, 81]. The social drift hypothesis argues that financial hardship comes

as a result of mental health conditions and their impact on our ability to cope. However, the social causation hypothesis argues it is the stresses attached to money problems that cause mental illness [50, 80, 81]. Poor mental health can negatively affect our capacity to work - and therefore our income - as well as our memory, planning, problem solving and communication abilities, all of which can make money management more difficult [25]. This would seem to support the social drift hypothesis. However, studies have also found that recent experiences of hardship and deprivation negatively impact mental health [44, 80], and this would seem to support the social causation hypothesis. Topor et al. conclude that these two theories are not mutually exclusive [81]. The relationship between money and mental health has been described as "*bidirectional*" [25] and "*nonlinear*" [28], with money troubles and poor mental health feeding into each other and trapping individuals in a "*vicious cycle*" [69] that becomes difficult to escape [28]. Improving our understanding of how the cycle of mental illness and financial hardship unravels can help develop more effective interventions to support those struggling with their mental health [25, 35, 44].

Existing research into the subject of money and mental health has been mostly undertaken within the fields of psychiatry, psychology, and social work, with a few studies focusing on the daily money practices of people with mental illness (e.g. [13, 28, 34–36, 70, 81]). This research has uncovered several financial "*coping strategies*" [23], i.e. problem-solving behaviours and adaptations that allowed participants to get by [23]. These include i) taking advantage of subsidies, community programmes and other available assistance for housing, utilities, food and leisure [13, 36, 81]; ii) relying on social networks [28, 35, 36, 81]; iii) cost-efficient shopping [13, 36, 81]; iv) careful financial planning [35], which involved activities such as budgeting [13, 36], prioritising [13], earmarking [35], spending self-discipline [36], and even doing without basic necessities when needed [81]; v) debt management, which included both avoiding credit [13] and borrowing when necessary [35, 81]; vi) seeking additional income [28, 35, 36, 81] by pursuing activities such as collecting cans, selling cigarettes, taking part in research studies [36, 81] or finding part-time work [28]; vii) attempting to save money [13]; and viii) nominating a legal guardian to manage their finances on their behalf [81]. This body of research has also revealed the main challenges experienced by those with poor mental health when engaging with financial services: cost and lack of friction. Given how poor mental health is often associated with lower financial income [80], this group is disproportionately affected by fees and charges [35, 81]. Lack of friction in payments, transfers and obtaining credit is also particularly damaging for people with mental illness [35]. This is because their symptoms may include impulsive shopping and over generosity [35, 70], as well as a need "*to comfort themselves through spending*" [35].

2.2 Technology and "Moneywork"

Both Caplan [13] and Harper et al. [35] touch upon the subject of financial technologies in their studies of money practices and mental illness, highlighting their potential for good. Caplan describes how getting welfare benefits deposited into bank accounts rather than paid by cheque, and paying bills online, helped participants save time and money [13]. In their discussion, Harper et al. postulate that "fintech" offers "*promising, low-cost ways to help people add friction to their spending, to put money aside as savings, and even to borrow*" [35]. However, their research also exposes some of the problems associated with technology in financial services. For instance, although payday lending and their often abusive practices are illegal in some US states, they remain accessible through online channels. Online bill payments by debit card can move bank accounts into negative numbers even if account holders have not opted into overdraft services, which results in charges and penalties [35].

In spite of the contradictions and complexities that surround the introduction of technology in financial services, no study has yet looked specifically at the effect of these technologies in the cycle of mental illness and financial hardship,

or the role they play in the coping strategies and challenges of those living with poor mental health. This is a subject that HCI is well positioned to address, but has yet to do so. A recent literature review of the last decade of HCI research on affective health [72] does not mention any papers looking at financial matters. HCI literature on money has paid some attention to the particularities of managing on a low income (e.g. [76, 77, 87, 89]), and to the financial lives of older adults [19, 84, 86], but not to those struggling with mental illness. Although there is overlap between the financial strategies and circumstances of those living on a low income and those living with poor mental health [35, 81], the latter also face particular challenges. For instance, their symptoms can make it harder to control spending [35, 69, 70]. They may also have limited capacity to make financial decisions at certain times [35]. At such times, and akin to studies of the financial needs of older people needing support from carers [84], people suffering from poor mental health can benefit from third party assistance with money management [52]. However, their needs when receiving help with minding money are different from the needs of older adults. Incapacitating age-related conditions are often permanent or degenerative, coming with expectations of increased support over time. By contrast, impairment connected to poor mental health tends to be intermittent and fluctuating [52], with people requiring varying degrees of support at different times. These particularities make those struggling with mental health a distinct population in terms of day-to-day financial practices.

HCI can also contribute concepts and frameworks for the study of the financial practices of those struggling with their mental health. Reflecting on the effort required from their participants in order to make ends meet, and the health consequences of their constant preoccupation with money problems, Harper et al. conclude that *"normative conceptions of 'work' fail to capture the labors of those who live with both mental illness and very low incomes"* [36]. The notion of "moneywork" [66] can help address this issue. The term "moneywork" was initially coined by the sociologist Sandra Colavecchia, who defined it as the *"labour of managing family finances"* [15]. The concept has been expanded by the HCI literature to include *"the physical and social interactions that users make individually and collectively in order to enable transactions"* [47]; as well as the hidden labour done by users in order to make money work for them [58]. In this broader sense, "moneywork" has inspired HCI research on alternative currencies [66]; personal financial management [47]; payments for ride-hailing services [40, 58]; loan repayments by rickshaw drivers [61]; and financial third party access [65]. Even before the term "moneywork" was adopted into this field, HCI researchers have demonstrated a commitment to the study of money from the perspective of the hidden work it demands (e.g. [51, 67]). The notion of moneywork, as conceptualised in HCI literature, can thus provide a useful framework for the study of the added labour taking place within the cycle of mental illness and financial hardship.

2.3 Financial Citizenship

In a paper published in 1995, Leyshon and Thrift proposed the concept of "financial citizenship" as a form of resistance against the exclusionary practices of the UK banking industry, which during the 1990s started to redirect credit towards wealthier social groups in order to avoid risk, and concentrated branch closures in lower-income areas [49]. The authors compared these exclusionary practices to state borders, since they resulted in a financial system that, like states, creates a distinction between those on the inside (citizens) and those on the outside (non-citizens). The concept of "financial citizenship" was thus coined as a way of *"putting pressure on states to reform their financial systems so that they include rather than exclude"* [49]. In 2009, Leyshon defined "financial citizenship" as a *"concept that recognizes the significance of the financial system to everyday life and confers a right and ability on individuals and households to participate fully in the economy and to accumulate wealth"* [48]. As such the concept of financial citizenship intends to contribute to a *"critical reevaluation of the concept of financial inclusion"* [48], which has been criticised for yielding only market-based

interventions that engage individuals purely as consumers rather than citizens [48, 54]; for focusing on access over usage [59]; and for introducing new problems, such as indebtedness [4].

Proponents of "financial citizenship" share an opposition to the financialisation of the state, which involves the dismantling of public welfare mechanisms and the "*responsibilisation*" of citizens [3]. The "*responsibilised citizen*" [3] is required to forgo the public resources they are ultimately entitled to, and become instead individually accountable for their own financial security and well-being [3].

At the root of "financial citizenship" is also a call for the introduction of democratic oversight of financial processes [3]. According to Ingham, the power to create money is exercised jointly by the state and a banking system over which there is no democratic control [37]. Financial citizenship would entail the recognition that individuals also possess certain rights with regard to the socio-technical system that produces money and maintains its value [37]. Riles builds upon this idea and suggests that citizens must have a role in the stewardship of the economy [71]. They should participate in the choices and decisions involved in financial governance so as to strengthen our collective - and not just our individual - economic well-being [71].

Through its emphasis on rights and collective well-being, financial citizenship can help us move away from narratives that portray those in financial difficulty as irresponsible [64]; and those struggling with their mental health as fragile, impaired or vulnerable. By insisting on democratic oversight, financial citizenship also undermines processes of individual responsibilisation by foregrounding the role that institutions and socio-technical structures play in our personal financial circumstances. This paper explores the presence and use of financial technologies at the intersection of money and mental health through the HCI concept of "moneywork", and the participatory qualities of "financial citizenship". It does so in collaboration with people who self-identify as living with a mental health condition. In the next section, we describe how that collaboration took place, how data was collected and analysed.

3 STUDY DESIGN AND DATA COLLECTION

The data we report on was collected between July and October 2019. The research engaged with 14 people who self-identified as living with a mental health condition, with whom we carried out a 90-day diary study through mobile messaging and paper diaries, together with semi-structured interviews conducted at the start and the end of this period. Our study had two main purposes. First, we sought to understand and explore the financial practices of those living with mental health conditions and how participants used and integrated financial technologies into money management. Second, we were conducting an evaluation of a new mobile application designed for people living with mental health conditions. For the purposes of this paper, we focus on the former, with the latter being reported separately elsewhere [65]. This paper reports on an entirely different analysis and data to this other work.

The study started with a semi-structured interview, during which we discussed participants' mental health history, their economic circumstances, money management and banking habits, as well as information and communication technology use. The 90-day diary study commenced immediately after this initial interview, and was carried out through mobile messaging and paper diaries. The paper diaries were designed and printed by the researchers specifically for the study. They invited participants to reflect on their daily financial lives, and included prompts about mood, personal finances, the role of money in activities, events and relationships, as well as space for paper financial artifacts such as receipts. After the 90 days, 13 of the 14 participants agreed to take part in a closing interview, during which we discussed the impact of the study on their money management habits and practices.

The research was conducted in collaboration with the Money and Mental Health Policy Institute, a UK charity focused on advocating for the needs of people living with mental health problems in the financial services sector and

shaping policy in this space. As well as supporting the recruitment of participants, they advised the research team on how to engage participants responsibly. Upon their recommendation, the researchers put in place safeguarding policies and procedures. The research received ethics approval from **Northumbria University**.

3.1 Study Participants

14 people **who self-identified as living with a mental health condition** were recruited from a sample of 5,000 research volunteers administered by the collaborating charity. **This self-identification was core to the study, which wanted to acknowledge the value of subjective experiences and understandings of mental health.** Participants were not required to disclose any details about their age, mental health **diagnosis** or employment status as part of the research protocol. **We did not gather this data in an effort to minimise the private information collected. In addition, we did not consider age directly relevant to the study, and nothing in the data we gathered suggested fundamental differences in financial technology use based on participants' age.**

Some participants chose to **share information about their age, mental health and employment status** during their interactions with the researchers. Eight disclosed their age, which ranged from 27 to 60 years old; and 12 mentioned a mental health condition, diagnosis or symptom. Four participants reported being diagnosed with borderline personality disorder, three with bipolar disorder, two with post-traumatic stress disorder, one with schizophrenia and one with agoraphobia. In addition, participants disclosed suffering from depression (6), anxiety (4), panic attacks (2), paranoia (2) and psychosis (1). Conditions often co-existed: seven participants reported more than one of them, and the same number acknowledged some kind of physical ailment. These included osteoarthritis, tinnitus, diabetes, fibromyalgia, chronic fatigue syndrome, irritable bowel syndrome and spinal injury. Two participants also had a history of addiction to gambling (1) and alcohol (1).

All 14 participants shared their employment status: five participants were employed full time; eight were off work and received social welfare or income protection benefits; and one worked part time and received welfare benefits to complement their income. 11 participants had personal experience of debt, either in the past or during the time of the study; and five had liaised with debt relief and support services. Debt seemed to derive mostly from credit card and bank account overdraft use. Table 1 summarises the health and financial circumstances of the study volunteers.

All 14 participants owned a smartphone (7 iOS and 7 Android). Eight of them also mentioned having a second device: five a computer and three a tablet. Although as a group they seemed comfortable with digital tools and devices, they were not by any means expert technology users.

3.2 Data Analysis

The study gathered 27 interviews, which **were recorded and resulted** in over 25 hours of audio material. **Average interview length was 62 minutes. The study also collected 283 mobile messages and 8 printed diaries. Diary use was voluntary, and 7 of the 14 participants chose to fill them. P6 also kept a separate personal diary during the study period and handed it over to the researchers, for a total of 8 diaries.** To identify the source of participants' quotes within this paper, unique identifiers will be followed by "_opening" for the opening interviews, "_closing" for the closing interviews, "_mobile" for the mobile messages, and "_diary" for the paper diaries.

Data was processed as follows: interview audio recordings were transcribed verbatim; mobile messages were exported into text files; and diaries were scanned and transcribed. We performed thematic analysis [11] on the interview transcripts, mobile messages and diaries, applying an inductive approach to the coding phase. **A first round of coding was done by the first author using the Nvivo software application. The resulting codes were then discussed and iterated**

Table 1. Participants' profile

ID	Gender	Age	Mental health	Physical health	Income	Debt	Debt Support
P1	F	27	Borderline Personality Disorder Post-Traumatic Stress Disorder	Endometriosis	Benefits	Yes	-
P2	F	-	Post-Traumatic Stress Disorder Depression	Osteoarthritis Tinnitus	Benefits	Yes	Yes
P3	F	48	Depression, Anxiety	-	Work F/T	Yes	-
P4	F	42	Depression Gambling addiction	Chronic pain	Benefits	Yes	-
P5	M	46	Schizophrenia	-	Work F/T	Yes	-
P6	F	44	Depression, Anxiety	Diabetes Recovering from surgery	Benefits	Yes	Yes
P7	M	60	Bipolar Disorder	-	Work F/T	Yes	Yes
P8	F	41	Borderline Personality Disorder Depression, Anxiety Panic Attacks, Paranoia, Psychosis	Fibromyalgia Chronic Fatigue Syndrome Irritable Bowel Syndrome	Benefits	Yes	Yes
P9	F	-	-	Unspecified disabling physical condition	Work P/T + Benefits	-	-
P10	F	46	Borderline Personality Disorder Depression, Agoraphobia	Spinal injury	Benefits	Yes	Yes
P11	F	-	Bipolar Disorder	-	Work F/T	-	-
P12	F	-	-	-	Benefits	Yes	-
P13	M	-	Borderline Personality Disorder Anxiety, Panic attacks Paranoia, Alcohol Addiction	-	Benefits	-	-
P14	F	-	Bipolar Disorder	-	Work F/T	Yes	-

by the first and second authors. The process rendered 188 codes that were imported into a web-based kanban board to enable remote collaboration between all authors during theme development. All authors collaborated in this process, revising and negotiating disagreements in coding and themes. The emphasis during these discussions was not on reaching agreement about which code to apply to a given unit of text, but in developing themes as recurrent topics representing the phenomena under study [53].

Three broad themes emerged during the analysis process: i) activities, tasks and work involved in financial collaboration; ii) use and impact of the evaluated mobile application; and iii) role of technology in money management. In what follows, we delve on the last of these 3 themes, describing how mental health conditions affected our participants' relationship with money; the role that technology played in their financial coping strategies; and the impact of the digitisation of financial service provision.

4 FINDINGS

Most of our participants had a *"turbulent"* (P7_opening) relationship with money that was severely impacted by their mental health. Their conditions affected their ability to work and therefore their income, their spending behaviour and their motivation to attend to financial affairs. As a result of these challenges, many of our participants had experienced debt and financial hardship. Despite the clear links between their health and their economic situation, our participants tended to blame themselves. Although acknowledging the impact of their mental health conditions, many still believed they were bad at managing money. For example, P13 told us he was *"very crap with money"* (P13_closing), P1 that she was *"terrible with money"* (P1_closing), and P8 portrayed herself as *"A person who is not good with money"* (P8_closing), as did P11. P3 said she was *"not very good on numbers"* and *"not a plan ahead girl"* (P3_closing); and P14 found *"quite hard managing money on my own"* (P14_opening).

During the study, however, it became clear that participants had developed a keen awareness of their own financial behaviours, and invested significant effort in building strategies to minimise the impact their mental health had on their finances. The researchers found them to be rather good with money, and extraordinarily committed to becoming even better. In what follows, we describe some of our participants' financial coping strategies, and how they were supported by financial technology. After this we go on to discuss some of the challenges introduced by financial technologies, and the additional labour they often demanded from our participants.

4.1 Technology-Supported Coping Strategies

Our participants had to contend with the impact of their health conditions over their finances. To get by, they made use of every *"coping strategy"* [23] identified by the literature on surviving on a low income (e.g. [12, 13, 23, 41, 76, 87]), including earmarking [41, 87]; monitoring [76, 87]; budgeting [13, 41, 87]; making use of subsidies, community programmes and support from personal networks [12, 13, 23, 76]; cost-effective spending [13, 76]; raising income through informal or semi-formal activities [23, 76]; debt management [13, 76]; saving [13]; and spending control [12, 76]. Several of these financial coping strategies were supported by technology, which played a fundamental role in making them possible. In what follows, we provide examples of how earmarking, financial monitoring, budgeting, cost-effective spending, and raising additional income were undertaken using technology.

4.1.1 Earmarking. Earmarking refers to the practice of designating *"separate uses for particular kinds of money"* [91]. Vines et al. mention how some of their participants still used cash and *"little jars"* for earmarking [87], but none of our participants earmarked with cash any longer. Earmarking was done through bank accounts and credit cards instead.

Current accounts, joint accounts and savings accounts were all used for earmarking. For instance, P8 had designated the income from one of her welfare payments *"to cover the bills"* (P8_opening). That money was paid fortnightly into her current account, but she would move it into a separate savings account to ensure it would not be spent on anything else: *"I have no choice because if I had all the money in my current account, I couldn't guarantee that it would be there to pay the bills"* (P8_opening). For P8, this allocation of funds to essentials in advance was a strategy against her difficulties with spending control, which were related to her borderline personality disorder:

part of my symptoms of my borderline personality disorder is that I have this tendency to obsess over things. So like when I get an obsession it becomes all consuming. So like I had a thing about Kipling handbags and I ended up with about 30 of them. I had a thing about tarot cards and I've got about 60 odd decks now. God knows. So I go through those phases. (P8_closing)

P4 similarly used a separate current account for the money arriving from her Christmas savings club. That way she stopped the funds she had earmarked for Christmas shopping from being used to pay bills or her overdraft. Once

more, strict allocation shielded P4 against overspending, in particular her tendency to buy items to self-soothe during depressive episodes, something she compared to *"comfort eating"* (P4_closing).

Our participants also used credit cards for earmarking based on different criteria, such as the type of spending (essential vs. luxury) and the transaction amounts. P14 had two credit cards: she used one of them for essentials like food and fuel, and the other one for non-essential spending and small treats like *"hair and beauty"* (P14_opening). P14 found money management difficult and avoided financial matters while unwell, so this division between essential and non-essential credit cards was likely to support her financial monitoring efforts. P11 also had two credit cards: one that offered 0% interest for purchases, and a second one that offered free cash withdrawals abroad. She used the former for sizable purchases, such as furniture for her new home. The latter was *"mostly just for holidays"* (P11_opening), and day-to-day spending like fuel and shopping. P11's credit card use was marked by negative prior experiences, where the instant availability of credit had fed the impulse and comfort spending that often accompany bipolar disorder [70]:

last year when I was manic, I'd made a £6000 investment in someone who had claimed to be a psychologist who was not a psychologist (...) I've done it with depressive episodes as well and emotional spending.
(P11_opening)

P3 also had several credit cards that were carefully managed due to her past experiences of debt partly caused by comfort spending:

I don't think I have excessive spending habits now, but I know that definitely did. I would buy all sorts of nonsense that I didn't and never would need, but I did it in an attempt to try to make myself feel better.
(P3_opening)

P3 would use one of the cards for any household-related spending over £100 in order to benefit from purchase protection. She had a second credit card with a higher credit limit that would be used only occasionally for big items like booking holidays. Finally, she had a third credit card that offered free foreign currency transactions, and would be used only when abroad. That card *"just sits tucked away. It's actually in with our passports somewhere ready for the next holiday. (...) Then there's no temptation to have some nonsense that you don't need in your life."* (P3_opening). P3's credit card discipline was rooted in her experience of debt. In spite of the dangers of easy credit, she trusted the system she had put in place: *"it's easy to get out of control but I think I'm managing relatively okay"* (P3_opening).

The availability of almost instant money transfer functionality via digital banking facilitated widespread use of bank accounts for earmarking. Six participants (P1, P2, P4, P7, P8 and P12) specifically mentioned transferring money when describing their digital banking use. In the case of credit cards, our participants were apt at identifying and assessing their different features and perks, and carefully allocated spending based on them.

4.1.2 Financial Monitoring. Financial monitoring refers to the habit of checking one's finances through *"occasional glimpses"* [41] in order to maintain a *"peripheral awareness"* [87] of the state of one's financial affairs. Kaye et al. observed that the most common means of financial monitoring between their participants was accessing Internet banking via a personal computer, with only *"some"* [41] using their mobile phones. In the case of our participants, all of them used mobile banking apps for financial monitoring. In fact, that was the main reason for engaging with such apps.

For some participants, mobile app use came with additional challenges related to their mental health. For instance, P2 had decided to give up using her bank's mobile banking application, along with other apps on her smartphone, in an effort to minimise distractions and address her concentration and attention problems. However, she had started using mobile banking again six months before our study because her account had started falling into overdraft. She felt she

needed "to keep tabs on things" (P2_opening), and reinstalled her mobile banking app specifically for that purpose in spite of the negative effects it could have on her concentration.

For some, financial monitoring involved checking balances, verifying incomings, tracking automated bill payments, and keeping an eye on outgoing transactions:

I'm double checking transactions have gone through and when they went through. I double check direct debit dates. (...) I check the amounts are correct and I particularly check not going below a certain amount as well. (P9_opening)

These activities not only contributed to awareness: they also allowed participants to ensure they had enough funds in the right places to meet their financial commitments: *"I just check my direct debits. I check the dates when they are coming out so I know then that I need more money in there at that particular time"* (P4_opening). P6 and P9 felt that this monitoring also protected them against fraud, and checked their accounts to ensure *"that there hasn't been any fraudulent activity"* (P6_opening).

For our participants, digital banking in general, and mobile banking in particular, had become the main ways of monitoring their finances. Tracking money was particularly crucial for them, given the negative impact mental health conditions had on their income. Eight participants (P1, P2, P4, P6, P8, P10, P12 and P13) were forced to stay out of work altogether, which meant getting by on meagre welfare benefits. For others, like P11 and P9, poor health affected the amount of time they could dedicate to work. For instance, P9 was forced to work only part-time, and had to rely on state benefits to top up her income. Having to survive on a reduced income was also the main factor behind budgeting efforts, to which we turn next.

4.1.3 Budgeting. According to Caplan, budgeting *"describes a systematic way to track and plan for expenses"* [13]. Three of our participants engaged in this kind of systematic budgeting (P5, P9 and P11) with the support of digital tools. P9 also maintained a paper tray in order to aid coordination with her husband - who disliked digital financial tools - and as an insurance policy against technology glitches and annoyances:

we've created a paper folder between us so that all of the direct debits are all printed out and we've got copies (...) for each, whether it's utility or it's [mobile phone provider] or whatever, so that any time, you now, technology decides to be annoying or just overcomplicated, we have got that file. (P9_closing)

For herself, P9 had experimented with several money tracking apps, and had settled on a particular one because of its short-term planning capabilities:

I have been using some other apps (...) to try and keep a handle on things, particularly Emma because you can track your future payments. Sometimes it is not just about what you have spent or are spending or amounts of money. It's that future thing: what have I got coming up in the next week or two that we need to be aware of? (P9_closing)

P5 and P11 instead made copious use of spreadsheets, which required substantial manual data entry and tracking. For both participants, this monitoring habit had been prompted by a sudden period of financial difficulty. This is similar to findings from Buckland et al., who reported that participants' drop in income *"forced them to either begin budgeting or to budget more strictly"* [12]. P11 had recently started her spreadsheet after ill health prevented her from working:

I've had to take time off work for a little while with ill health so we are putting a spreadsheet together to make sure we can cover these periods for future occurrences. (P11_mobile)

P5's spreadsheet started with his divorce:

because of divorce that started 3 years ago, my financial situation was quite dire let's say. So I really had to be very, very anal in managing my money because it was, you know: I was struggling to pay for food, let's say. Even though I had a good income the situation dictated that. I had to be really strict on myself with finances. (P5_opening)

P11 tracked her personal spending with the spreadsheet, and made *"personal budgets"* that included *"best case/worst case"* scenarios *"for a couple of months at a time"* (P11_opening). P5 kept his spreadsheet *"on a cloud"* (P5_closing), so that he could access it from anywhere and any device. In it, he included all his bank accounts and credit cards, all automated bill payments with their due dates, and all regular payments such as rowing club fees and child maintenance. He added manually all card transactions and cash withdrawals on a daily basis. He also took the trouble of reconciling it with the mobile banking app: *"I go on [the mobile banking app] to check my balance and my transactions and tick it off my Excel spreadsheet"* (P5_opening). This detailed tracking system allowed him to *"know exactly where I am"* (P5_closing) in financial terms.

4.1.4 Cost-effective Spending. Cost-effective spending [13] refers to the various means by which people attempt to pay as little as possible for products and services. These include, for instance, *"carefully checking catalogs and supermarket shelves"* [76] for special offers, buying in second-hand or discount stores, buying in bulk, using coupons and loyalty cards.

Many of our participants' cost-effective spending strategies involved digital technology. P7, for example, made the best of the features provided by traveling websites in order to spend as little as possible on trips, and to protect himself from losing money if he could not travel for **mental** health-related reasons:

I like to travel as much as possible and do it on an extremely tight budget. As opposed to looking for a specific destination I look for the best deals on flight, as cheap as £32 return for my next one. I then book budget accommodation on [hotel booking website], only bookings that I can cancel up to the day before arrival. I do this in case I get hype or depressed and can't travel. It means I'd only lose the cost of the flight. (P7_diary)

P2, P6 and P19 mentioned buying through cashback websites. P2 and P6 happened to use the same one: TopCashback, which is popular in the UK. P2 explained how you can get pretty much anything through it: *"your new mobile phone contract, change your new broadband provider, or even your electricity or gas"* (P2_closing). During the study, P6 used TopCashback to buy a tin of paint for her mother, and her new iPhone. P3 used her bank's cashback programme instead, which was available via her mobile banking app:

they have this retailer offer thing where you get cash back if you spend with them. Sometimes you think, well I shop there frequently so I might as well just use it, get these bonuses. It's not much, it's not a fortune, but it's worth a look. (P3_opening)

She would also check this cashback programme for restaurant offers before treating the family to a meal out. P5, P6 and P9 used price comparison websites to get the best possible deals. P5 described how he used them to review his bank and utility providers every year:

I joined [my bank] three months ago, four months ago because they were offering £125. Plus, if you stay with them 12 months, you get £50. I pretty much each year look at all that kind of stuff. Utility bills, I make sure each year I go onto a comparison site and get the best deals. If there's a bank account that's

offering me some money to change, it's so easy to change nowadays, why not do it ... £125 is £125 at the end of the day. (P5_opening)

Finally, P5 and P7 had opened accounts with some of the new UK mobile-only banks, known as "neobanks" [21], to save on foreign transaction fees: *"if you use it abroad, there is no charges from that and it's like a really good exchange rate you get"* (P7_closing). P5 used his neobank account exclusively for traveling: *"I've just used it for going abroad. (...) they don't charge you a percentage for the exchange rate and you get the best exchange rate as well. If you're going abroad, it's stupid not to use it really"* (P5_opening).

As illustrated by the examples above, participants made the best of digital services to optimise their spending.

4.1.5 Raising Additional Income. Studies about living on a low income have shown that people often resort to informal or semi-formal activities to raise additional money (e.g. [23, 35, 36, 76, 81]). For instance, some of Snow et al.'s participants sold *"household items through informal economies such as Gumtree, Facebook and local markets or jumble sales"* [76]. Three of our participants did so as well (P3, P5 and P10), but exclusively through digital marketplaces: no brick-and-mortar markets were mentioned.

When going through the apps installed on his phone, P5 listed Shpock and Gumtree, which he used *"if I want to sell some stuff"* (P5_opening). P3 wrote in her diary about *"trying to turn items into cash. It feels productive"* (P3_diary). She mentioned listing her items on Facebook Marketplace and eBay.

This income-generating activity was particularly meaningful for P10, for whom the impact of poor mental health had been sudden and severe. P10 was a teacher and had been in full-time employment until relatively recently, when her health situation deteriorated and caused her to stop working. Unable to keep up her mortgage payments after losing her income, she had been forced to put her house up for sale and move in with her mother. She felt ashamed about her situation and was eager *"to go back to work and be independent again"* (P10_closing). With help from her sister, she had started to look *"at practical ways that I can improve my finances and selling things that I don't need on eBay (...) I do give a lot of things to charity, but I've set up eBay for the first time ever instead of giving it to charity"* (P10_closing). For P10, the ability to engage in this income-generating activity represented a step towards regaining control over her life.

4.2 The Impact of Digitising Financial Service Provision

All of our participants were smartphone users, banked online and on their mobile phones. They found Internet banking useful, and seemed satisfied with their banks' mobile banking applications. As demonstrated by the coping strategies described above, they made the best out of the opportunities offered by financial technologies. However, they also identified aspects of the digitisation of financial service provision that significantly hampered their ability to manage their finances. These included adding difficulty to financial monitoring, constant temptations to spend, lack of friction and increased money management work.

4.2.1 Adding Barriers to Financial Monitoring. Participants brought up the consequences of the move from cash to cards. P8 believed that *"since we took the physicality out of money, it's made it harder for people to realise what they are spending"* (P8_opening). P3 explained that sometimes she would *"try to just take the cash out and not touch any cards. (...) Sometimes having the money in your hand seems a little bit more real than bits of plastic"* (P3_opening).

Some participants disliked the delay between paying by card and the transaction appearing in their bank accounts. P8 explained that *"sometimes you pay in a shop and it doesn't come off your balance for a couple of days"* (P8_opening). P5 observed how, after paying by card, merchants *"don't necessarily like to give you a receipt, so you don't have a record"*

particularly. So you only find out a few days after" (P5_closing). Delays in transaction recording made it harder to maintain an up-to-date awareness of the state of one's finances, and introduced doubt and uncertainty in reported balances. The consequences of the dematerialisation of money and the impact of delays on financial monitoring may have been particularly noticeable for our participants, given their difficulties with spending control, their struggles with motivation, and their reduced income.

P9 found that the move to digital banking had made it harder for her and her husband to collaborate in the management of their household finances. Digital banking required them to access their joint account separately through their personal banking credentials, something P9 perceived as isolating. The strictly individualised digital access to the joint account compared badly to the experience of paper statements:

we've got a joint bank account, but we are often not viewed as a couple. (...) He's always seen as a separate entity, but he is not a separate entity. We've never thought of ourselves in that way (...) you'd get your statement in the post previously that you were both immediately able to open because it was Mr & Mrs. It was to both of you and therefore you can both look at it together. That's completely gone, you're now treated as two separate people. (P9_opening)

P9 believed her and her husband should have a joint way of accessing digital banking that replicated the experience of reading the same paper statement. Because this did not exist, they developed their own workaround: P9 would access the account using the mobile banking app on her smartphone, and her and her husband would look at the information on the screen together.

Existing digital banking tools, albeit useful, did not compensate for these shortcomings. Participants asked for improvements in terms of "reporting and tracking" (P11_opening) of expenses, particularly those involving small amounts. They also wanted tools that helped them with short-term planning, calculation of "projected spend" (P9_opening), and ring-fencing money for essential bills. They observed that, in spite of all the technologies available, they still needed to calculate for themselves simple and obvious personal financial metrics, such as what their disposable income would be for the month, or whether their balance would cover their bill payments within the next 2 weeks.

4.2.2 Constant Temptations to Spend. Participants appeared subjected to constant temptations to spend, particularly from online services. This posed a serious challenge to their financial stability, since it compounded with the negative impact of their mental health conditions on their spending behaviour. Each participant had their own "downfall" (P4_opening). For P2, P8 and P13 it was e-commerce services like Amazon and eBay: "I shouldn't have the Amazon app and I shouldn't have the eBay app. They're dangerous" (P8_opening). For P4, who had a history of problem gambling, it was freemium mobile games and online bingo. She was trying hard to keep away from online gambling sites, which for her acted as a comfort mechanism:

last week I went back on to [online bingo service] (...) but I haven't been on any gambling sites. I've kept away from them ... but that's what I go back to. I go back to a familiar place. That like settles my head, but then, you know, it is not good. (P4_closing)

For P3, the problem was offers delivered by text or email:

the text comes or on email: 'try this'. And you know actually, before it came through, you weren't going to try it. Suddenly you might have gone and spent £40 that you weren't going to. (P3_closing)

P3 also commented on how the lack of friction in contactless payments could lead to overspending, and called this payment technology "a danger zone" (P3_closing). Even financial mobile apps could act as an invitation to spend. P14

considered her mobile banking app a useful tool *"to keep track of things"* (P14_opening), but she also pointed out that the app had a darker side:

sometimes it will work in the opposite way, because then it's like I see I've got a little bit of credit or I've got some money in my account, so I spend it rather than just leaving it alone and not thinking about it. So yes [laughs] good and bad sometimes. (P14_opening)

She had the same issue with the mobile apps offered by her credit card providers:

again sometimes that can be a bit negative because if my credit's gone up, I will apply for more credit, so sometimes that can have an adverse effect. [Laughs] (P14_opening)

Participants also felt it was far too easy to obtain credit. According to P4, the availability of this *"easy money"* (P4_closing) caused an over-reliance on borrowing and contributed to untenable amounts of personal debt. One of P4's purchases provided an example of this technology-enabled easy credit. With her first grandchild on the way, P4 stumbled upon what appeared to be a heavily discounted nursery set. Since she couldn't afford to pay it outright, and could not borrow any further from her bank, she used PayPal's credit facility instead:

I didn't pay that out of my normal account. I got PayPal credit (...) you get 4 months interest free to pay it. So as long as you pay within the 4 months, you're alright like, so that's not a problem. (...) I have to pay £100 a month now for the next 4 months. (P4_closing)

She reflected on this experience, noting how in reality she did not have the spare funds for several months in a row to pay back what she owed, and could not really afford the amount she had borrowed via PayPal. Through constant temptation, both in terms of spending and credit, financial technologies undermined our participants' efforts to keep their spending under control.

4.2.3 Bringing Friction Back. Several participants had developed strategies to compensate for the lack of friction in both spending and getting credit. For instance, to stop himself from spending, P7 handed over funds to a trusted third party for safeguarding:

I had an insurance policy which is due to pay out in a few weeks. It's not a huge amount but will get me on a few trips. I've given half of it to my wife so I won't spend it. I'm keeping it if I ever need a replacement car. (P7_diary)

Motivated by the risk of impulse spending connected to his bipolar disorder, P7 had also started to experiment with lockable "saving pots", a feature provided by a neobank with which he had opened an account: *"The saving pots (...) you can lock them, so you can't try to spend it on anything. So then, if I was feeling manic, I would ... you know what I mean"* (P7_opening). In terms of credit, P7 also protected himself by opening a "basic" bank account that did not offer an overdraft facility, an action often recommended by debt support charities in the UK [14]. **At the time of the study, P7 was repaying credit card debt accrued during a manic phase when he was unable to control his spending, an experience that made him wary of credit facilities:**

I'm down to a basic bank account so I can't go overdrawn or anything like that. I'll not be able to get credit which I don't want. I'm quite happy with that. I've had enough of credit cards and things like that. They're just not for me and my problems. (P7_opening)

P10 had a basic bank account as well, **which she opened as part of her debt repayment plan. In her case, debt accumulated after being forced out of work for health reasons, and due to the lengthy process of applying for welfare**

benefits, during which she had no income. P10's basic bank account came with a top up debit card. She appreciated how the card added friction into her spending by introducing an opportunity to reflect:

I like how I can't just spend money, I have to actually think about it and transfer it onto the card first. I can't just walk into a shop and just spend money without thinking. (P10_opening)

Giving oneself the chance to think seemed a simple but effective way of exercising control. This approach was also behind P3's strategy of letting online baskets rest overnight as a way of managing spending impulses:

So this sounds really weird, but I am going to tell you anyway. When I feel I need to buy stuff, I go online and fill a shopping basket and then I don't actually go any further with it. I just leave it overnight then go back to it in the morning and delete everything because actually I don't need any of it. So it is really funny, if you just leave it a few hours how it can change. So I have saved myself a fortune doing that. (P3_closing)

P2 had developed a similar habit, that in her case involved deleting items after filling the shopping basket: *"I browse buy up to 200 (...) then after that I just go through and delete, delete, delete. [Laughs] Kind of crazy"* (P2_closing).

Perhaps the most extreme attempt to bring friction back was provided by P14 who, during a mental health crisis, decided to put all her money in the hands of her husband:

I think that I need to have some checks and balances in place. We've tried different things in the past (...) and for a little while, when I had my last really bad episode, my husband just dealt with all the finances (...) he took charge of everything and I had to (...) say if I wanted to go to the hairdressers, I had to say: can I borrow a card or could I have the money type of thing. (P14_opening)

This strategy proved unsustainable, but illustrates the difficulty of finding a *"happy medium"* (P14_opening) in terms of financial friction: *"I found it too constricting, and it's quite hard to find a middle ground really where you don't feel like you're being, sort of, not exactly controlled, but being monitored"* (P14_opening).

Left to their own devices, participants had to develop their own workarounds to compensate for the lack of friction, since financial tools offered little or no support in this regard.

4.2.4 Additional Moneywork. Although financial technologies delivered convenience and streamlined certain tasks such as bill payments and bank transfers, they also introduced new forms of moneywork. In some cases, they required extraordinary amounts of time, energy and effort. P9 wrote in her diary about using *"different apps, voucher schemes + cashback sites to save money. It can be time consuming and hard work but it's gotta be done"* (P9_diary).

Cashback services and price comparison websites seemed particularly demanding, often for little returns. P6 described for us in great detail what was involved in purchasing her new smartphone through one of the cashback services available in the UK:

I purchased my new phone contract via TopCashBack (TCB), as I do with all my online purchases where possible. First irritant was that the day before I placed my order, the cash back rate was £130 however it had decreased to £70 when I came to order. I then found that Quidco were offering £120 so I took a screen print of it so that I could send to TCB for processing under their highest cashback guarantee policy. Second irritant was that for some reason my cashback transaction didn't track properly and failed to show in my account after seven days so I had to submit a query ticket to TCB for them to investigate. (P6_diary)

In order to get an amount close to the £130 initially offered, P6 had to check how much cash back was offered by a competitor, get evidence of it being higher than the one offered by her chosen service, and submit the corresponding claim. In addition, she was forced to query the transaction, since it somehow managed not to appear in her account

after 7 days. Finding that out would of course have required her to remember checking her cashback account after the 7 days had passed. P6 ended up receiving £120 for the transaction, which seems a sizable amount. However, P2's testimony paints a different picture of the returns one can expect from the time and effort invested in using these cashback services. She told us that 4 years using TopCashback had yielded £800: just a little over £16 per month.

The returns of price comparison websites seemed even lower, but participants used them following recommendations from money advice services that position comparing products to get the best deal as financially responsible. P6 described for us what was involved in following this advice when renewing car insurance:

I always make the effort each year to shop around to see if I can get a better price (...) As per my usual routine, I followed the guidance provided by Martin Lewis and began by obtaining quotes from the comparison sites Money Supermarket, Confused.com, Go Compare, Compare The Market and Quotezone. (P6_diary)

As if comparing prices across 5 different websites wasn't enough, P6 also obtained quotes from 2 additional providers: "Direct Line and Aviva, as these don't feature on comparison sites" (P6_diary). In addition, she "ran a 'new customer' quote" (P6_diary) using the website of her current insurance provider. After half an hour on the phone with them, her "haggling paid off" (P6_diary) and P6 managed to obtain a discounted price for new customers in her insurance renewal.

This participant invested a whole afternoon running price comparisons across 5 websites, obtained quotes from 3 additional insurance companies, and spent half an hour on the phone in order to save £60 a year: just £5 per month in return for a whole afternoon of intense moneywork. It is those for whom small amounts like this can make a difference who take on the disproportionate amount of work needed to save them.

5 DISCUSSION

The findings of our study highlighted how, while our participants perceived themselves as "bad with money", their financial coping strategies and the way they integrated technology into them demonstrate self-awareness, knowledge about their health conditions, financial capacity, as well as motivation and willingness to improve their economic situation. This resonates with prior research, which found those living under the "double trouble" [81] of financial hardship and mental illness resourceful [13], hard working [36], and "essentially able to manage living under strained financial circumstances" [81]. Financial capacity is, for the most part, not the problem. In spite of this evidence, initiatives connected to money and mental health continue to focus on individual capacity, for instance by providing financial literacy training [35], as well as coaching and other therapeutic activities intent on convincing recipients they can free themselves from "the traps of debt, poverty, unemployment and disability" [18]. This emphasis on capacity reflects a broader trend to individuate financial hardship, which is "assumed to stem from individual deficits" [34]. This individuation can be observed in both health provision and public policy. Topor et al. comment on the "tendency to medicalise and pathologise the habits of people living in poverty" [81]. Davies et al. criticise policy narratives based on the concept of vulnerability that "seek to individualise debt as a personal problem" [18]. According to this "vulnerability framework" [18], we are solely responsible for finding ourselves in financial difficulties, which are the result of our very own failures [18].

Our findings suggest that financial technology is also contributing to this tendency to individuate financial hardship and place responsibility on those who suffer from it. It does so in two ways. First, by individuating the medium of exchange. As Pahl has observed, "financial services and products have always been based on the idea of the individual consumer" [63]. New forms of money such as debit and credit cards transfer these ideas into the domain of payments. Compared to cash and cheques, they are "an essentially individualised medium of managing and spending money" [63].

This individuation can be observed in digital banking as well. Like most online services, digital banking assumes that each digital account *"will only be accessed by one person, ever"* [1], enforcing *"a strict one-to-one relationship"* [1] to access control even for joint bank accounts. These can be accessed by all account holders, but only through their individual digital banking identities, as P9 shrewdly observed. Digital banking even enshrines this strict individualisation through its terms and conditions [1]. Sharing digital banking credentials with someone else constitutes a breach of the bank's terms of service, and cancels all fraud protections [22]. Logging into someone else's digital banking, even if just to provide help with minding money, is considered a *"fraudulent behaviour"* [22]. Digital banking effectively enforces individuation, penalising any attempt to bypass it.

The second way financial technology contributes towards the individuation of financial hardship is through its relentless focus on optimisation. This was the driver behind most of the tools discussed by our participants, such as cashback and price comparison websites, *"voucher schemes"* (P9_diary), credit rating services, financial assistants and micro-savings applications. The responsibility to optimise one's income was also very much ingrained in our participants' practices, as could be appreciated in their regular use of such tools, as well as the time and effort invested in order to save meagre to modest amounts. The vast majority of "fintech" tools targeting consumers seem intent on helping us make the most of our money. This includes comparing products and services *"to ensure you find the best deal for your needs"* [74]; strengthening *"your credit history (...) by reporting on-time rent payments"* [17]; assisting with budgeting by showing us where we spend our money and identifying *"areas for improvement"* [82]; getting us to save *"no matter your paycheck's size"* [31]; or helping us understand our financial circumstances and giving us debt advice if needed [83]. As useful and convenient as they may be, these digital services never question whether the resources being optimised are actually sufficient to cover someone's needs, whether accrued debts are fair or should be contested, or whether the transaction data they are collecting indicates financial hardship and, if so, how to address it. In their drive for optimisation, these fintech tools effectively transfer all responsibility for financial well-being to the individuals who use them.

When technology reinforces the individuation of finance, it draws attention away from the role that institutional factors play in financial difficulty, and ignores that the association between poverty and mental health is *"a multi-dimensional systemic social issue"* [28]. The progressive withdrawal of government support, benefits and subsidies; a financialised economy increasingly reliant on debt; precarious labour markets [18]; lack of access to suitable and affordable financial tools and services; and the fundamental contradiction in banking between pursuing profit and the measures that would truly help those struggling to make ends meet [35] are some of those institutional and structural factors that contribute to financial hardship. All of them take a back seat while designers of financial technologies concentrate on optimising scant and ever diminishing resources. Prioritising optimisation also means we are paying less attention to the other design problems currently present in our financial technologies, such as the lack of friction and the barriers to financial collaboration.

5.1 The Design Shortcomings of Financial Technologies

Perhaps enticed by the promise of reduced marginal costs per customer [20], the financial industry seems to take for granted that introducing technology delivers convenience and makes it easier for people to manage their money. Although financial technologies do have strengths and advantages, in their current form they also have limitations and problems. These can be appreciated through the experiences and practices of those struggling with their mental health and their finances. In our participants' narratives, we can observe several dichotomies. For instance, Internet banking and mobile banking apps facilitate earmarking, and thus careful allocation of funds, through bank accounts. They do

so by enabling easy and almost instant transfers seven days a week all year round. At the same time, earmarking is undermined by the very same ease of transfer that makes it possible, since the careful allocation of funds becomes trivial to undo. In another example, all participants valued the contribution of mobile banking apps to financial monitoring, as these apps helped them remain aware of the state of their finances. However, as P14 explained, being constantly reminded of the availability of spare money or additional credit becomes a temptation to spend. Finally, financial technology's promise of convenience clashed against the additional "moneywork" it required from our participants. Although we no longer need to visit our local bank branch to pay our bills or transfer money, financial technologies place new demands on us that cancel out some of their purported efficiencies. Updating payment details in a myriad of ecommerce services every time our bank cards expire, cancelling or changing direct debits when we move accounts, trawling through dozens of options in price comparison websites to find a suitable deal, negotiating the quirks and glitches of cashback sites, and experimenting with an endless stream of new tools and services are some of the additional tasks our participants had to undertake in order to engage with financial technology.

Of the design issues surrounding financial technologies, one of the most pressing for those living with poor mental health is the lack of friction [35]. This is due to the fact that impulsive and compulsive behaviours, as well as comfort spending, are common symptoms in mental health conditions [35, 69, 70]. Lack of friction is present in both obtaining and spending credit [35], and prompts the development of personal strategies to add resistance in both domains. Handing over money to others for safekeeping, seeking bank accounts without overdraft services, using pre-paid debit cards, experimenting with neobanks' "saving pots", and letting online shopping carts "rest" overnight are all workarounds to increase friction that were deployed by our participants. Snow et al. describe a money tin devised by one of their participants that could only be accessed with a can opener, and where the difficulty of getting to the money inside helped spending control [77]. Through the lens of those trapped in the cycle of mental illness and financial hardship, lack of friction morphs from a symbol of convenience and choice into a deeply problematic feature, one that demands urgent attention from designers. The compelling effects of introducing friction in financial technologies are illustrated by Ferreira et al.'s account of SMS payments with the Bristol Pound [27]. The authors describe how a somehow slow and cumbersome payment system generated opportunities for playful and pleasurable interactions, social and community contact, engagement with local places and reflection about consumption and means of payment.

A second area in need of attention from designers is financial collaboration. Research about managing on a low income, as well as on money and mental health, has repeatedly shown the importance of social networks of support as a financial coping strategy. Vyas and Dillahun describe in depth the significance of community and sharing practices, and how they contribute to resilience in times of financial crisis [89]. Davies et al. observe how successful ways of dealing with personal debt *"involve seeking help and sympathy from others"* [18]. Topor et al. identify having a social network *"willing and able to provide help"* [81] as a key condition to manage in relative poverty, and list nominating a legal guardian during periods of crisis as one of the coping strategies of those living with mental illness. Ware and Goldfinger found that pooling resources and house *"loan funds"* helped alleviate poverty between people with mental illness living in shared accommodation [90]. Forchuk et al.'s participants identified *"having supportive relationships"* as one of the factors that helped them financially [28]. Enabling assistance with minding money and third party financial oversight has become an ever-present policy recommendation in the UK [8, 57, 60]. Meanwhile, collaborative features in financial technologies have been mostly limited to bill splitting (e.g. [5, 10]) and peer to peer mobile payments (e.g. [6, 7, 78, 88]). Albeit useful and convenient, these apps and features demonstrate a somehow superficial understanding of the meaning and impact of financial collaboration.

5.2 Towards Technologies for Financial Citizenship

Harper et al. appear confident about the potential of digital technologies to improve financial services for those living with mental illness, and list some examples of companies in the US that have begun to address both friction and financial collaboration [35]. Some progress has also been made in the UK, where some banks now allow customers to block payments to certain retailers (e.g. [30]), and technology startups are starting to engage with issues at the intersection of money and mental health (e.g. [45]). However, initiatives are limited in scope and seem mostly driven by competition pressures, rather than users' experiences and practices. There is still a dominant emphasis on optimisation, and the individualisation of money that comes with it, which obscure the importance of collaboration in our personal financial lives; turn friction into something to be removed, rather than carefully fine tuned; and conceal the influence of institutional and social factors on our financial circumstances. Designers must move beyond optimisation and tackle friction, collaboration and context if they are to fulfill the potential of financial technology for those trapped in the cycle of mental illness and financial hardship.

In terms of ways forward for design that speak to the practices and desires of our participants, we suggest useful insight can be gained by drawing on the concept of financial citizenship. The term was proposed by Leyshon and Thrift in the context of developing opposition and resistance to exclusionary practices in the financial industry [49]. Although questioned for not challenging the ongoing process of financialisation in economic and social life [3, 42], financial citizenship does seek to move beyond discourses of inclusion to introduce ideas of participation and influence. The financial inclusion agenda has been criticised because it leads to superficial engagement with financial services, and does not help individuals to exercise power within the financial system [4]. Like financial inclusion, financial citizenship requires that people have access to the products, services and resources they need for financially responsible behaviour. However financial citizenship also requires participation, i.e. that people are given *"the opportunity and capacity to shape the way the financial system functions"* [4]. As Berry and Serra succinctly state: *"Inclusion alone does not guarantee citizenship"* [4].

Financial citizenship demands an active role from the state, which must guarantee access to appropriate financial products and services [4, 49]. We argue that the technologies that increasingly mediate financial service provision should also assume an active role in the pursuit of financial citizenship. **To do so, financial technology design must shift away from financialised market agendas oriented towards short-term profit [3], and introduce principles of i) opposition against exclusion and the systematic responsabilisation of individuals, ii) democratic oversight of financial processes, iii) citizens' stewardship of the economy and iv) collective well-being.** Financial technologies should strive to become a vehicle through which citizens can exercise influence over how financial institutions operate. They must also work towards systems that legitimise and enable the capabilities, skills and practices that citizens have developed to manage their financial lives, rather than medicalising, stigmatising and penalising their behaviour. In doing so, technology may become not only an *"institution of resistance"* to the process of *"financial infrastructure withdrawal"* [49] that drives financial exclusion, but also a tool for democratic oversight of the socio-technical system that produces and maintains money [37]. In what follows, we propose a set of technology design directions that can help engage financially excluded groups as financial citizens:

1. Configurability: Financial technologies, as currently designed and deployed, de-personalise and standardise service provision to save costs. This reinforces existing processes of customer commodification [49]. We propose to design for configurability instead. Configurability would provide a layer of options on top of standard financial services, so that people can customise those services to their personal financial practices. Many of the features that have been

recommended to the financial industry in the context of mental health fall within this configurability concept. For instance, the ability to create alerts based on transaction amount, time of day and merchant [26]; the ability to share such alerts with a trusted third party [57]; read-only access to online banking [26, 57]; or "self-imposed" spending limits on debit cards and ATM withdrawals [26].

2. Complementarity: Within the financial industry, technology is mostly considered a gateway to operational efficiencies, i.e. a way to save money by replacing more expensive channels for service provision such as bank branches and telephone contact centres. We propose that financial technologies should aim not to replace other service channels, but to complement them. They should be understood as one more option within a set of financial interaction possibilities that may include face-to-face service provision, telephone and digital technologies, as well as physical financial artifacts such as cash, paper application forms or paper receipts. A varied set of interaction channels and artifacts will allow citizens to choose the most appropriate ones, taking into account their specific circumstances; their knowledge, comfort and experience; as well as the nature of the product or service. Monzo's design concept for allowing customers "*to choose their preferred form of communication*" [9] is within this spirit of complementarity. Sadly, at the time of writing, Monzo has yet to implement this proposal.

3. Reflection: This sensitivity requires designers to tackle the problems caused by the absence of friction. It demands that we create space for reflection in our interactions with financial technologies. Several design traditions can contribute to this endeavour, such as slow technology [32], reflective design [73], and the concept of "microboundaries" [16]. Current examples of adding friction to financial technologies mostly involve introducing delays. For instance, by asking to confirm a transaction after 12 or 24 hours [26]; or by establishing "*cooling off periods*" [26] to deactivate gambling blocks [46]. However, the reflection design agenda should aim beyond the supply of time. Its ultimate goal is supporting "*value-led behaviour*" [16], assisting people in interacting with technology in ways that align with their values and preferences [16]. This includes encouraging reflection about the consequences of our financial transactions, both for us and our "*circle of care*" [75]; our consumption habits; and the impact of our chosen means of payment [27]. Introducing reflection actually aligns with the core strategy behind several of the friction workarounds developed by our own participants, such as the use of top up debit cards that invited thought about spending through the act of transferring funds onto the card; or letting online shopping baskets rest overnight.

4. Collaboration: Designers should recognise the importance of communal money practices for financial well-being [18, 28, 81, 89, 90], and technologies should encourage and amplify collaborative financial practices, rather than obstructing them. Collaboration should become a core use case in financial technology design. From pooling resources [90] to group savings [55] or giving help with minding money [65], designers should engage with the numerous and mundane ways in which collaboration around money takes place on a daily basis. Ferreira et al. demonstrate how the process of re-conceptualising money-mediated activities as social activities can take place in the case of payment transactions [27].

5. Participation: Beyond the inclusion agenda, financial technologies should demonstrate a commitment to amplify the voices of those who use them. They should support them in their attempts to exercise influence over the financial system, in contesting institutional policies and practices, and in combating the endemic inequality embedded in the production and circulation of credit money [37]. In short: financial technologies should support financial citizenship. This requires moving away from the drive to optimise resources, and turning attention instead to the structural and institutional factors that contribute to relative poverty, over indebtedness and hardship. This sensitivity recalls the politically-committed nature of the Scandinavian tradition of participatory design [85], and maps to its third arena of participation, where "*the general legal and political framework is negotiated*" [43]. While participatory design interests

have expanded in recent years from workplace relations to other areas [33], there has been little engagement with mainstream financial services. The lack of participatory design research in this domain is all the more striking when we consider the omnipresence and importance of such services in an increasingly financialised society, where a bank account and access to credit have become "*a social necessity*" [49]. There is much to gain through the introduction of participatory design processes and politics inside financial service providers.

The above sensitivities direct attention to all the spheres involved in financial difficulty: individuals and their communities, the financial system and society at large [2]. In doing so, they can help technology fulfill its potential for those trapped in the cycle of poor mental health and financial hardship.

5.3 Limitations of the Study

We acknowledge several limitations in our study. First, the small number of participants (14) and their recruitment through a single charity partner mean that the sample cannot be deemed representative. Second, we note the lack of clinical data to verify our participants' self-reported diagnoses. Consequently, care should be taken with any generalisations concerning mental health drawn from our findings. The behaviours and practices described by our participants should not be construed as representative of all people experiencing mental health difficulties, or as characteristic of certain mental health conditions. The value of our qualitative study resides instead in demonstrating how lived experiences of money and poor mental health can contribute to the critical examination of financial technologies.

6 CONCLUSION

In this paper, we have discussed the role of technology in enabling and hindering the financial practices of people living with mental health conditions. We have highlighted how technology supports diverse forms of financial earmarking, budgeting and monitoring; while, at the same time, it can also increase feelings of anxiety around money, provide temptations to spend, and remove the frictions that many people felt were critical to ensuring financial stability. Our participants' experiences help us appreciate how existing financial technologies reinforce the individualisation of financial hardship through a relentless focus on optimisation. We encourage designers of these technologies to emphasise configurability, complementarity, reflection, collaboration and participation instead, so as to engage those who use them not as targets for financial inclusion, but as full financial citizens.

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