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Financial difficulties and mental health problems

Edited by
Thomas Richardson, Sharon Collard and Annie Harper

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Financial difficulties and mental health problems

Topic editors

Thomas Richardson — University of Southampton, United Kingdom
Sharon Collard — University of Bristol, United Kingdom
Annie Harper — Yale University, United States

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Wulf Rössler,
Charité Universitätsmedizin
Berlin, Germany

*CORRESPONDENCE
Thomas Richardson
T.H.Richardson@soton.ac.uk

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Editorial: Financial difficulties and mental health problems

Thomas Richardson[1]*, Sharon Collard[2] and Annie Harper[3]

[1]School of Psychology, School of Geographical Sciences, University of Southampton, Southampton, United Kingdom, [2]Personal Finance Research Centre, University of Bristol, Bristol, United Kingdom, [3]School of Medicine, Yale University, New Haven, CT, United States

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finance, financial, debt, mental health, recession, gambling, substance use, homelessness

Editorial on the Research Topic
Financial difficulties and mental health problems

This special edition, begun in early 2021 had three aims:

- To bridge the gap between academic research, policy and practice.
- To encourage contributions from different disciplines to provide a new range of perspectives and give a bigger picture on the topic.
- To provide an international focus that would balance the dominance of the UK and USA in the existing literature.

We are pleased that our special edition covers an international cohort from Bangladesh, Finland, Sweden, the UK and USA. We also have a range of disciplines and approaches represented within the edition. Although the articles are dominated by health professions including psychiatry, health sciences, addiction, psychology and public health, they do cover both academic and practitioner perspectives. There are also contributions from computer science, social work, economics, mathematics, and social policy as well as input from those with lived experience. The edition showcases a range of methodologies including a case report, national cohort studies, a feasibility study, cross sectional and interview based studies. These are all quantitative, indicating a continued need for qualitative approaches to better understand the lived experience and mechanisms between financial difficulties and mental health. Importantly, the included papers all draw out clear implications for practice and policy of their respective research findings.

A clear theme in the articles is the importance of the macro-economic context. A 20-year follow up study in Finland by Jarroch et al. highlights the impact of a recession on the long-term risk of psychiatric and alcohol related disorders, showing significantly raised risk, but only in men. Two studies examine the impact of the COVID-19 pandemic on mental health in Bangladesh, with a study on wage earners by Sultana et al. showing that those who lost their income had a greater risk of depression and anxiety. Siddique et al. found that depression, anxiety and stress were more common in those with greater risk of unemployment and decreased income. Perhaps unexpectedly, such risk was greater

in those with higher family income; this may be explained by the pandemic posing a greater financial risk to those who had more income to lose. These studies show the importance of continuing to monitor and address the financial impacts of the pandemic and recessions, which may be long-term.

Other papers, while acknowledging the significance of the broader context, focus more on understanding individual level processes. Jimenez-Solomon et al. show that for people with psychiatric diagnoses, the impact of objective financial hardship (ability to pay bills, over-indebtedness etc.) on life satisfaction is strongly mediated by subjective financial hardship (dissatisfaction with and shame/stress about finances, and feeling able to plan one's financial futures). The authors suggest that in addition to policies designed to address objective financial hardship, people should be offered shame-resilience skill-building, and peer support. Blair et al. similarly focus on individual level processes, using a case study of one person with bipolar disorder to address the limitations associated with relying on self-reported financial data. They explore the potential for accessing financial data to identify early warning signs and allow for pre-emptive action to prevent further deterioration of a person's financial and mental health, also highlighting associated ethical considerations.

Richardson et al., meanwhile, explore the potential role of technology in addressing the link between finances and mental health. They evaluated a digital CBT intervention – "Space from Money Worries" - designed to address the link between financial difficulties and poor mental health. They find that the intervention is acceptable (positive ratings of modules and a 77% completion rate) with significant impact on symptoms of depression and anxiety, perceived financial wellness and psychological factors in the relationship between financial difficulties and poor mental health.

A third theme in the edition explores the links between financial risk-taking and mental health. The COVID-19 pandemic is likely to have catalyzed an increase in online risky behaviors such as day trading which has a reported association with harmful gambling practices. There is therefore a worrying potential for day trading to cause gambling problems, debt and mental health problems. Such emerging concerns may warrant further research, new screening tools and clinical guidelines. A nationwide register study in Sweden, meanwhile, uses social welfare payment as a proxy to explore economic hardship as a potential risk factor that might contribute to intentional self-harm in people with gambling disorder (Karlsson et al.). While the study does not find social welfare payments to be a significant risk factor for intentional self-harm among this population, nonetheless the findings indicate that social services departments should pay greater attention to suicidality and self-injurious behavior among recipients of social welfare payment given the prevalence of intentional self-harm among this group.

Finally, a review paper by Maguire discusses the different types of debt seen in homelessness including rent, health and drug debt, and how they maintain homelessness. This review considers possible interventions in terms of budgeting, systemic organizational change and psychological interventions such as motivational interviewing.

This special edition shines a spotlight on the complex links and interactions between financial difficulties and mental health problems, from different disciplinary perspectives and utilizing a range of research methods. It has achieved its aim of putting this topic more firmly on the academic radar but there is clearly great potential for further work as we continue to face global economic turbulence with record inflation and a cost of living crisis in many countries. We would like to thank all of the authors who contributed and the participants who took part to make this special edition possible.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

Author TR received payment for developing, and receives royalties from use of Space from Money Worries which is discussed in this editorial. Author SC receives funding from GambleAware, a national charity operating in Great Britain.

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Gambling-Like Day Trading During the COVID-19 Pandemic – Need for Research on a Pandemic-Related Risk of Indebtedness and Mental Health Impact

Anders Håkansson[1,2]*, *Fernando Fernández-Aranda*[3,4,5] *and Susana Jiménez-Murcia*[3,4,5]

[1] Department of Clinical Sciences Lund, Psychiatry, Faculty of Medicine, Lund University, Lund, Sweden, [2] Region Skåne, Malmö Addiction Center, Clinical Sports and Mental Health Unit, Malmö, Sweden, [3] Department of Psychiatry, Bellvitge University Hospital-L'Institut d'Investigació Biomèdica de Bellvitge (IDIBELL), Barcelona, Spain, [4] Ciber Fisiopatología Obesidad y Nutrición (CIBERObn), Instituto de Salud Carlos III, Madrid, Spain, [5] Department of Clinical Sciences, School of Medicine and Health Sciences, University of Barcelona, Barcelona, Spain

Stock exchange trading increasingly has been highlighted as a possible cause of gambling disorder, typically in rapid and excessive "day trading" which may cause over-indebtedness and mental health problems. The COVID-19 pandemic has been suspected to increase online gambling and gambling problems. In a number of recent media reports, day trading has been reported to increase during COVID-19, possibly in relation to changes in everyday life, financial problems and job insecurity during the pandemic. Increasing day trading has thereby been suspected to cause addictive behavior, financial difficulties, and poor mental health. However, there is hitherto a lack of research in the area. The present paper addresses the potential for day trading to cause problem gambling, debts and mental health problems, and calls for research and clinical guidelines in problem gambling related to stock market behavior as a problematic gambling behavior. Screening tools, awareness among clinicians, and longitudinal research studies may be warranted, both during the COVID-19 pandemic and beyond.

Keywords: gambling, problem gambling, COVID-19, day trading, stock exchange

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Annie Harper,
Yale University, United States

Reviewed by:
Devin Mills,
Texas Tech University, United States
Andreas Staudt,
Technische Universität Dresden, Germany

***Correspondence:**
Anders Håkansson
anders_c.hakansson@med.lu.se

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INTRODUCTION

Poor mental health has been raised as one of the public health concerns related to the COVID-19 pandemic (1, 2). Gambling disorder, an established addictive disorder involving excessive and problematic gambling for money, is known to impact mental health in those affected and among their families (3, 4). Increased gambling practices, potentially becoming addictive and leading to a gambling disorder, is one of the public health challenges mentioned as a possible consequence of the COVID-19 pandemic (5).

Problem gambling, with or without the progression into a gambling disorder (3), is known to cause debts and over-indebtedness in affected individuals and for those living in their households. This is also known to cause severe mental health consequences in those affected (6). It is also known that indebtedness in general is a risk factor of a number of medical consequences (7), including a link to suicidal behavior (8).

Over the past few years, stock exchange trading has been increasingly highlighted as one of the gambling types – or as a gambling equivalent – occurring in a minority of treatment-seeking gambling disorder patients. In recent years, for example, authors described that around eight percent of financial market investors may fulfill criteria of problem gambling in relation to their trading behavior, and for whom around half of them may fulfill criteria of a gambling disorder (9). It has been argued that financial investment and gambling are inherently diverse constructs, but also that the speculative component of financial trading shares similarities with gambling, and that stock market speculation and problem gambling in a society therefore may be correlated (10).

One type of stock market trading is the so-called "day trading," characterized by a frequent and often continuous and rapid investment pattern aimed to gain money from very short-term market activities. Day trading has been reported to be associated with more intense and more problematic gambling habits with respect to traditional gambling types, compared to the general population (11). While day traders may share some characteristics with patients with problem gambling, they also may differ with respect to gambling characteristics, with a higher preference for skill-based games (11). In addition, trading with modern forms of financial instruments, such as cryptocurrencies, has been increasingly highlighted, as a potentially addictive type of gambling behavior. This has been shown to be associated with other stock market activity and with a higher degree of gambling problems (12).

COVID-19 AND POTENTIAL FOR INCREASED DAY TRADING BEHAVIOR AND DEBTS

Several behavioral changes and changes in mental health can be suspected to occur during the COVID-19 pandemic and its impact on everyday life, including the increase in time spent at home, job insecurity, and concerns about one's future financial situation. This has called for research attention to a range of online-based addictive behaviors, such as online gaming (13), online gambling (5), and online pornography use (14). In addition, financial insecurity, job insecurity or sudden unemployment may have caused substantial financial and psycho-social problems during the pandemic. For example, many settings saw a rapid rise in unemployment rates during the first phase of the pandemic (15). In addition, the COVID-19 crisis has been the cause of most volatile financial markets globally, in particular during the first phases of the pandemic (16).

During the COVID-19 pandemic, rapid, online investment services have been increasingly discussed in the context of addictive gambling. Day trading intuitively shares characteristics with traditional gambling, and typically with the rapid-outcome, online-based gambling types which are either entirely chance-based or involving some degree of skills (17). This change also has been reported, in media reports, to include an increase in treatment seeking for gambling disorder among individuals involved in day trading, for example caused by more time working from home (18). In addition, stock exchange trading in general has been described to increase as a consequence of the COVID-19 pandemic (19). Moreover, during the very first phase of the pandemic, sports events globally were canceled, and it has been shown that this affected the distribution of gambling across gambling types, favoring non-sports-related or horse-related betting practices (20). In line with these reports of a certain migration between traditional gambling types, media have also reported that people with intense gambling conditions may have turned to stock day trading as an equivalent behavior to gambling (21). While this topic is concerning and discussed in the media, there is hitherto limited scientific reporting about the extent and nature of day trading behaviors during the pandemic, and about its association to gambling and disordered gambling. This includes the need for scientific data describing whether day trading practices may have recruited new clients or whether it has increased primarily in clients engaging in these practices before, or whether it has recruited new individuals, for example as a sign of migration from traditional gambling types. Related to this, there is need for research-based data addressing whether the providers of day trading opportunities may have adapted to the COVID-19 situation and to the opportunity to recruit new groups of gamblers. Given the similarity of day trading apps with gambling sites (17), it is less known how marketing strategies may have adapted to the COVID-19 crisis. Thus, the line of research addressing gambling advertising and its impact on gamblers, may need to expand to the marketing of financial instruments, including in times of the pandemic and similar crises.

CALL FOR RESEARCH AND CLINICAL GUIDELINES

Although increasingly understood as a gambling-like behavior, with the potential to cause a gambling disorder, day trading is sparsely addressed in the mental health literature. As media reports indicate a relatively pronounced day trading behavior during the COVID-19 pandemic, preventive and therapeutic interventions are likely to be needed. Also, given the impact of indebtedness on mental health, there is reason to believe that the present type of stock trading behavior may contribute to mental distress during and beyond the pandemic (7).

Assessment instruments for problem gambling should include stock exchange and similar as a gambling type, allowing for the study of treatment seeking and for the monitoring of longitudinal changes in the gambling types reported by problem gamblers in the general population. For example, Addiction Severity Index-Gambling (ASI-G), even in its earliest versions, includes this kind of non-traditional stock market data in the assessment of gambling problems (22), although such data are rarely reported. Thus, although this represents a minority of treatment-seeking individuals with gambling problems, the reporting of stock market use as a gambling problem may need

to be followed over time, and even more so in light of the COVID-19 pandemic and its consequences on everyday working habits and financial transactions. In addition to research needs, clinical guidelines are likely also needed, and even more so in response to the current COVID-19-related changes. In particular, socio-demographic characteristics in people with addictive day trading habits may differ from those of patients with more traditional gambling problems. Likewise, within the group of day traders with addictive patterns, it is of value to study whether there are subgroups, for example traders with or without parallel traditional gambling practices. Such subgroups may differ with respect to personality features or other comorbidities, and given the lack of such data so far, such research is warranted and may have clinical implications.

DISCUSSION

The present paper highlights a topic rarely assessed in the scientific literature concerning gambling, although it may lead to severe financial problems through the same mechanisms as a more traditional gambling behavior, and thereby to severe health concerns. Mental health settings, including gambling disorder treatment facilities, should actively assess and monitor stock market trading, including day trading, in their patients. In addition, credit counselors, and social service staff involved in indebtedness issues, may need to address stock market trading from the same perspective as a more traditional gambling problem involving, for example, sports betting and casino gambling. Worrying media reporting about an increased day trading behavior during COVID-19 raises the challenge to take rapid action in the active monitoring and prevention of addictive day trading behaviors, over-indebtedness and poor mental health.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

All authors were responsible of the overall research idea, its theoretical background, and the message of the paper. AH wrote the manuscript draft, and all authors contributed with input and revision of the manuscript and approved its final version.

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ORIGINAL RESEARCH
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The Association Between Financial Hardship and Mental Health Difficulties Among Adult Wage Earners During the COVID-19 Pandemic in Bangladesh: Findings From a Cross-Sectional Analysis

Mst. Sadia Sultana[1], Abid Hasan Khan[1], Sahadat Hossain[1,2], Tauhidul Islam[3], M. Tasdik Hasan[2,4], Helal Uddin Ahmed[5], Zezhi Li[6]* and Jahangir A. M. Khan[7]*

[1] Department of Public Health and Informatics, Jahangirnagar University, Dhaka, Bangladesh, [2] Public Health Foundation, Dhaka, Bangladesh, [3] Faculty of Veterinary, Animal and Biomedical Sciences, Sylhet Agricultural University, Sylhet, Bangladesh, [4] Department of Primary Care and Mental Health, University of Liverpool, Liverpool, United Kingdom, [5] National Institute of Mental Health, Sher-E-Bangla Nagar, Dhaka, Bangladesh, [6] Department of Psychiatry, The Affiliated Brain Hospital of Guangzhou Medical University, Guangzhou, China, [7] Health Economics and Policy Unit, School of Public Health and Community Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden

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Edited by:
Barna Konkoly-Thege, Waypoint Centre for Mental Health Care, Canada

Reviewed by:
Éva Susánszky, Semmelweis University, Hungary
Noemi Tari-Keresztes, Charles Darwin University, Australia

***Correspondence:**
Mst. Sadia Sultana
sadiasuhi.ju@gmail.com
orcid.org/0000-0002-3991-4198
Zezhi Li
lizezhi1981@aliyun.com
orcid.org/0000-0003-0241-1500

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Background: The ongoing COVID-19 pandemic has created several challenges including financial burdens that may result in mental health conditions. This study was undertaken to gauge mental health difficulties during the COVID-19 pandemic and gain an insight into wage earners' mental health.

Method: This cross-sectional study was conducted through an online survey. A t total of 707 individual Bangladeshi wage earners were enrolled between 20 and 30 May 2020. The questionnaire had sections on sociodemographic information, COVID-19 related questions, PHQ-9 and GAD-7 scales. STATA version 14.1 program was used to carry out all the analyses.

Results: The study revealed that 58.6 and 55.9% of the respondents had moderate to severe anxiety and depressive symptoms, respectively. The total monthly income was <30,000 BDT (353.73USD) and displayed increased odds of suffering from depressive symptoms (OR = 4.12; 95% CI: 2.68–6.34) and anxiety (OR = 3.31; 95% CI: 2.17–5.03). Participants who did not receive salary income, had no income source during the pandemic, had financial problems, and inadequate food supply and were more likely to suffer from anxiety and depressive symptoms ($p \leq 0.01$). Perceiving the upcoming financial crisis as a stressor was a potential risk factor for anxiety (OR = 1.91; 95% CI:1.32–2.77) and depressive symptoms (OR = 1.50; 95% CI:1.04–2.16).

Limitations: The online survey method used in this study limits the generalizability of the findings and self-reported answers might include selection and social desirability bias as a community-based survey was not possible during the pandemic.

Conclusion: Wage earners in a low resource setting like Bangladesh require mental health attention and financial consideration to deal with mental health difficulties.

Keywords: COVID-19, anxiety, depressive symptoms, financial crisis, wage earners, Bangladesh

INTRODUCTION

The ongoing COVID-19 pandemic has resulted in many people having serious concerns about job security and financial challenges globally. With a rapidly increasing number of infected cases, the governments of most countries have declared that many public health approaches including nationwide lockdown, declaration of general holidays, and social distancing, etc. in this critical situation. However, these strategies have also been found to be the most important factors associated with death by suicide during an emerging infectious disease outbreak (1). A recent Chinese study during the COVID-19 pandemic reported that 53% of respondents rated the psychological effects of the epidemic was as moderate or severe, 16.5% had mild to extreme depressive symptoms, and 28.8% had moderate to severe anxiety symptoms (2). Another study during the pandemic among people in Indian communities revealed that people of younger age, female gender, and that comorbid physical conditions were all associated with a greater psychological effect (3). The most recent nationwide, representative survey (National Mental Health Survey 2018-19) was conducted in 2019 before the pandemic and the prevalence of any mental disorder amongst the adult population was 16.8% (4).

Two previous Bangladeshi studies before the COVID-19 pandemic showed 16.3% respondents from rural areas (5) and 28% respondents from urban areas (6) had mental health disorders whereas, economically deprived responders, those over 45 years old, and women from large families have a slightly higher incidence of psychiatric illnesses (5). It was documented before that poverty-related emotional distress can affect a person's capability to deal with economic deprivation, which contributes to psychiatric illnesses (5, 7).

More recently, few studies including some in Bangladesh and Pakistan have reported that people committed suicide for fear of COVID-19 infection, social stigma, isolation, anxiety, depression, and emotional disharmony as well as economic shutdown, financial, and future insecurities (8, 9). Therefore, it has been anticipated by the United States that the economic recession as a consequence of this ongoing pandemic is a more significant factor in terms of loss of life COVID-19 itself, as there has been a huge rise (4.6 million) in unemployment during this outbreak (10). As a result, peoples' mental health is becoming unstable. The economic fallout triggered by the pandemic needs to be researched and these potentially negative consequences examined.

While people in high-income and welfare states have access either to public funds (social benefits, unemployment benefits, sickness benefits, and universal basic income, etc.) or COVID-19 related income support from the government, the people in less developed and developing countries undoubtedly remain more vulnerable as numerous small and medium shaped businesses have been hard-hit, resulting in bankruptcy (11, 12), with these issues also affecting Bangladesh. It needs to be noted here that the governments in many low- and middle-income countries declared COVID-19 related income support, however, the situation in Bangladesh is more fragile as a report from the 2018–2019 economic year revealed that 20 and 10.5% of people in Bangladesh live below the poverty line and in extreme poverty, respectively. The unemployment rate is 4.4% among the general population and the percentage of people living from hand-to-mouth is remarkably high (70%) (13–15). This situation is likely to get more serious due to the extreme fallout in economic sectors among Bangladeshi people due to the COVID-19 emergency, as per capita income declined 82% from $1.30 (US) in February to $0.32 in early April among slum dwellers and 79% fallout from $1.05 to $0.39 among poor rural people (15). Consequently, there is a chance of a 1.10% downfall in GDP (approximately $3 billion loss in GDP), the cruel outcome of the COVID-19 pandemic (16). Additionally, the price of daily commodities is rising day by day as the production and supply have been seriously disrupted. Poor people suffer most as it is tough for them to survive with lower or no income during the pandemic situation as they experience financial uncertainty more acutely (9, 17). Price hikes and income fallout together are creating challenges for people, especially those who strive to live for the basic needs of their families. The most serious concern is that no one knows when this financial crisis, unemployment problem, as well as the concern of job insecurity, will be resolved.

There is an urgent need to understand the possible mental health issues that are faced by the wage-earning members of families as the financial challenges have risen in this outbreak. However, to the best of our knowledge, no detailed study on the mental health difficulties of earners during the pandemic has been conducted in Bangladesh. Thus, the current study seeks to explore the mental health difficulties of wage earners in the country of Bangladesh to report on anxiety and depressive symptoms and identify some potential factors linked with these mental issues during the COVID-19 outbreak.

METHODOLOGY

Study Design and Participants

This cross-sectional study was conducted through an online survey, a total of 707 individual Bangladeshi wage earners were enrolled between 20 May 2020 and 30 May 2020. The study was conducted following the Checklist for Reporting Results of Internet ESurvey (CHERRIES) guidelines (18). The target population of the study was Bangladeshi earners (not restricted to any division or district) living in the country during the COVID-19 outbreak. Other inclusion criteria include: willingness to participate; providing informed consent; age $\geq$18 years; being able to understand Bangla language. An online convenience sampling technique was chosen to meet the study aims.

Data Collection Tool

An online semi-structured questionnaire was developed using google forms and then used as a data collection tool. The questionnaire was drafted in Bangla first. Then translation and back translation from Bangla to English and vice versa was done by bilingual experts. A pilot test was performed on 30 respondents to confirm the reliability of the questionnaire and further modifications were done in the questionnaire. Survey link was disseminated with the description of the study on ~30 Facebook groups including different alumni and

organizational groups (i.e., Jahangirnagar University Alumni Association, Teacher's association), where the group members were mostly wage-earners from different occupations. An information sheet describing the aim and process, right to refuse their participation from the study was presented on the first page of the survey attaching a consent form with it. No incentive was provided to the participants for their participation in this study. The questionnaire had sections on sociodemographic information, COVID-19 related questions, and PHQ-9 and GAD-7 scales to assess depressive symptoms and anxiety, respectively. Participants were informed that their information will only be used for research purposes. Anonymity and confidentially were fully ascertained. All the participants provided written consent prior to participation. All the procedures of this study complied with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for any experiments involving humans. The protocol of this study was reviewed & supported by the Department of Public Health and Informatics, Jahangirnagar University, Savar, Dhaka, Bangladesh.

Measure

Socio-Demographic Measures

Socio-demographic information was gathered from all the respondents through both open-ended and closed-ended questions, including their sex, age, religion, marital status (i.e., married, unmarried, divorced, widow), educational status, occupation, monthly family income, area of residence (rural or urban), name of the district, number of family members and number of earning members in the family. For categorization of age in our study, the first category was 18–24 years taking this age group into account as youth groups (19). While the 25–35-year-old category was taken as younger adults (compared to >35 years) based on the fact that it takes ∼25 years for a person to complete their educational attainment according to the Bangladeshi educational context. Lastly, people over >35 years were considered as the middle age group. The average monthly family income was categorized into three categories: (i) <30,000 BDT; (ii) 30,000–70,000BDT; (iii) >70,000BDT by considering 30,000 BDT as median income following a prior published paper from Bangladesh (20).

Current Income Status-Related Data

Current income status-related data were obtained through a checklist, which had 4 options such as "I am not getting any salary in this lockdown situation"; "I have no source of income currently"; "My income is not enough for my family" and "I'm satisfied with my income." Respondents were able to choose multiple answers from this checklist.

Perceived Social and Financial Stressor-Related Data

Respondents were asked to choose some factors related to socio-economics that were putting them in psychological discomfort through a checklist that had options such as "I'm getting no salary in this lockdown situation," "food supply is not enough for my family," "dealing with the financial problem," "future financial crisis," "price increment in daily necessary commodities," and "hamper my children's study." Respondents were able to choose multiple answers from this checklist.

Depressive Symptoms

The nine-item scale, Bangla Patient Health Questionnaire (PHQ-9) corresponding to DSM-IV Diagnostic Criteria of symptoms for major depressive disorder was used to measure the level of depressive symptoms of the participants (21, 22). Respondents were asked to answer on a 4-point Likert scale (from "0 = not at all" to "3 = nearly every day") based on the past 2 weeks, whereby a 0–27 score range is possible. A score of 0 indicates the absence of depressive symptoms and a total score of 27 indicates daily depressive symptoms. The five cut-off points were used for the categorization of depressive symptoms: (i) ′0–4′ for "normal"; (ii) ′5–9′ for "mild depressive symptoms"; (iii) ′10–14′ for "moderate depressive symptoms"; (iv) ′15–19′ for "moderately severe depressive symptoms"; and finally, (v) '20 or higher' for "severely severe depressive symptoms." A cut-off score of ≥ 10 was set to denote "depression positive" for analysis in this study (23). In the present study, the Cronbach's alpha was 0.85.

Anxiety Disorder

The seven-item scale, Bangla Generalized Anxiety Disorder (GAD-7), which was reported to have good sensitivity (89%) and specificity (82%) for assessing the severity of anxiety in both the clinical and general population, was used in this study (24–26). Participants were asked how often they were bothered by the symptoms of GAD-7 based on the past 2 weeks to respond on a 4-point Likert scale the same as PHQ-9, where a score range of 0–21 was possible. The cut-off points for the categorization of the level of GAD symptoms were as follows: (i) ′0–4′ for normal, (ii) ′5–9′ for mild, (iii) ′10–14′ for moderate, and (iv) ′15–21′ for severe. A cut-off score of ≥ 10 was set to denote "anxiety positive" for analysis in this study (27). In the present study the Cronbach's alpha was high (0.84).

Statistical Analysis

Descriptive statistics such as frequency and percentage were obtained to describe participants' characteristics. Both bivariate and multivariate logistic regression were performed to explore the potential influencing factors associated with anxiety and depressive symptoms. All variables were entered into a binary logistic regression model with "depressive symptoms" and "anxiety" as the dependent variable. The odds ratio (OR), adjusted odds ratio (28), and 95% confidence interval (95% CI) were obtained from logistic regression models. A $p \leq 0.05$ was considered to be statistically significant for all analyses. The STATA version 14.1 program (StataCorp LP., College Station, TX, USA) was used to carry out all analyses.

RESULTS

Sociodemographic Characteristics, Anxiety, and Depressive Symptoms

Responses came from 707 citizens (age range: 18–75 years, with a mean of 31.41 ± 8.73 years) from the 50 districts of Bangladesh. The majority of the respondents belonged to the age group

25–35 (62.38%), were male (77.23%), and were government or private service holders (60.82%). Most of the respondents were living in an urban setting (85.86%) in a family consisting of <5 members (43.28%) or 5–7 members (44.70%). Almost half of the respondents reported earning <30,000 BDT (48.94%) and almost one-third of the respondents were the only earner in their family (33.66%) (**Table 1**).

We found that 28.43% of the participants suffered from severe anxiety, while 30.13% were found to experience moderate anxiety, 24.05% were found to be experiencing mild anxiety at the time of data collection. Furthermore, it was found that 10.89% of the participants suffered from severely severe depressive symptoms, while 18.81% were found to experience moderately severe depressive symptoms, 26.17% of the participants were found to be experiencing moderate depressive symptoms, 23.48% were found to be experiencing mild depressive symptoms at the time of data collection.

Respondents aged below 25 were more likely to be experiencing depressive symptoms compared to respondents aged above 35 (OR = 2.29; 95% CI: 1.38–3.83). Females had a higher likelihood for both anxiety (AOR = 1.69; 95% CI: 1.11–2.58) and depressive symptoms (AOR = 1.97; 95% CI:1.28–3.01). Similarly, respondents earning <30,000 BDT (353.26 USD) monthly were about two or three times more likely to have depressive symptoms (AOR = 2.86; 95% CI: 1.73–4.67) and anxiety (AOR = 3.12; 95% CI: 1.90–5.17). The average monthly income ranging from 30,000 to 70,000 BDT was significantly associated with anxiety (AOR = 1.78; 95% CI: 1.12–2.84) and depressive symptoms (AOR = 2.04; 95% CI: 1.27–3.27). Apart from all these, working in business, having an education below honors and being the only earning member of the family had a significant association with anxiety or depressive symptoms or both with higher odds (**Table 1**).

Current Financial Situation, Anxiety, and Depressive Symptoms

One-fourth of the respondents were not getting any salary due to the critical pandemic situation (25.32%) and they were more likely to be in anxiety (AOR = 1.69; 95% CI: 1.10–2.61) and depressive symptoms (AOR = 1.95; 95% CI: 1.27–3.00) in reference to those getting salary in some way. Similarly, respondents (34.65%) having no source of earning during the pandemic were also more likely to be in anxiety (AOR = 1.64; 95% CI: 1.11–2.43) and depressive symptoms (AOR = 2.03; 95% CI: 1.37–2.99) in reference to respondents with an earning source. Additionally, salary not being enough for family which might be reduced for the pandemic situation, and being unsatisfied with current earning had a significant association with anxiety or depressive symptoms or both with higher likelihood (**Table 2**).

Social and Financial Stressors, Anxiety, and Depressive Symptoms

About 27% of respondents reported dealing with financial problems as stressor and they had higher odds for anxiety (AOR = 2.82; 95% CI: 1.83–4.36) and depressive symptoms (AOR = 2.45; 95% CI: 1.61–3.72) in reference to their counterparts. The increased price of daily commodities (55.87%), inadequate food supply (77.93%), children's educational loss (29.42%) were significantly associated with anxiety or depressive symptoms or both with higher odds. Furthermore, respondents (79.63%) perceiving upcoming financial crisis were 2-fold more likely to be in anxiety (AOR = 2.01; 95% CI: 1.34–3.01) and 1-fold more likely to be in depressive symptoms (OR = 1.50; 95% CI: 1.04–2.16) in reference to respondents not perceiving any future financial crisis (**Table 3**).

Outcome of Multivariate Analysis With All Independent Study Variables

After having all the independent study variables in the same regression model (**Table 4**), some deviations from previous AORs were noticed. Through this approach, it is again noticed that females were more likely to have depressive symptoms compared to their male counterparts (AOR' = 1.67; 95% CI: 1.05–2.66), respondents in lower educational qualification category (up to higher secondary level) similarly had higher odds of having depressive symptoms than respondents with better educational qualifications (AOR' = 1.89; 95% CI: 1.15–3.12). Furthermore, respondents who were not satisfied with their earning had a significantly strong relationship with anxiety (AOR' = 2.52; 95% CI: 1.49–4.26) and depressive symptoms (AOR' = 1.72; 95% CI:1.02–2.91) in reference to respondents who were satisfied with their earning. Respondents expecting a financial crisis in the near future had their anxiety up (AOR' = 1.76; 95% CI: 1.13–2.73) but those who were dealing with the financial problems already were more likely to have anxiety (AOR' = 2.02; 95% CI:1.26–3.23) and depressive symptoms (AOR' = 1.91; 95% CI: 1.21–3.01) compared to respondents not facing or dealing with the financial problems during the pandemic. However, variables such as being the only earner of the family, having no earning source, children's educational loss alongside some other variables did not produce any significant results through this model.

DISCUSSION

This study upholds the most updated scenario of Bangladeshi wage-earners' mental health difficulties amid a period of financial stress during the ongoing COVID-19 pandemic. The findings of the present study indicate that anxiety and depressive symptoms are high among wage earners, with a prevalence of 58.6 and 55.9%, respectively. There was a clear upward trend in the prevalence of anxiety and depressive symptoms compared to previous studies conducted during the COVID-19 outbreak (29, 30). A study on Bangladeshi job seekers found a greater percentage of depression (81.1%) and anxiety (61.5%) compared to the present study (31). Two prior studies on Bangladeshi peoples' mental health during COVID-19 revealed comparatively lower depression (33%) (32) and anxiety (37.3%) (33) compared to the present study. On the contrary, another study on Bangladeshi adult peoples' mental health during the pandemic showed a higher percentage of depression (57.9%) than the present study (34).

TABLE 1 | Association among socio-demographics, anxiety and depressive symptoms among adult wage earners in Bangladesh.

Variables	*n* (*N* = 707)	Anxiety[§]		Depressive symptoms[§§]	
		OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Age (years)					
<25	112 (15.84%)	1.26 (0.68-1.44)	1.30 (0.66–2.57)	2.29** (1.38–3.83)	1.69 (0.85–3.36)
25–35	441 (62.38%)	0.99 (0.77–2.09)	1.16 (0.73–1.86)	1.19 (0.83–1.72)	1.30 (0.82–2.05)
>35	154 (21.78%)	Ref.	Ref.	Ref.	Ref.
Sex					
Female	161 (22.77%)	1.78** (1.22–2.59)	1.69* (1.11–2.58)	2.29** (1.57–3.34)	1.97** (1.28–3.01)
Male	546 (77.23%)	Ref.	Ref.	Ref.	Ref.
Education					
Up to Higher secondary	167 (23.62%)	2.30** (1.57–3.37)	1.22 (0.77–1.93)	3.22** (2.17–4.76)	1.95** (1.22–3.10)
Honors or above	540 (76.38%)	Ref.	Ref.	Ref.	Ref.
Occupation					
Businessman	88 (12.45%)	3.31** (1.78–6.14)	2.40** (1.22–4.73)	2.66** (1.47–4.81)	2.25* (1.16–4.39)
Govt./Pvt. Service holders	430 (60.82%)	1.53 (0.99–2.34)	1.18 (0.74–1.88)	1.51 (0.98–2.32)	1.26 (0.79–2.01)
Others[†]	86 (12.16%)	1.46 (0.82–2.60)	1.03 (0.54–1.98)	1.99* (1.11–3.56)	1.41 (0.72–2.74)
HCW[‡]	103 (14.57%)	Ref.	Ref.	Ref.	Ref.
Marital status					
Ever married[e]	362 (51.20%)	1.36* (1.01–1.84)	1.32 (0.88–1.96)	0.97 (0.72–1.31)	1.00 0.67–1.48)
Unmarried	345 (48.80%)	Ref.	Ref.	Ref.	Ref.
Living setting					
Urban	607 (85.86%)	1.08 (0.70–1.65)	1.46 (0.91–2.34)	0.99 (0.65–1.52)	1.45 (0.90–2.33)
Rural	100 (14.14%)	Ref.	Ref.	Ref.	Ref.
Number of family members					
>7	85 (12.02%)	1.23 (0.75–1.99)	1.54 (0.89–2.64)	0.97 (0.60–1.58)	1.05 (0.61–1.80)
5–7	316 (44.70)	1.64** (1.19–2.26)	1.76** (1.23–2.51)	1.24 (0.90–1.70)	1.20 (0.84–1.71)
<5	306 (43.28%)	Ref.	Ref.	Ref.	Ref.
Number of earning family members					
Only earner	238 (33.66%)	1.47* (1.07–2.03)	1.57* (1.09–2.27)	1.14 (0.83–1.56)	1.25 (0.87–1.79)
More than one earner	469 (66.34%)	Ref.	Ref.	Ref.	Ref.
Average monthly family income (BDT)					
<30,000	346 (48.94%)	3.31** (2.17–5.03)	3.12** (1.90–5.17)	4.12** (2.68–6.34)	2.86** (1.73–4.67)
30,000–70,000	232 (32.81%)	1.67* (1.08–2.58)	1.78* (1.12–2.84)	2.11** (1.35–3.30)	2.04** (1.27–3.27)
>70,000	129 (18.25%)	Ref.	Ref.	Ref.	Ref.

*$P \leq 0.05$; **$P \leq 0.01$.

OR, Odds ratio; AOR, Adjusted odds ratio (adjusted for the variables only that were included in this particular table); CI, Confidence interval.

[§]*Anxiety was defined as individuals who scored ≥ 10.*

[§§]*Depressive symptoms was defined as individuals who scored ≥ 10.*

[†]*Included researchers, journalists, farmers, tutors.*

[‡]*Included doctors, nurses, and medical technologists.*

[e]*Included Married/divorced/widowed respondents.*

A study which was conducted on workers in United State found that 16% of the respondents had depression (35), 26.3% depression was found in a population-based study in German (36), 0.4–15.7% depression was found in a multilevel study of 187,496 individuals from 53 countries (37). All of the aforementioned studies reported less prevalence of depression compared to the present study. The financial crisis and socioeconomic stressors may play a significant role behind the high percentage of anxiety and depression among respondents. Previously increased depression was reported in Greece due to economic crisis (38, 39), all of the prevalences of depression were lower than the present study. This elevated anxiety and depression prevalence compared to previous studies might be attributed to different socio-economic background and distinctions in the health care system. Moreover, being wage earner might be a cruicial factor acting behind the higher anxiety and depression prevalences in the present study as they meet all financial responsibilities in the family even in this critical pandemic situation where joblessness and insufficient income are predominant.

This study identified eight critical risk factors behind earners' anxiety and depressive symptoms such as "being female,"

TABLE 2 | Association among current financial situation, anxiety and depressive symptoms among adult wage earners in Bangladesh.

Variables	*n* (*N* = 707)	Anxiety[§]		Depressive symptoms[§§]	
		OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Not getting any salary due to COVID−19					
Yes	179 (25.32%)	2.84** (1.94–4.17)	1.69* (1.10–2.61)	3.05** (2.09–4.45)	1.95** (1.27–3.00)
No	528 (74.68%)	Ref.	Ref.	Ref.	Ref.
No earning source					
Yes	245 (34.65%)	2.78** (1.98–3.90)	1.64** (1.11–2.43)	3.09** (2.21–4.32)	2.03** (1.37–2.99)
No	462 (65.35%)	Ref.	Ref.	Ref.	Ref.
Salary not enough for family					
Yes	311 (43.99%)	2.27** (1.67–3.10)	1.45 (0.97–2.16)	2.26** (1.66–3.07)	1.71** (1.15–2.56)
No	396 (56.01%)	Ref.	Ref.	Ref.	Ref.
Satisfied with earning					
No	455 (64.36%)	3.88** (2.80–5.36)	2.20** (1.39–3.48)	3.47** (2.51–4.78)	1.58 (0.99–2.51)
Yes	252 (35.64%)	Ref.	Ref.	Ref.	Ref.

*$P \leq 0.05$; **$P \leq 0.01$.

OR, Odds ratio; AOR, Adjusted odds ratio (adjusted for the variables only that were included in this particular table); CI, Confidence interval.

[§]*Anxiety was defined as individuals who scored ≥ 10.*

[§§]*Depressive symptoms was defined as individuals who scored ≥ 10.*

"being in younger age (<25 years)," "having lower education," 'working in business," "belonging to the middle-sized family (5–7 members)," "being the only earner of the family," "family income both <30,000BDT (353.73USD) and ranging from 30,000BDT to 70,000BDT compared to >70,000BDT." The present study reported a much higher OR depressive symptoms and anxiety among younger earners (<25 years) than the older ones, which is identical to previously published studies reporting that psychological symptoms are linked to younger age (40). The economic crisis might appear as less depressing to older adults due to their greater maturity, patience, and experience derived from the vicissitudes of life (40). Furthermore, elevated rates (11.92%) of youth unemployment in Bangladesh can make younger adults more prone to depression compared to older individuals (41).

In agreement with the findings of previous reports and studies (29, 42), the present study found that female earners were 1.78 times more likely to be anxious and 2.29 times more likely to be depressed than the male counterparts. Working females are responsible for dealing with both household responsibilities and work responsibilities in Bangladesh, meaning they are burdened with different stresses, which may be the reason for increased anxiety and depressive symptoms. Further research is required to clarify the reasons and mechanisms behind this finding. For example, it has been suggested that women might be sensitive to stress hormones, which could affect their reaction to stressful situations (43).

The findings of our study agree with the observation that higher education works as a protective factor for both anxiety and depression (44). A higher level of education can buffer negative psychological effects, as it provides cognitive abilities to cope, and is often a conducive and less precarious social position, which decreases the negative impact of a stressful life situation on the psychological state (45). Furthermore, cognitive skills, attitudes, and shared values regarding health-related behaviors are insights from education that buffers against depression (46).

Both unadjusted and adjusted estimates in regression analysis show that earners who worked in business had higher odds of both anxiety and depressive symptoms. Some job holders were still getting a salary, but people who work in the business industry often had limited sources of income in the pandemic situation and are going through a drastic loss. A previous report claimed that worrying about cash flow is mentally challenging for business owners (47). As consistently reported previously, the present study reveals that respondents who were married had a more significant link with anxiety (48). According to the Family Stress Model, spouses' distress increases when dealing with daily economic difficulties, resulting in negative feelings like unhappiness, grudges, and disappointment about the future, which could be the reason for marital conflicts and less supportive behavior for partners. Marital conflict has therefore been reported as being linked to mental health problems (49). The study found that in medium-size families with 5–7 family members the risk was twice as high as in the smaller size families. However, the risk of having anxiety symptoms is the same in families smaller than five as those with more than seven family members. This finding might be attributable to the fact that bigger families (of >7 members) are likely to have more secure financial positions with more active earners, compared to medium-sized families, which plays a significant role in lessening burdens on mental health. Our study revealed a significant finding that respondents who were the only earning member in the entire family were 1.47 times more likely to be anxious.

Our results are in line with the results of other investigations (44, 50, 51), which reported that those who had a comparatively low salary (<30,000BDT in this study) had a higher likelihood of being depressed and anxious. A study reported that low-income elderly were 2.35 times more likely to experience depressive

TABLE 3 | Association among social & financial stressors, anxiety and depressive symptoms among adult wage earners in Bangladesh.

Variables	*n* (*N* = 707)	Anxiety[§]		Depressive symptoms[§§]	
		OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Not getting any salary during the pandemic					
Yes	215 (30.41%)	2.64** (1.86–3.75)	2.05** (1.40–3.01)	3.08** (2.17–4.38)	2.45** (1.68–3.57)
No	492 (69.59)	Ref.	Ref.	Ref.	Ref.
Dealing with financial problem					
Yes	188 (26.59%)	3.66** (2.47–5.42)	2.82** (1.83–4.36)	3.37** (2.31–4.91)	2.45** (1.61–3.72)
No	519 (73.41%)	Ref.	Ref.	Ref.	Ref.
Increased price of daily necessary commodities					
Yes	395 (55.87%)	1.52** (1.12–2.05)	1.23 (0.87–1.72)	1.64** (1.22–2.22)	1.44* (1.03–2.02)
No	312 (44.13%)	Ref.	Ref.	Ref.	Ref.
Inadequate food supply					
Yes	551 (77.93%)	4.24** (2.72–6.59)	2.27** (1.39–3.70)	4.00** (2.62–6.11)	2.19** (1.37–3.49)
No	156 (22.07%)	Ref.	Ref.	Ref.	Ref.
Children's educational loss					
Yes	208 (29.42%)	1.80** (1.28–2.53)	1.61** (1.10–2.36)	1.65** (1.18–2.31)	1.39 (0.96–2.03)
No	499 (70.58%)	Ref.	Ref.	Ref.	Ref.
Upcoming financial crisis					
Yes	563 (79.63%)	1.91** (1.32–2.77)	2.01** (1.34–3.01)	1.50* (1.04–2.16)	1.47 (0.99–2.19)
No	144 (20.37%)	Ref.	Ref.	Ref.	Ref.

*$P \leq 0.05$; **$P \leq 0.01$.

OR, Odds ratio; AOR, Adjusted odds ratio (adjusted for the variables only that were included in this particular table); CI, Confidence interval.

[§]*Anxiety was defined as individuals who scored ≥ 10.*

[§§]*Depressive symptoms was defined as individuals who scored ≥ 10.*

symptoms compared to their higher-income counterparts, which is somewhat identical to the present study (52). Again, respondents whose salary was not enough for their family had significantly higher ORs for anxiety and depressive symptoms. With regards to depressive symptoms, income was more strongly associated with depressive symptoms than education, which was observed in another previous study (52). The reason for the lower prevalence of depressive symptoms and anxiety may be that higher-income jobs allow for greater social prestige and the working conditions tend to be better from both psychological and physical perspectives (53).

In terms of current income status, consistent with our expectation, losing income almost triples the probability of mental symptoms while being dissatisfied with income almost quadruples it. However, a recent Bangladeshi study showed that the economy and jobs were significantly affected by the perception that the pandemic disrupted life events (34). It also suggests that respondents who had no source of income were more likely to be anxious and depressed. These results may be relevant for earners in other developing countries, as lockdown due to the COVID-19 pandemic has significantly disrupted employment status. Other studies were in agreement with this finding, reporting that unemployment had a negative impact on mental health (40, 54). Another epidemiological study found that unemployed people had an elevated prevalence of major depression at 58 and 53% compared to economically active and inactive people, respectively (38). This study also showed that respondents who were not satisfied with their income were suffering from anxiety and depressive symptoms. This could be because of concern about the future financial crisis, as 79.63% of respondents perceived the upcoming financial crisis as a stressor. Financial uncertainty was reported as significantly associated with anxiety and depression (17). The current study explored the association between financial hardship and mental health difficulties. Results indicated that the "dealing with financial problems" variable was very significantly associated with anxiety and depressive symptoms. A previous study mentioned that individuals displayed increased odds of suffering from major depression in 2011 when they experienced financial distress (39).

Our findings also indicate a relatively strong association between inadequate food supply and anxiety and depressive symptoms. In agreement with the findings of the present study, Butterworth et al. reported in 2009 that food insecurity causes the most serious mental health effects (50). Furthermore, perceiving inadequate food supply as a stressor was significantly associated with both anxiety and depressive symptoms, which is consistent with a recent study which was conducted on Bangladeshi students (17). Although the multivariate analysis did not find that any significant relationship of the stressor "increased price in daily commodities" with anxiety, it was found to be strongly associated with depressive symptoms even in multivariate regression. We are unaware of any previous studies in Bangladesh evaluating anxiety and depression in pandemic situations among wage earners, and are unable to compare our results with previous data from Bangladesh. Respondents who reported their children's educational loss as a stressor were found to be depressed and

TABLE 4 | Adjustment of Odds-ratios (ORs) using all independent study variables.

Variables	*n* (*N* = 707)	Anxiety[§]		Depressive symptoms[§§]	
		OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Socio-demographics					
Age (years)					
<25	112 (15.84%)	1.26 (0.68–1.44)	1.18 (0.57–2.47)	2.29** (1.38–3.83)	1.58 (0.76–3.27)
25–35	441 (62.38%)	0.99 (0.77–2.09)	1.23 (0.74–2.06)	1.19 (0.83–1.72)	1.41 (0.85–2.33)
>35	154 (21.78%)	Ref.	Ref.	Ref.	Ref.
Sex					
Female	161 (22.77%)	1.78** (1.22–2.59)	1.41 (0.89–2.23)	2.29** (1.57−−3.34)	1.67* (1.05–2.66)
Male	546 (77.23%)	Ref.	Ref.	Ref.	Ref.
Education					
Up to Higher secondary	167 (23.62%)	2.30** (1.57–3.37)	1.14 (0.69–1.89)	3.22** (2.17–4.76)	1.89** (1.15–3.12)
Honors or above	540 (76.38%)	Ref.	Ref.	Ref.	Ref.
Occupation					
Businessman	88 (12.45%)	3.31** (1.78–6.14)	1.38 (0.66–2.90)	2.66** (1.47–4.81)	1.35 (0.65–2.78)
Govt./Pvt. Service holders	430 (60.82%)	1.53 (0.99–2.34)	1.00 (0.61–1.64)	1.51 (0.98–2.32)	1.08 (0.66–1.78)
Others[†]	86 (12.16%)	1.46 (0.82–2.60)	0.77 (0.37–1.57)	1.99* (1.11–3.56)	1.11 (0.54–2.29)
HCW[‡]	103 (14.57%)	Ref.	Ref.	Ref.	Ref.
Marital status					
Ever married[e]	362 (51.20%)	1.36* (1.01–1.84)	1.15 (0.74–1.78)	0.97 (0.72–1.31)	0.85 (0.55–1.32)
Unmarried	345 (48.80%)	Ref.	Ref.	Ref.	Ref.
Living setting					
Urban	607 (85.86%)	1.08 (0.70–1.65)	1.58 (0.96–2.63)	0.99 (0.65–1.52)	1.60 (0.96–2.65)
Rural	100 (14.14%)	Ref.	Ref.	Ref.	Ref.
Number of family members					
>7	85 (12.02%)	1.23 (0.75–1.99)	1.10 (0.60–2.02)	0.97 (0.60–1.58)	0.72 (0.40–1.32)
5–7	316 (44.70)	1.64** (1.19–2.26)	1.57* (1.07–2.30)	1.24 (0.90–1.70)	1.02 (0.70–1.49)
<5	306 (43.28%)	Ref.	Ref.	Ref.	Ref.
Number of earning family members					
Only earner	238 (33.66%)	1.47* (1.07–2.03)	1.41 (0.94–2.10)	1.14 (0.83–1.56)	1.06 (0.72–1.58)
More than one earner	469 (66.34%)	Ref.	Ref.	Ref.	Ref.
Average monthly family income (BDT)					
<30,000	346 (48.94%)	3.31** (2.17–5.03)	1.63 (0.94–2.83)	4.12** (2.68–6.34)	1.48 (0.85–2.56)
30,000–70,000	232 (32.81%)	1.67* (1.08–2.58)	1.37 (0.83–2.26)	2.11** (1.35–3.30)	1.64 (0.99–2.72)
>70,000	129 (18.25%)	Ref.	Ref.	Ref.	Ref.
Current (during COVID−19 pandemic) financial status					
Not getting any salary due to COVID−19					
Yes	179 (25.32%)	2.84** (1.94–4.17)	1.29 (0.70–2.35)	3.05** (2.09–4.45)	1.20 (0.67–2.16)
No	528 (74.68%)	Ref.	Ref.	Ref.	Ref.
No earning source					
Yes	245 (34.65%)	2.78** (1.98–3.90)	1.05 (0.64–1.72)	3.09** (2.21–4.32)	1.32 (0.81–2.15)
No	462 (65.35%)	Ref.	Ref.	Ref.	Ref.
Salary not enough for family					
Yes	311 (43.99%)	2.27** (1.67–3.10)	0.81 (0.50–1.29)	2.26** (1.66–3.07)	1.12 (0.71–1.78)
No	396 (56.01%)	Ref.	Ref.	Ref.	Ref.
Satisfied with earning					
No	455 (64.36%)	3.88** (2.80–5.36)	2.52** (1.49–4.26)	3.47** (2.51–4.78)	1.72* (1.02–2.91)
Yes	252 (35.64%)	Ref.	Ref.	Ref.	Ref.

(Continued)

TABLE 4 | Continued

Variables	*n* (*N* = 707)	Anxiety[§]		Depressive symptoms[§§]	
		OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Financial and social stressors					
Not getting any salary during the pandemic					
Yes	215 (30.41%)	2.64** (1.86–3.75)	1.17 (0.65–2.12)	3.08** (2.17–4.38)	1.38 (0.78–2.44)
No	492 (69.59)	Ref.	Ref.	Ref.	Ref.
Dealing with financial problem					
Yes	188 (26.59%)	3.66** (2.47–5.42)	2.02** (1.26–3.23)	3.37** (2.31–4.91)	1.91** (1.21–3.01)
No	519 (73.41%)	Ref.	Ref.	Ref.	Ref.
Increased price of daily necessary commodities					
Yes	395 (55.87%)	1.52** (1.12–2.05)	1.29 (0.89–1.86)	1.64** (1.22–2.22)	1.30 (0.90–1.88)
No	312 (44.13%)	Ref.	Ref.	Ref.	Ref.
Inadequate food supply					
Yes	551 (77.93%)	4.24** (2.72–6.59)	1.85* (1.08–3.70)	4.00** (2.62–6.11)	1.67* (1.01–2.79)
No	156 (22.07%)	Ref.	Ref.	Ref.	Ref.
Children's educational loss					
Yes	208 (29.42%)	1.80** (1.28–2.53)	1.55 (0.97–2.49)	1.65** (1.18–2.31)	1.54 (0.97–2.47)
No	499 (70.58%)	Ref.	Ref.	Ref.	Ref.
Upcoming financial crisis					
Yes	563 (79.63%)	1.91** (1.32–2.77)	1.76** (1.13–2.73)	1.50* 1.04–2.16)	1.31 (0.84–2.02)
No	144 (20.37%)	Ref.	Ref.	Ref.	Ref.

*$P \leq 0.05$; **$P \leq 0.01$.

OR, Odds ratio; AOR, Adjusted odds ratio; AOR', Adjusted odds ratio (adjusted for all independent variables); CI, Confidence interval.

[§]*Anxiety was defined as individuals who scored ≥ 10.*

[§§]*Depressive symptoms was defined as individuals who scored ≥ 10.*

[†]*Included researchers, journalists, farmers, tutors.*

[‡]*Included doctors, nurses, and medical technologists.*

[e]*Included Married/divorced/widowed respondents.*

anxious. This finding will hopefully help in making suitable policies with significant relevance. Finally, it is worth mentioning that the upcoming financial crisis, which was also a stressor for earners, was found to be associated with both anxiety and depressive symptoms. This major finding has implications for dealing with future mental health crises, both during and after this ongoing pandemic, as the effects of financial loss are not temporary.

Strength and Limitations

The study reported on the pandemic-related economic crisis, examining the mental state of the earning members of families. This subject has received little research attention, particularly in the context of Bangladesh. To our best knowledge, no other study has been published on this issue with this specific population.

The strength of this study lies in the use of validated assessment tools to measure mental health difficulties. However, the study has several limitations that should be taken into account. The major limitation of this study is that participation in the study required participants to have access to smartphones or a computer, which indicates that the respondents from lower socio-economic subgroups could not be included. Considering the online data collection methods and smaller sample sizes, our study is not nationally representative. Secondly, this study relies on self-reported data and was not free of recall or report biases. Thirdly, the possibility of selection bias should be considered, as the study was conducted online using a convenience sampling technique. Fourthly, the study did not assess whether the respondents suffered from COVID-19 or they had any mental health conditions prior to the pandemic. Finally, the cross-sectional design of the study includes method bias as a causal relationship, which cannot be elucidated accurately in this design. Future qualitative and longitudinal studies are needed to uncover scenario in the context of the COVID-19 pandemic.

CONCLUSION

The study provides important findings that wage earners may experience an elevated level of anxiety and depressive symptoms during the COVID-19 outbreak. Current income status, socio-economic stressors & negative perception of the earners about the emerging financial stress played a significant role to develop mental health difficulties. This upward trend of anxiety and depressive symptoms indicates that wage earners in society require adequate mental health support. Furthermore, financial consideration from the state or their workplace may help them to deal with mental health difficulties during this unprecedented crisis. The findings of our study will help the frontline practitioners, mental health professionals, and policymakers to deal with the negative costs of the pandemic on the wage earners' mental health.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethical Board of Jahangirnagar University, Savar, Dhaka, Bangladesh. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MS: conceptualization, methodology, investigation, data curation, writing—original draft, writing—review and editing, and validation. AK: investigation, formal analysis, data curation, writing—original draft, and validation. SH: conceptualization, supervision, writing—review and editing, and validation. TI: investigation, data curation, writing—original draft, and validation. MH, HA, JK, and ZL: writing—review and editing and validation. All authors contributed to the article and approved the submitted version.

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Psychiatric Comorbidity and Economic Hardship as Risk Factors for Intentional Self-Harm in Gambling Disorder—A Nationwide Register Study

Anna Karlsson[1,2*], *Olivia Hedén*[1], *Helena Hansson*[3], *Jenny Sandgren*[4] and *Anders Håkansson*[1,5]

[1] Department of Clinical Sciences Lund, Psychiatry, Faculty of Medicine, Lund University, Lund, Sweden, [2] Department of Pediatrics, Skåne University Hospital, Malmö, Sweden, [3] Faculty of Social Sciences, School of Social Work, Lund University, Lund, Sweden, [4] Clinical Studies Sweden – Forum South, Skåne University Hospital, Lund, Sweden, [5] Malmö Addiction Center, Region Skåne, Malmö, Sweden

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***Correspondence:**
Anna Karlsson
anna.karlsson.5043@med.lu.se

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Background: There is an increased risk of suicidality in gambling disorder (GD) and economic hardship is common in the population. Economic hardship itself is a risk factor for suicidality. This study aims to explore the risk of intentional self-harm in GD utilizing social welfare payment (SWP) as a proxy for economic hardship and exploring how economic hardship, gender, criminality, socioeconomic-, and psychiatric risk factors might contribute to intentional self-harm in GD.

Methods: This is a nationwide register-based study of 848 individuals diagnosed with GD in the Swedish healthcare system during the years of 2011–2014 with an average follow up of 4.9 years. Pearson's Chi-square analyses were carried out for comparisons regarding psychiatric comorbidity and intentional self-harm with regards to gender and SWPs. Univariable and multivariable Cox regression were utilized to analyse risk factors for intentional self-harm.

Results: A large part of the study population received SWPs (45.5% with an insignificant overrepresentation of women) and psychiatric disorders were more common in these individuals ($p < 0.001$). Conviction for crime in general ($p < 0.001$) as well as intentional self-harm ($p = 0.025$) were also more common amongst recipients of SWPs. Criminal conviction in general was abundant (26.5%). In the stepwise multivariable regression, substance-related diagnoses as well as anxiety, depressive, and personality disorders remained risk factors for intentional self-harm and no significant results were found with regards to gender, criminal history, or SWPs.

Conclusions: Social welfare payment was common among GD patients and intentional self-harm was more common amongst recipients than GD patients as a whole. Social welfare payments were however not a significant risk factor for intentional self-harm. However, attention to suicidality and self-injurious behavior should be paid from social

services controlling SWPs due to the large prevalence of intentional self-harm in this group. In accordance with previous studies, comorbid psychiatric disorders such as anxiety, depression, substance use, and personality disorders increased the risk of intentional self-harm.

Keywords: gambling disorder (GD), suicidality, suicide attempt, self-harm, social welfare payments, criminality, risk factors, comorbidity

INTRODUCTION

Gambling disorder (GD) is an addictive disorder with an approximate prevalence of 0.5% (1, 2), however, the treatment seeking rate is estimated to be only around 10% and many remain undiagnosed (3). Suicidality and psychiatric comorbidity are common in GD (4–6), women more often being diagnosed with co-occurring psychiatric disorders in general and affective- and anxiety disorders in particular (7). Although suicide levels and suicide attempts in GD have been sparsely described in clinical nationwide samples, a prior study from our research group estimates a 1.8-fold increase in the general mortality and a 15-fold increase in suicide mortality (for which depression was the only significant risk factor) for individuals with GD (8). As a matter of fact, few studies have investigated the relation between GD and completed suicide. Disordered gambling has however been found in so called "psychological autopsies" investigating the lives of suicide victims prior to death (9).

Suicidality is a complicated concept in register research, often defined as suicidal thoughts and suicide attempts. Neither the International Classification of Disease System 10 (ICD 10) nor the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM 5) can differ between acts of suicidal intent and of self-injury (10, 11). Further, no specific diagnosis describes suicidal thoughts (10, 11). Self-injury and self-harm are often associated with emotionally unstable personality disorder and can often be an attempt at anxiety relief but can occur in many other individuals as well (12). Self-harm is however an important risk factor for suicide (13, 14). A survey study from Connecticut concluded that self-injurious behavior was associated with at-risk and problem gambling in youth and is to our knowledge the only study investigating self-injurious behavior related to problem gambling (15).

Studies on suicidality and GD are however more abundant. A study from our research group indicate elevated levels of suicide attempts and acts of intentional self-harm on a national level, with one in five individuals with GD having attempted or completed an act of self-harm/suicide (16). Further, little is known about women with GD and suicide even though many studies argue that female gender is an independent risk factor of suicidality in GD (17–19).

It appears as if criminal activity is markedly more common in individuals with GD (20). Further, individuals committing gambling related crime appear to suffer from worse gambling addiction, however no difference has yet been detected with regards to suicidality (21).

Further, economical risk factors have been found to increase the risk of suicidality and suicide in general (22, 23), and indebtedness has been found to be related to suicidality in GD in particular (24). Economic hardship and indebtedness are common amongst individuals with GD (24, 25), and personal debt has been described as an aggravating factor in GD (25). There is to our knowledge very little research on the effects of financial hardship and indebtedness on suicidal behavior although a Singaporean hospital record study indicated an association between indebtedness and past suicide attempts (however self-reported) (26).

An Australian study concluded that gambling related debt was greater in men than in women (27). However, a Swedish study concluded that over-indebtedness was more abundant in female gamblers and hypothesized that the gender related income differences between men and women might contribute to women being more likely to experience over-indebtedness although gambling debts have been described to be larger among men (28).

Women might suffer greater economic disadvantages from gambling (28), are to a greater extent burdened by psychiatric comorbidity (2, 7, 29, 30), and more often gamble as a mean to escape negative emotions (31). Our research group considers these facts, together with the notion that gambling to a large extent is being perceived as part of the male norm (32), underlines the need for gender specific research as we hypothesize that women with GD experience greater guilt and stigmatization contributing to increased suicidality.

Social welfare payments (SWP) are in Sweden granted to those individuals or households that are not able to cover their regular, most basic, expenses on their own (33). Included here are amongst other costs expenses regarding food, clothing, housing, leisure activities, and health and hygiene (34), and other necessary expenses such as costs for dental or medical care and child care (33). In general, recipients of welfare benefits in the form of SWP are worse off regarding self-reported health, social relations, and experience of poverty and do to a lesser extent have lower educational achievements and employment levels than those who do not receive such aid (35–37). A recent case-control study on problem gamblers suggests that financial risk factors in addition to psychiatric risk factors might contribute to the risk of attempting suicide, and suicide attempters were four times as likely to have payment defaults (38).

The knowledge on self-harm in GD is not well-known and previous research based on registry data cannot separate between suicide attempts and intentional self-harm due to the nature of the diagnostic coding. However, based on studies examining completed suicide or death from intentional self-harm, it is fair to assume that the majority of those deceased passed away due to actual suicide. Since the aim of this study was not to

assess risk factors for completed suicide, we chose to utilize the term intentional self-harm which could indeed be self-injurious behavior—or a suicide attempt with a non-lethal outcome.

The main aim of this study is thus to investigate risk factors for intentional self-harm in individuals with GD focusing on gender, socio-economic risk factors, primarily SWPs but also criminality in relation to previously known psychiatric risk factors.

METHODS

This is a national cohort study based on register data provided by The Swedish National Board of Health and Welfare, Statistics Sweden and The Swedish National Council for Crime Prevention which hold several national registers.

Materials and Procedure

The cohort was created by identifying individuals diagnosed with GD in Swedish healthcare during the years of 2011–2014 in the Swedish National Patient Register (NPR). The register contains data from specialized healthcare including emergency—inpatient and outpatient care. The NPR has been proposed to have a positive predictive value ranging between 85 and 95% for various kinds of psychiatric and somatic diagnoses (39). As part of the NPR, the Hospital Discharge Register has since the year of 1987 had a complete national coverage and 99% of all somatic and psychiatric hospital discharges have been registered (39). However, the hospital-based outpatient care coverage rates have been estimated to be lower, around 80% in 2011 (39). The lower rates regarding outpatient care coverage have been postulated to be due to missing data from, for example, private caregivers (40). Subsequent data have suggested that, missing data on diagnoses have diminished to 4% in outpatient psychiatry (41). Psychiatric diagnoses were categorized according to the ICD 10 system. In this article we will use the terminology of intentional self-harm with regards to diagnoses describing non-lethal suicide attempts and self-injurious behavior since the ICD 10 cannot differentiate between the two (10).

Data on criminal convictions were collected from the register on individuals found guilty of crime provided by The Swedish National Council for Crime Prevention. This register has a very high accuracy with only 0.001% cases missing a personal identification number in a study on 205,846 violent convictions (42). Apart from looking at crime in general, we looked at violent crime, sexual crime, acquisitive crime, economic crime, and drug crime. See **Appendix A** in Supplementary Material for specification of these categories.

The study also included data from The Register for SWPs held by the Swedish National Board of Health and Welfare. The overall assessment of financial aid need among the applicants is reviewed by a municipal social worker, and it is based on a standardized evaluation form taking into account social factors, work and efforts on the labor market (43). All of the municipalities across the nation provide information on an individual level (44). Regarding the quality of the register, the coverage rate of SWP has been proposed to be high but the unreported or incorrectly registered cases in Sweden is unknown (44). The information provided contains the monetary value of the SWP as well as number of months on SWP, the latter variable containing no missing data in contrast to the monetary value which is why this variable was chosen for the calculations. We will utilize SWP as a proxy variable for personal economic hardship and will thus not primarily investigate personal indebtedness but rather a need for financial contributions to make ends meet. Information on marital status and number of children were provided by Statistics Sweden.

Finally, information has been collected from the Swedish Cause of Death Register (CDR). In the CDR, the main cause of death is based on the information provided from the death certificate and is generally determined by the treating physician or, as is the case with unclear deaths or deaths from injuries, deaths amongst individuals utilizing drugs or alcohol and unnatural deaths such as accidents and suicide, by the forensic examiner (45). In turn, 95% of all deaths by suicide are reported to CDR (45).

There are often several causes of death listed on each deceased individual in the CDR. Self-inflicted harm without fatal outcome, a variable which indeed could involve various intents—from anxiety-alleviation to suicidal intentions—as well as various degrees of harm, were defined as the outcome variable. We chose to separate events of undetermined intent (i.e., ICD-10 codes X40–X49 or Y10–Y34) (8). This constituted a methodological choice previously suggested as preferable due to strongly confounding background factors related to events of undetermined intent as opposed to clear suicide diagnoses (46). Due to the low numbers of completed suicide ($n = 7$) no separate analysis on suicide death was performed since the statistical power would be inadequate.

The study was censored on December the 31, 2017, indicating that no data was retrieved after this date and that study follow-up ended on this date.

Participants

In total, 878 patients were found to have been diagnosed with GD (pathological gambling, F63.0 according to the ICD-10, the diagnostic manual in use during the study period). One of these individuals was disqualified due to an erroneous personal identification number. Patients who were 18 years of age, or older, were included ($n = 848$) but minors were not. This was based on the assumption that receiving a GD-diagnosis as a minor might instead represent having a gaming disorder (8).

Statistical Analysis

SPSS Statistics version 26 was used for carrying out statistical analyses and for compilation of descriptive data. Age distribution was presented in median and interquartile ranges (IQR). Follow up time was analyzed in order to evaluate the robustness of the data considering the fact that GD is being increasingly recognized in the Swedish health care system.

Pearson Chi-square analyses were conducted to investigate possible gender differences as well as differences between recipients of SWP and non-recipients with regards to psychiatric and socioeconomic factors.

As for the gender comparison, differences in SWP, acts of self-harm, psychiatric comorbidities, and substance use were

investigated. This analysis was carried out to investigate potential differences between men and women at a group level in their overall mental health and socioeconomic situation, as we hypothesized that psychiatric comorbidity and need for SWP would be greater amongst women.

The comparative analysis on individuals receiving SWP and not receiving SWP included factors such as psychiatric comorbidity, criminality, and intentional self-harm factors which might be of potential interest to social services already involved with those individuals receiving SWP.

A separate analysis was also conducted comparing prevalence of crime committed during follow up investigating differences in drunk driving, violent-, sexual-, property-, drug-, and economic crime.

In the comparative analysis between those with female and male gender a Bonferroni-Holm procedure was utilized to diminish the risk for type 1 error, due to the large number of tests analyzed. We chose to divide the variables according in four groups: socioeconomic factors ($n = 1$), self-harm ($n = 4$), substance use disorders (SUD) ($n = 11$), and psychiatric comorbidities ($n = 8$). For each of these groups, the Bonferroni-Holm procedure was used to test the significant results (with the significance level of alfa <0.005). Further a chi-square analysis was conducted comparing gender differences in criminal convictions.

Finally, simple multiple factor Cox regression analyses were assessed to investigate known, and hypothesized, risk factors of intentional self-harm, from which the individual had not passed away (i.e., ICD codes X60–X84 in the NPR and not the CDR). Criminality in general was also included due to the fact that this potential risk-factor has not been studied much in the GD context but is a known risk factor for suicidality in general (47). Further, previously known factors associated with suicidality or self-harm were included, i.e., gender (16), substance (16), and alcohol use disorders (AUD) (16), as well as psychiatric comorbid disorders such as psychotic disorder (48), personality disorder such as borderline personality disorder and narcissistic personality disorder (49), bipolar disorder (50), depressive disorder (16), and anxiety disorder (16). Results were presented as hazard ratios (HR) and described with a 95% confidence interval. Again, the Bonferroni-Holm procedure was used to diminish the risk of type 1 error (with the significance level of alfa <0.005). A multiple Cox regression analysis was then based upon remaining significant results from the single factor analysis. Results were considered significant if the p-value was <0.05.

Ethical Considerations

The study procedures were carried out in accordance with the Declaration of Helsinki. However, the requirement for informed consent was waived because the study was based on administrative population-based registers. Information to the public about the ongoing project with contact information to the research group was launched at the Lund University platform "LUPOP" on 02052019 (51). The study was approved by the regional ethics committee of Lund, Sweden (file number: 2018/3).

RESULTS

The population consisted of 848 individuals, amongst whom 169 individuals were of female gender (19.9%). The average age at baseline was 38.23 years (median 37; IQR: 28–47) with a range between 18 and 84 years. The average time in study was 4.9 years (median 4.86; IQR: 3.83–6.09). Among the subjects who died during the observation time ($n = 26$, nine women and 17 men) the average time in study was 3.32 years (median 3.22; IQR: 1.19–5.05). Seven of these individuals (all men) passed away due to suicide (ICD 10 codes X60–X84) and two additional individuals passed away due to potential suicide (Y10–Y34). Together, these individuals had an average time in study of 3.07 years (median 3.30; IQR: 0.86–4.96).

The majority of the sample did not have any children (68.7%, men: 70.4%, women 62.1%) with men, being less likely to be parents [Pearson Chi square test: $\chi^2_{(6,838)} = 13.3$, $p = 0.039$]. The majority were non-married with 13% being married [12.8% of the men and 13.6% of the women, Pearson Chi square test: $\chi^2_{(1,848)} = 14.6, 6$ $p < 0.001$]. One-fifth were divorced (21.1%).

Out of all the study individuals, 731 individuals (86.2%) had concomitant psychiatric disorders (all ICD 10 "F-diagnosis" except F63.0, GD) (**Table 1**). In our population, 45.6% ($n = 387$) had been in both inpatient and outpatient psychiatric care. Of these individuals, 99.5% ($n = 385$) had psychiatric diagnoses co-occurring with GD. A total of 421 subjects (49.6%) had solely been in outpatient care during the observation time, and 74.8% of them had co-occurring psychiatric diagnoses. In total, a number of 107 (12.6%) subjects were found to have attempted or committed suicide or had made an act of intentional self-harm (X60–X84).

Social Welfare Payments

Out of all subjects, 45.5% ($n = 386$, 85 women and 301 men) had received SWP at some point during the observation time. Amongst the women 50.3% received SWP and 44.3% of the men. The total number of months on such aid ranged between 1 and 84 months. The average (median) number of months on aid was 9.0 months (3.0–28.0) and the mean number of months on SWP was 17.8 months with a standard deviation of 19.6 months. The average (median) time in study among individuals on SWP was 5.07 (3.94–6.31) years.

Significant differences were found between those with and without SWP regarding psychiatric disorders in general [$\chi^2(1,848) = 21.6$, $p < 0.001$] and depressive disorder [$\chi^2(1,848) = 4.11$, $p = 0.043$], anxiety disorder [$\chi^2(1,848) = 32.8$, $p < 0.001$], personality disorder [$\chi^2(1,848) = 19.5$, $p < 0.001$], AUD [$\chi^2(1,848) = 4.6$, $p = 0.031$], and SUD [$\chi^2(1,848) = 39.3$, $p < 0.001$] all of which were more common among recipients of SWP. Conviction for crime in general [$\chi^2(1,848) = 24.3$, $p < 0.001$] as well as non-lethal self-harm (X60–X84), [$\chi^2(1,848) = 4.1$, $p = 0.042$] were also more common amongst those who had received SWP (**Table 2**).

Gender

Among study subjects, women were more likely to suffer from concomitant psychiatric disorders [$\chi^2_{(1,848)} = 11.0$, $p < 0.001$]

TABLE 1 | Prevalence of psychiatric disorders, self-harm, and suicide.

Selected variable (ICD 10 code)	Male gender	Female gender	Total (*n*, %)	*p*	Bonferroni-Holm significance level
Social welfare payment	*N* = 301 (44.3%)	*N* = 85 (50.3%)	*N* = 386 (45.5%)	0.163	NA
Death from suicide X60–X84	*N* = 7 (1%)	*N* = 0 (0%)	*N* = 7 (0.8%)	1.000**	NA
Death from self-harm of unknown intent Y10–Y34	*N* = 2 (0.3%)	*N* = 0 (0%)	*N* = 2 (0.2%)	1.000***	NA
Non-lethal intentional self-harm X60–X84*	*N* = 71 (10.5%)	*N* = 31 (18.3%)	*N* = 102 (12%)	0.005	0.013
Non-lethal self-harm of unknown intent Y10–Y34	*N* = 16 (2.4%)	6 (3.6%)	22 (2.6%)	0.415**	NA
SUD F11–F19	*N* = 154 (22.7%)	*N* = 41 (24.3%)	195 (23.0%)	0.662	NA
Alcohol, F10	*N* = 188 (27.7%)	45 (26.6%)	233 (27.5%)	0.782	NA
Opioids, F11	*N* = 21 (3.1%)	6 (3.6%)	27 (3.2%)	0.762	NA
Cannabinoids, F12	*N* = 34 (5.0%)	7 (4.1%)	41 (4.8%)	0.639	NA
Sedatives, F13	*N* = 39 (5.7%)	18 (10.7%)	57 (6.7%)	0.023	0.005
Cocaine, F14	*N* = 5 (0.7%)	1 (0.6%)	6 (0.7%)	1.000**	NA
Other stimulants, F15	*N* = 18 (2.7%)	1 (0.6%)	19 (2.2)	0.146*	NA
Hallucinogens, F16	*N* = 4 (0.6%)	2 (1.2%)	6 (0.7%)	0.343**	NA
Tobacco, F17	*N* = 17 (2.5%)	7 (4.1%)	24 (2.8%)	0.296*	NA
Volatile solvents, F18	*N* = 1 (0.1%)	0 (0.0%)	1 (0.1%)	1.000**	NA
Multiple drug use and psychoactives, F19	*N* = 88 (13%)	24 (14.2%)	112 (13.2%)	0.670	NA
Psychiatric comorbidity *F* diagnosis (exluding F63.0)*	*N* = 572 (84.2%)	*N* = 159 (94.1%)	*N* = 731 (86.2%)	<0.001	0.001
Bipolar disorder F30–F31*	*N* = 69 (10.2%)	*N* = 35 (20.7%)	*N* = 104 (12.3%)	<0.001	0.006
Anxiety disorder F40–F48*	*N* = 352 (51.0%)	*N* = 113 (66.9%)	*N* = 465 (54.8%)	<0.001	0.007
Depressive disorders F32–F33*	*N* = 280 (41.2%)	*N* = 370 (43.6%)	*N* = 379 (43.6%)	0.005	0.013
Other depressive disorder F34–F39	*N* = 23 (3.4%)	*N* = 9 (5.3%)	32 (3.8%)	0.237	NA
Psychotic disorder F20–F29	*N* = 61 (9.0%)	*N* = 7 (4.1%)	*N* = 68 (8.0%)	0.038	0.017
Personality disorder, F60–F62 excluding antiscoial personality disorder (F602)*	*N* = 80 (11.8%)	*N* = 53 (31.4%)	*N* = 133 (15.7%)	<0.001	0.008
Antisocial personality disorder F602	*N* = 13 (1.9%)	*N* = 1 (0.6%)	*N* = 15 (1.7%)	0.227	NA

Gender comparison through Pearson Chi square test and Fisher's test when needed. Significant results at p level 0.05 were then tested with the Bonferroni-Holm procedure dividing the factors into four groups; socioeconomic factors (n = 1), self-harm (n = 4), substance use disorders (n = 11), and psychiatric comorbidities (n = 8) with an alfa level at 0.05. N = 848. AUD, alcohol use disorder; SUD, substance abuse disorder.

**Significant at the alfa level of 0.05 after Bonferroni-Holm correction.*

NA, not applicable.

***One of the cells (25%) had expected count <5. Results are thus from Fisher's test, two-sided results displayed.*

****Two of the cells (50%) had expected count <5. Results are thus from Fisher's test, two-sided results displayed.*

(**Table 1**). Women were slightly more often recipients of SWP (50.3% compared to 44.3% of the men although not statistically significant) [$\chi^2_{(1,848)} = 1.9, p = 0.163$] (**Table 1**).

Of the seven certain suicides (diagnoses X64–X80 in the CDR) [$\chi^2_{(1,848)} = 1.7$, $p = 0.185$] all had been committed by men; however, the difference did not reach statistical significance (**Table 1**). As many as 18.3% of the women and 10.5% of male study subjects had an episode of intentional self-harm [$\chi^2_{(1,848)} = 7.9$, $p = 0.005$] (**Table 1**).

Criminality

Roughly one in four study subjects (26.5%) had been sentenced for a criminal conviction during follow up. This was more common in men although one in five women had also received a sentence [$\chi^2_{(1,848)} = 8.4, p = 0.004$]. Property crime appeared to be the most common amongst the women whilst the men had committed a larger variety of criminal acts (**Table 3**). Further, criminal conviction was more common in recipients of SWP [$\chi^2_{(1,848)} = 24.3, p < 0.001$] (**Table 2**).

Risk Factors for Intentional Self-Harm

The non-adjusted, single factor Cox regression analyses showed that SWP was not statistically significantly associated with intentional self-harm. However, criminal conviction, female gender, and psychiatric disorders such as AUD and SUD, personality disorders, and anxiety-, depressive-, and psychotic diagnosis appeared to be associated with intentional self-harm. Although when investigating the results with the Bonferroni-Holm procedure, female gender and criminal conviction did not reach statistical significance (**Table 4**).

In the multivariable Cox regression analysis, the predictive value of bipolar disorder and alcohol use diagnosis (AUD), respectively, were no longer statistically significant for self-injury. However, substance use diagnosis (SUD) as well as

TABLE 2 | Prevalence of psychiatric comorbidity amongst recipients of social welfare payment compared with Pearson Chi square test to non-social welfare payment recipients.

Selected variable (ICD 10 code)	No social welfare payment (*n*/%)	Social welfare payment (*n*/%)	*p*
AUD*	113 (24.6%)	120 (31.1%)	0.031
SUD*	68 (14.7)	127 (32.9)	<0.001
Psychiatric comorbidity*	375 (81.2)	356 (92.9)	<0.001
Bipolar disorder, F30–F31	53 (11.5)	51 (13.2)	0.442
Anxiety disorder. F40–F48*	212 (45.9)	253 (65.5)	<0.001
Depressive disorder, F32–F33*	187 (40.5)	183 (47.4)	0.043
Personality disorders, F60–F62 exkluding antiscoial personality disorder (F602)*	48 (10.4)	85 (22.0)	<0.001
Psychotic disorders, F20–F29	33 (7.1)	35 (9.1)	0.304
Criminality*	91 (19.7)	134 (34.7)	<0.001
Non-lethal intentional self-harm (X60–X84)*	46 (10.0)	56 (14.5)	0.042

N = 848. AUD, alcohol use disorder; SUD, substance abuse disorder.
** $p < 0.05$.*

TABLE 3 | Prevalence of criminal conviction during follow up.

Category of crime	Total *n* (%)	Men *n* (%)	Women *n* (%)	*P*-value
Violent crime	40 (7.7)	36 (5.3)	4 (2.4)	0.107
Sexual crime	3 (0.35)	3 (0.4)	0 (0)	0.387
Property crime	61 (7.2)	51 (7.5)	10 (5.9)	0.473
Drunk driving	26 (3.1)	21 (3.1)	5 (3.0)	0.928
Drug crime	42 (5.0)	38 (5.6)	4 (2.4)	0.083
Economic crime	65 (7.7)	58 (8.5)	7 (4.1)	0.054
Other crime*	67 (7.9)	60 (8.8)	7 (4.1)	0.043
Any crime*	225 (26.5)	195 (28.7)	30 (17.8)	0.04

Gender comparison through Pearson Chi square test. N = 848.
**Significant at the alfa level of 0.05 after Bonferroni-Holm correction.*

anxiety disorder (HR: 1.920 95% CI:1.156–3.189, $p = 0.012$) depressive disorders (HR:2.385, 95% CI:1.539–3.695, $p < 0.001$), and personality disorders (HR: 2.195, 95% CI:1.446–3.331 $p < 0.001$) remained risk factors for intentional self-harm (**Table 5**).

DISCUSSION

Although intentional self-harm was more abundant in women and in recipients of SWP previously known psychiatric risk factors i.e., substance related diagnosis, anxiety-, depressive-, and personality disorders were the factors which predicted intentional self-harm in the multivariable Cox regression. This does not mean that female gender and SWP are not per se risk factors for intentional self-harm, larger studies are needed to further analyse these relationships. It is however of clinical importance that psychiatric risk factors appear to be the strongest predictors of intentional self-harm and that there is need to assess GD in relation to psychiatric comorbidity.

Previous research has also found intentional self-harm and suicidality to be more frequent among women (16, 18, 52). The increased risk of suicide attempts among women have been proposed to be explained by higher prevalence of depression in the same group (53). Nevertheless, more recent studies have suggested that this risk was associated with female gender, also when controlling for depression (16, 17). It is apparent that the relationship between gender, psychiatric, and socioeconomic risk factors are complex in terms of suicidality and acts of self-harm.

The results from this study show that almost half of the population had received SWP during follow up. In comparison, recent data from the Swedish National Board of Health and Welfare show that around one in twenty households in the overall population were recipients of SWP in 2018 (33). Although the median follow-up in our study was close to 5 years, the results indicate a greater need for economic support for those with GD.

Future studies are needed to get a more comprehensive picture of indebtedness, economic hardship, and suicidality in GD. Accordingly, larger samples and perhaps other variables than SWP such as factors related to indebtedness might be better predictors of suicidality. In fact a recent study indicates that as many as 50% of problem gamblers had borrowed money for gambling and that these loans most often were from private acquaintances, followed by payday loans or "cash advances" and unsecured bank loans (54). Finding one single indicator for personal indebtedness or economic hardship might thus be hard.

We found no significant gender differences regarding prevalence rates of concomitant SUDs or AUD in our population in accordance with previous literature (7). Moreover, from the adjusted regression analysis in our study, SUD (excluding AUD) was found to be associated with an increased risk of intentional self-harm. The impact of SUD on suicide attempts have been described as three-fold, in previous literature (55). In addition, we found that psychiatric comorbidity including depressive-, anxiety-, bipolar-, and personality disorders were more common among women. This has also been demonstrated in previous studies (2, 7, 29, 30). Psychotic disorder however was more common amongst the male study participants. As expected, criminality in general was more common in men but surprisingly common amongst the women. Almost 18% of the women had been sentenced to a crime during follow up which is in line with previous findings from New Zeeland where Abbot et al., describe high rates of gambling problems amongst female prison clients (56).

Rates of criminality were overall high in the study sample, women most often being involved in acquisitive crimes whilst the male population had been sentenced to a variety of criminal categories such as violent crime, property crime, economic crime and "other criminal categories." These results need further investigation beyond the scope of the present study. All in all, as many as one in four were sentenced to crime during follow up with a male dominance.

TABLE 4 | Univariable Cox regression investigating intentional self-harm (ICD 10 codes X60–X84).

Risk factor (ICD 10 code)	Intentional self-harm (X60–X84)	Single factor cox regression			Bonferroni-Holm significance level
	n (%)	HR	95% CI	*p*	
Social welfare payment	56 (14.5)	1.443	0.977–2.132	0.066	NA
No social welfare payment	46 (10.0)				
Female gender	31 (18.3)	1.807	1.185–7.755	0.006	0.01
Male gender	71 (10.5)				
Age		1.000	0.984–1.016	0.996	NA
AUD (F10)*	46 (19.7)	2.214	1.499–3.270	<0.001	0.005
No AUD	56 (9.1)				
SUD (F11–F19) *	52 (26.7)	3.648	2.473–5.382	<0.001	0.006
No SUD	50 (7.7)				
Psychotic disorder (F20–F29)	12 (17.6)	1.461	0.799–2.670	0.218	NA
No psychotic disorder	90 (11.5)				
Anxiety disorder (F40–48)*	81 (17.4)	3.262	2.019–5.272	<0.001	0.006
no anxiety disorder	21 (5.5)				
Depressive disorder (F32–33)*	72 (19.5)	3.229	2.109–4.943	<0.001	0.007
No depressive disorder	30 (6.3)				
Personality disorder (F60–62)*	37 (26.6)	3.055	2.039–4.577	<0.001	0.008
No personality disorder	65 (9.2)				
Bipolar disorder (F30–31)	17 (16.3)	1.435	0.852–2.415	0.174	NA
No bipolar disorder	85 (11.4)				
Criminal conviction	38 (16.9)	1.581	1.058–2.363	0.025	NA
No criminal conviction	64 (10.3)				

Censoring (time of death, final emigration, or end of study: 20171231). Significant results at p level 0.05 were then tested with the Bonferroni-Holm procedure (n = 11). N = 848.
**Significant result at the alfa level 0.05 after Bonferroni-Holm procedure. AUD, alcohol use diagnosis; SUD, substance use diagnosis.*
NA, not applicable.

TABLE 5 | Multivariable Cox regression investigating intentional self-harm, from which the individual did not decease.

Risk factor (ICD 10 code)	Multiple factor Cox regression		
	HR	95% CI	*p*
AUD (F10)	1.419	0.930–2.164	0.104
SUD (F11–F19)*	2.404	1.569–3.683	<0.001
Anxiety disorder (F40–48)*	1.920	1.156–3.189	0.012
Depressive disorder (F32–33)*	2.385	1.539–3.695	<0.001
Personality disorder (F60–62)*	2.195	1.446–3.331	<0.001

(ICD 10 codes X60–X85). Censoring (time of death, final emigration, or end of study: 20171231). N = 848. AUD, alcohol use diagnosis; SUD, substance use diagnosis.
** $p < 0.05$.*

LIMITATIONS

Although the register material was quite extensive and of high quality in this study, there are inevitable limitations to conducting a register study on GD patients. Indeed, we were only able to include individuals who had been in the medical care system. This constitutes a limitation because, in contrast to the burden of harm associated with GD and the need of effective interventions, it has been described that overall treatment-seeking is sparse (57, 58). Associations between overall help-seeking motivation and a lower degree of severity have been found (59). This could indicate that our study subjects might have had milder forms of the condition. However, this is rather unlikely considering the high rate of psychiatric comorbidity in our population, which instead is associated with more severe forms of the condition (60). As previously discussed, the inability to distinguish between self-injurious behavior in the diagnostic systems implicate that no conclusions on the suicidal intent of the self-harm can be drawn. This distinction can in certain cases be hard to make even for the psychiatric clinician and it is well known that women are over-represented in studies focusing on suicide attempts whilst the inverse is true for death from suicide.

Further, the percentage of women in the material make statistical conclusions hard to investigate and the gender comparisons are to be taken as rather rough estimations which need to be confirmed in larger studies. Although statistical power was weak in these analyses, we chose to present results with regards to potential gender differences as we very much believe that differences in comorbid diseases and life circumstances in individuals with GD are quite substantial and that attention must

be paid to this in order to not draw erroneous conclusions for the group as a whole. Research on self-harm and suicidality in women with GD is much needed.

CONCLUSION

This study confirms the notion that individuals with GD often are economically burdened, indeed, SWPs were common and utilized by approximately half of the population. Self-harm and suicidality were as previously described abundant. Further, criminal activity was common in the population with as many as one in four having been sentenced to crime during follow up. Risk factors for suicide attempt and self-harm were however several psychiatric diagnoses, i.e., SUD, anxiety disorders, depressive disorders, and personality disorder. It is evident that individuals with GD are in need of acknowledgment and aid from health care sectors, the prison and probation system and social services.

DATA AVAILABILITY STATEMENT

The datasets presented in this article cannot be readily available without the consent from the authorities holding the registers (i.e., The Swedish National Board of Health and The Swedish National Council for Crime Prevention). Inquiries regarding this procedure can be directed to Anna Karlsson, anna.karlsson.5043@med.lu.se.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The Regional Ethics Committee of Lund, Sweden (file number: 2018/3). The ethics committee waived the requirement of written informed consent for participation.

AUTHOR CONTRIBUTIONS

AK and AH designed and applied for ethical permission of the study. AK carried out the main part of the statistical analyses and wrote the first draft of the paper. OH contributed to statistical analysis and in writing of the paper. JS is a professional statistician who prepared the data upon which the analyses were run. AH and HH were involved during the process of designing and in writing of the paper. All authors made substantial contributions to the extension and finish of the paper, are responsible of the overall research idea and the background data and are equally responsible of the interpretation of data.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2021.688285/full#supplementary-material

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Financial Difficulties Correlate With Mental Health Among Bangladeshi Residents Amid COVID-19 Pandemic: Findings From a Cross-Sectional Survey

Abu Bakkar Siddique[1,2], Sudipto Deb Nath[3], Md. Saiful Islam[1,2], Tausif Hasan Khan[4], Shahina Pardhan[5], M. Ziaul Amin[6], M. Imran Al Amin[7], Zayed Bin Zakir Shawon[8] and Kamrun Nahar Koly[9]*

[1] Department of Public Health and Informatics, Jahangirnagar University, Dhaka, Bangladesh, [2] Centre for Advanced Research Excellence in Public Health, Dhaka, Bangladesh, [3] Army Medical College Jashore, Jashore, Bangladesh, [4] Department of Chemical Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, [5] Vision and Eye Research Institute, School of Medicine, Anglia Ruskin University, Cambridge, United Kingdom, [6] Department of Genetic Engineering & Biotechnology, Jashore University of Science & Technology, Jashore, Bangladesh, [7] Dhaka Medical College Hospital, Dhaka, Bangladesh, [8] Department of Mathematics and Natural Sciences, Brac University, Dhaka, Bangladesh, [9] Health System and Population Studies Division, International Centre for Diarrhoeal Disease Research, Dhaka, Bangladesh

Background: The COVID-19 pandemic is a global threat which has challenged mental resilience and impacted the psychological well-being of people across all age groups globally. The present study aimed to investigate how financial difficulties during the pandemic correlate with mental health among residents of Bangladesh.

Methods: A cross-sectional survey was conducted on 4,020 residents from different parts of Bangladesh between July and September 2020, during a period of elevated risk of COVID-19 infection. A self-reported online questionnaire comprising socio-demographic, financial difficulties and psychometric measures (to assess depression, anxiety and stress) was used to gather information from participants. Multivariable logistic regression analysis was performed to determine the factors associated with mental health consequences.

Results: The prevalence of depression, anxiety, and stress in the sample were 71.1%, 62.3%, and 56.7%, respectively. Levels of depression, anxiety, and stress were significantly higher among participants who reported female sex, being unmarried, smaller families, higher monthly family income, poor self-perceived health status, living near people who had been infected by COVID-19, probability of decreased income, food scarcity (both during the pandemic and in the future) and the possibility of unemployment. However, due to the nature of the cross-sectional study performed with a convenience sampling method, the causal relationship between variables cannot be justified.

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***Correspondence:**
Md. Saiful Islam
islam.msaiful@outlook.com

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Conclusions: After several months of the COVID-19 pandemic in Bangladesh, more than half of the respondents rated their mental health concerns as moderate to severe. The findings highlight the contributing factors of poor mental health which warrant the creation of interventions that address the economic, financial and mental health impacts of the pandemic.

Keywords: mental health, anxiety, depression, stress, financial difficulties, COVID-19

INTRODUCTION

The world is undergoing an uncertain coronavirus disease 2019 (COVID-19) pandemic which has cost millions of lives, impacted the economy, and had severe mental health consequences. Bangladesh reported its first COVID-19 case on March 8, 2020 (1, 2). Since then, the highly contagious virus has spread rapidly with 1,545,800 confirmed cases and 27,277 deaths as of September 22nd 2021 (3). To prevent the spread of the virus, the Bangladesh government imposed a nationwide as well as partial (zonal) lockdown, home quarantine, and travel restrictions, similarly to other countries (4).

Pandemic related issues including fear of infection and losing loved ones, spread of misinformation, lack of medical treatment and shortage of properly equipped units to treat patients; along with lockdown-related stress (i.e., prolonged home isolation, social distancing, food insecurity, fear of unemployment, loss of income, etc.) have been associated with poor mental health. Common mental health issues include depression, anxiety, phobia, insomnia, and trauma (5–13). There is evidence that people may experience symptoms of psychosis, anxiety, trauma, suicidal ideation, and panic over communicable disease outbreaks (14, 15). While the world is combating the physical effects of COVID-19, mental health has often been neglected or left unaddressed (16).

Many of the world's nations, including Bangladesh, declared emergency lockdown measures to reduce transmission of the virus (17). During the COVID-19 pandemic, particularly in lockdown periods, people experienced multiple financial difficulties including but not limited to unemployment, job scarcity, income loss, and food insecurity (18, 19). Such financial difficulties, along with worries related to social distancing, isolation and quarantine may predispose people to common mental health issues such as anxiety, depression, and stress (18, 20). Most literature relating to this pandemic focuses on the genomic characterization of the virus, epidemiology, clinical identification features of infected patients and challenges for global health governance (21–24). In brief, through a global public health emergency such as the one we are currently experiencing, it is important to examine the pandemic's psychological effect on populations to establish symptom mitigation strategies (25).

Multiple studies have reported an increase in anxiety, depression, and stress during the COVID-19 pandemic (4, 13, 26–36). One potential reason could be the pandemic's influence on the economy and workforce. The negative effects of the pandemic on the economy as well as an increase in unemployment may have contributed to the higher levels of anxiety and depression in a unique way (37, 38). A recent study reported that the mental health of Canadian adults declined significantly during the early phase of the pandemic, correlated with economic concerns (39). Unprecedented increases in unemployment, economic uncertainty, and financial concerns are all key factors contributing to the rise in mental health problems during the pandemic (40). A longitudinal study conducted among British students prior to the pandemic revealed that mental health was associated with financial difficulties (41).

In this context, it is very important for us to know the financial issues and factors associated with mental health during the COVID-19 pandemic among residents of lower- and middle-income countries like Bangladesh. We sought to investigate the correlation between financial difficulties and mental health among Bangladeshi residents as there is scarce existing literature on this topic. We hypothesized that financial difficulties (e.g., decreased income and food scarcity, along with the possibility of future decreasing income and food scarcity) would be associated positively with poor mental health. Our study will help the Government and policy makers to resolve financial problems and to expand psycho-social support among the residents of Bangladesh.

METHODS AND MATERIALS

Participants and Procedure

A cross-sectional study was conducted among house-bound residents in Bangladesh from different cities (including Dhaka, Narayangonj, Sylhet, Chittagong, Mymensingh and Cox's Bazar) between July and September 2020. The data were collected utilizing an online survey tool (*Google Forms*) with a convenience sampling design. An online survey was used to avoid the possibility of infection and to maintain spatial distancing. After incorporating all questions in *Google Forms*, a shareable link was generated. The survey link was disseminated via online platforms including Facebook, Messenger, and WhatsApp in order to get a rapid response and cover a geographically diverse area of Bangladesh. Initially, 5057 participants submitted a response. After removing incomplete surveys, 4,020 were kept for final analysis. All surveys were completed in the Bengali language. The inclusion criteria included being (i) able to read Bangla, (ii) aged 18 years or over, and (iii) able to complete the entire survey. All respondents gave virtual informed consent.

Sample Size Calculation

The sample size was calculated using the following Equation (1):

$$n = \frac{z^2 pq}{d^2} \quad (1)$$
$$\Longrightarrow n = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{0.05^2}$$
$$\Longrightarrow n = 384.16 \approx 384$$

Here, $n =$ number of samples
$z = 1.96$ (95% confidence level)
$p =$ prevalence estimate (50% or 0.5)
$q = (1\text{-}p)$
$d =$ precision limit or proportion of sampling error (0.05).

We hypothesized that the prevalence estimate (p) for the present study would be 50%. Assuming a 10% non-response rate, a sample size of 423.5 ≈ 424 participants was estimated. Our sample size exceeded this estimate.

Measures

A self-reported questionnaire including questions concerning socio-demographics and financial difficulties along with a psychometric scale (i.e., DASS-21—see below) was used to collect data from participants.

Socio-Demographics Information

Socio-demographic questions section included those on age, sex, monthly family income, educational qualifications, marital status, size of family, habitat (rural/urban), and self-reported health status (good/poor).

In addition, "yes/no" questions were included in the survey regarding the effects of COVID-19 on the participants' family members and their close networks (neighbors and friends).

Measures of Financial Difficulties During the COVID-19 Pandemic

With regard to financial difficulties, participants were asked whether they thought that their income status had changed during the COVID-19 pandemic (yes/no), the probability of decreasing income in the future (yes/no), the possibility of losing their job in future (yes/no), food scarcity during the pandemic (yes/no), the probability of food scarcity in the future (yes/no). The Cronbach's alpha of these measures was 0.78.

Depression Anxiety Stress Scale (DASS-21)

Depression, anxiety, and stress were assessed utilizing the DASS-21 (42) comprising 21 items and three dimensions (seven items per dimension) (e.g., "*I could not seem to experience any positive feeling at all*" for depression; "*I was worried about situations in which I might panic*" for anxiety; and "*I found it difficult to relax*" for stress) responded to on a four-point Likert scale from 0 (*Did not apply to me at all*) to 3 (*Applied to me very much,* or *most of the time*). Higher scores on each dimension reflect higher depression, anxiety, and stress, respectively. Scoring of the sub-scales was as follows—depression: normal 0–9, mild 10–13, moderate 14–20, severe 21–27, and extremely severe +28; anxiety: normal 0–7, mild 8–9, moderate 10–14, severe 15–19, and extremely severe +20, and stress: normal 0–14, mild 15–18, moderate 19–25, severe 26–33, and extremely severe +34). In the present study, the Cronbach's alpha for depression, anxiety and stress were very good (0.80, 0.82, and 0.81 respectively) and the total was 0.80.

Statistical Analysis

Descriptive analysis including frequencies and percentages were performed for categorical variables, while means, standard deviations, etc. were calculated for continuous variables. We present prevalence estimates of depression, anxiety and stress using the predefined thresholds above. All items of the DASS-21 yielded Skewness and Kurtosis values within the ± 2.0 range, indicating that they were normally distributed (43). Chi-square tests were performed to determine the significant relationship of depression, anxiety, and stress with all examined variables. In addition, binary logistic regression analysis was performed to determine the candidates for multivariable logistic regression analysis. The variables that were statistically significant ($p < 0.05$) in the binary logistic regression analysis of depression, anxiety, and stress were included in the multivariable regression models. The multicollinearity was checked using tolerance (>0.1) and variance inflation factor (VIF; <10) before performing multivariable logistic regression. Analyses were performed using Statistical Package for Social Science (SPSS) version 25.0.

Ethics

The survey was conducted according to the guidelines of the Helsinki Declaration 1975. The study protocol was reviewed and approved by the Ethical Review Committee of the Faculty of Biological Science and Technology, Jessore University of Science & Technology, Jessore-7408, Bangladesh [Ref: ERC/FBS/JUST/2020-43(a)]. All respondents were informed about the purpose of the study, the procedure, and the right to withdraw their data. Each participant gave virtual informed consent prior to completing the study. Participants were informed that all their information would be kept anonymous and confidential, and they were provided with information about the nature and purpose of the study.

RESULTS

General Characteristics of Participants

A total of 4,020 participants (male: 53.6%) were included in the final analysis. Most were younger, aged between 18 and 25 years (86%). The majority were educated up to university level (78.9%), unmarried (87.8%), resided in urban areas (76.9%), had up to 4 members in their immediate family (54%) and a family monthly income ranging from 20,000–50,000 Bangladeshi Taka [BDT; 84.87 BDT = 1 US$] (47.6%). 7.3% reported poor self-perceived health status.

Almost 6% reported that COVID-19 had affected their family members, while the majority reported that COVID-19 had affected people in their residential area (72.3%). Over two-thirds of participants reported their income had decreased during the COVID-19 pandemic (66.7%), while 72.7% reported the possibility of decreased income in the future, and 35.3% reported the possibility of losing their job during the pandemic.

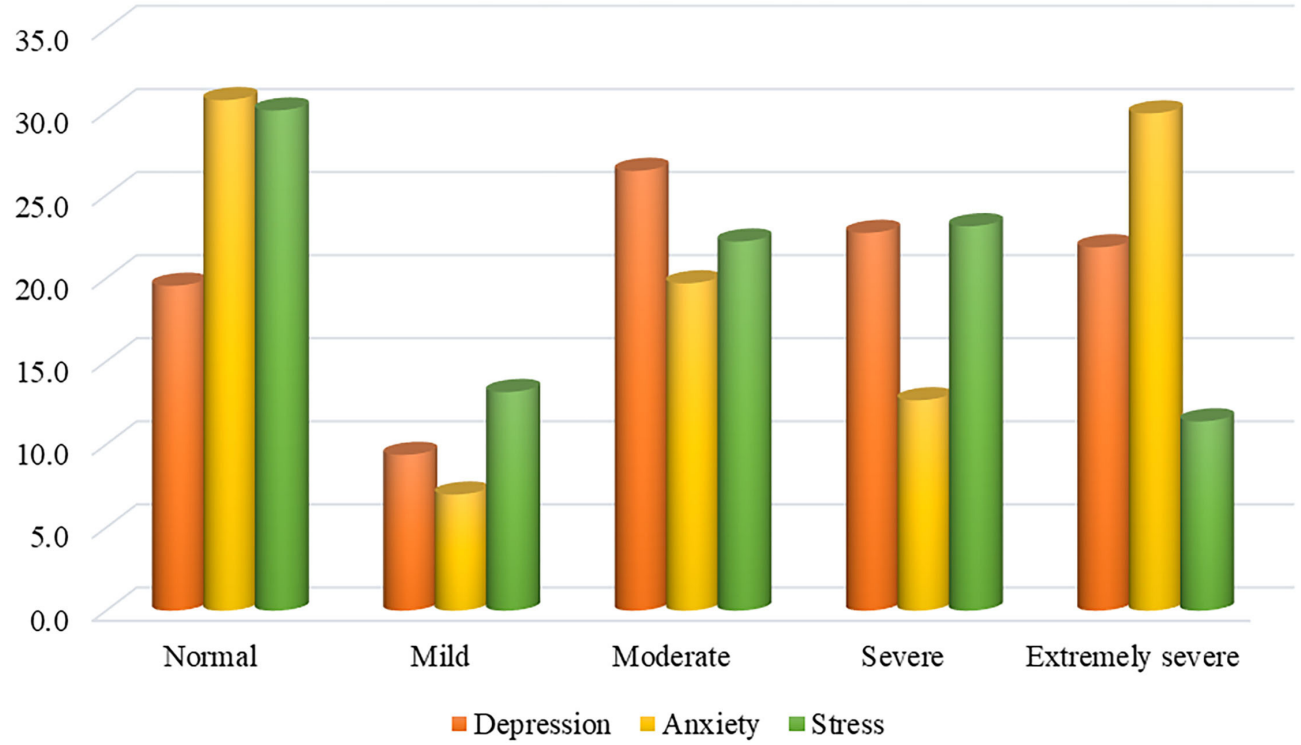

FIGURE 1 | Levels of mental health symptoms.

In addition, 17.2% reported current food scarcity, with almost half of participants thinking food scarcity was possible in the future (45.3%).

Mental Health Consequences and Their Association With Other Variables

Figure 1 presents the patterns of mental health concerns among Bangladeshi residents during the COVID-19 pandemic. The prevalence estimates of moderate to severe depression, anxiety, and stress were 71.1, 62.3, and 56.7%, respectively. As per as bivariate analysis (Chi-square tests), most variables were significantly associated with depression, anxiety, and stress (**Table 1**).

Regression Analysis

Table 2 shows the results of binary logistic regression analysis by depression, anxiety, and stress. The variables found to be significant in the binary logistic regression analysis were included in the adjusted models. As per as the multivariable logistic analysis (**Table 3**), females were more likely to have depression, anxiety, and stress compared to males ($AOR_{Depression}$: 1.34; 95% CI: 1.15–1.55, $p < 0.001$, $AOR_{Anxiety}$: 1.62; 95% CI: 1.41–1.86, $p < 0.001$, and AOR_{Stress}: 1.79; 95% CI: 1.57–2.05, $p < 0.001$). Similarly, the higher odds of depression, anxiety, and stress were found among participants who reported high family income, poor self-perceived health status, COVID-19 affected people in the local area, food scarcity, and probability of food scarcity in future.

Unmarried participants were 2 times more likely to have depression and stress than married participants ($AOR_{Depression}$: 1.87; 95% CI: 1.41–2.49, $p < 0.001$, and AOR_{Stress}: 1.72; 95% CI: 1.41–2.11, $p < 0.001$). Participants who reported smaller families and the possibility of decreasing income in the future had greater odds of depression and stress. In addition, the probability of losing employment was associated with higher odds of depression and anxiety; whereas COVID-19 affected people in the family and income status change during the COVID-19 were associated with anxiety and stress, respectively.

DISCUSSION

After the severe acute respiratory syndrome (SARS) outbreak in 2003 (44), the COVID-19 pandemic is the largest viral outbreak in modern history, and has had a significant effect on physical and mental health, and the financial status of the general population. Nearly every country in the world has been affected by COVID-19, with many nations undertaking lockdown measures to deter transmission, as a result of which large parts of the population have had to stay at home, and millions have lost their jobs (45). This may affect their financial situation and mental health, and can result in depression, anxiety, stress, frustration, and concerns about the future. It is therefore important to identify which factors are associated with mental health outcomes, so that healthcare and other policies (such as economic, employment, and social policies) can address them.

TABLE 1 | Distribution of all examined variables and association with depression, anxiety, and stress.

Variables	Overall $N = 4,020$	Depression			Anxiety			Stress		
		Negative *n* (%)	Positive *n* (%)	*p*-value	Negative *n* (%)	Positive *n* (%)	*p*-value	Negative *n* (%)	Positive *n* (%)	*p*-value
Age										
Younger age	3,458 (86)	955 (27.6)	2,503 (72.4)	<0.001	1,318 (38.1)	2,140 (61.9)	0.309	1,440 (41.6)	2,018 (58.4)	<0.001
Middle age	512 (12.7)	192 (37.5)	320 (62.5)		183 (35.7)	329 (64.3)		273 (53.3)	239 (46.7)	
Older age	50 (1.2)	16 (32)	34 (68)		15 (30)	35 (70)		26 (52)	24 (48)	
Sex										
Male	2,153 (53.6)	671 (31.2)	1,482 (68.8)	0.001	898 (41.7)	1,255 (58.3)	<0.001	1,064 (49.4)	1,089 (50.6)	<0.001
Female	1,867 (46.4)	492 (26.4)	1,375 (73.6)		618 (33.1)	1,249 (66.9)		675 (36.2)	1,192 (63.8)	
Education										
Below university	847 (21.1)	203 (24)	644 (76)	<0.001	247 (29.2)	600 (70.8)	<0.001	338 (39.9)	509 (60.1)	0.029
University	3,173 (78.9)	960 (30.3)	2,213 (69.7)		1,269 (40)	1,904 (60)		1,401 (44.2)	1,772 (55.8)	
Marital status										
Married	489 (12.2)	193 (39.5)	296 (60.5)	<0.001	174 (35.6)	315 (64.4)	0.320	267 (54.6)	222 (45.4)	<0.001
Unmarried	3,531 (87.8)	970 (27.5)	2,561 (72.5)		1,342 (38)	2,189 (62)		1,472 (41.7)	2,059 (58.3)	
Family members										
Up to 4	2,172 (54)	568 (26.2)	1,604 (73.8)	<0.001	791 (36.4)	1,381 (63.6)	0.145	881 (40.6)	1,291 (59.4)	0.001
5 to 8	1,593 (39.6)	505 (31.7)	1,088 (68.3)		630 (39.5)	963 (60.5)		732 (46)	861 (54)	
Above 8	255 (6.3)	90 (35.3)	165 (64.7)		95 (37.3)	160 (62.7)		126 (49.4)	129 (50.6)	
Monthly income (BDT)										
<20,000	712 (17.7)	223 (31.3)	489 (68.7)	0.021	302 (42.4)	410 (57.6)	<0.001	348 (48.9)	364 (51.1)	<0.001
20,000 to 50,000	1,913 (47.6)	514 (26.9)	1,399 (73.1)		641 (33.5)	1,272 (66.5)		774 (40.5)	1,139 (59.5)	
>50,000	1,395 (34.7)	426 (30.5)	969 (69.5)		573 (41.1)	822 (58.9)		617 (44.2)	778 (55.8)	
Residence										
Rural	930 (23.1)	282 (30.3)	648 (69.7)	0.286	354 (38.1)	576 (61.9)	0.817	435 (46.8)	495 (53.2)	0.014
Urban	3,090 (76.9)	881 (28.5)	2,209 (71.5)		1,162 (37.6)	1,928 (62.4)		1,304 (42.2)	1,786 (57.8)	
Self-perceived health status										
Good	3,728 (92.7)	1,107 (29.7)	2,621 (70.3)	<0.001	1,458 (39.1)	2,270 (60.9)	<0.001	1,657 (44.4)	2,071 (55.6)	<0.001
Poor	292 (7.3)	56 (19.2)	236 (80.8)		58 (19.9)	234 (80.1)		82 (28.1)	210 (71.9)	
COVID-19 affected people in family										
Yes	237 (5.9)	60 (25.3)	177 (74.7)	0.206	58 (24.5)	179 (75.5)	<0.001	86 (36.3)	151 (63.7)	0.026
No	3,783 (94.1)	1,103 (29.2)	2,680 (70.8)		1,458 (38.5)	2,325 (61.5)		1,653 (43.7)	2,130 (56.3)	
COVID-19 affected people in area										
Yes	2,907 (72.3)	758 (26.1)	2,149 (73.9)	<0.001	1,008 (34.7)	1,899 (65.3)	<0.001	1,158 (39.8)	1,749 (60.2)	<0.001
No	1,113 (27.7)	405 (36.4)	708 (63.6)		508 (45.6)	605 (54.4)		581 (52.2)	532 (47.8)	
Income status change due to COVID-19										
Yes	2,683 (66.7)	667 (24.9)	2,016 (75.1)	<0.001	886 (33)	1,797 (67)	<0.001	1,043 (38.9)	1,640 (61.1)	<0.001
No	1,337 (33.3)	496 (37.1)	841 (62.9)		630 (47.1)	707 (52.9)		696 (52.1)	641 (47.9)	
Possibility of decreasing income										
Yes	2,923 (72.7)	706 (24.2)	2,217 (75.8)	<0.001	974 (33.3)	1,949 (66.7)	<0.001	1,144 (39.1)	1,779 (60.9)	<0.001
No	1,097 (27.3)	457 (41.7)	640 (58.3)		542 (49.4)	555 (50.6)		595 (54.2)	502 (45.8)	
Probability of losing job										
Yes	1,421 (35.3)	267 (18.8)	1,154 (81.2)	<0.001	354 (24.9)	1,067 (75.1)	<0.001	505 (35.5)	916 (64.5)	<0.001
No	2,599 (64.7)	896 (34.5)	1,703 (65.5)		1,162 (44.7)	1,437 (55.3)		1,234 (47.5)	1,365 (52.5)	
Food scarcity due to COVID-19										
Yes	692 (17.2)	90 (13)	602 (87)	<0.001	101 (14.6)	591 (85.4)	<0.001	206 (29.8)	486 (70.2)	<0.001
No	3,328 (82.8)	1,073 (32.2)	2,255 (67.8)		1,415 (42.5)	1,913 (57.5)		1,533 (46.1)	1,795 (53.9)	
Probability of food scarcity in future										
Yes	1,821 (45.3)	369 (20.3)	1,452 (79.7)	<0.001	492 (27)	1,329 (73)	<0.001	654 (35.9)	1,167 (64.1)	<0.001
No	2,199 (54.7)	794 (36.1)	1,405 (63.9)		1,024 (46.6)	1,175 (53.4)		1,085 (49.3)	1,114 (50.7)	

TABLE 2 | Binary logistic regression analysis by depression, anxiety, and stress.

Variables	Depression		Anxiety		Stress	
	COR (95% CI)	*p*-value	COR (95% CI)	*p*-value	COR (95% CI)	*p*-value
Age						
Younger age	Ref.		Ref.		Ref.	
Middle age	0.63 (0.52–0.77)	<0.001	1.10 (0.91–1.34)	0.302	0.62 (0.51–0.75)	<0.001
Older age	0.81 (0.44- 1.47)	0.492	1.43 (0.78–2.64)	0.243	0.65 (0.37–1.15)	0.143
Sex						
Male	Ref.		Ref.		Ref.	
Female	1.26 (1.10–1.45)	0.001	1.44 (1.27–1.64)	<0.001	1.72 (1.52–1.95)	<0.001
Education						
Below university	1.37 (1.15–1.63)	<0.001	1.61 (1.37–1.90)	<0.001	1.19 (1.02–1.38)	0.027
University	Ref.		Ref.		Ref.	
Marital status						
Married	Ref.		Ref.		Ref.	
Unmarried	1.72 (1.41–2.09)	<0.001	0.90 (0.740–1.097)	0.300	1.68 (1.13–2.03)	<0.001
Family members						
Up to 4	1.54 (1.17- 2.02)	0.002	1.03 (0.79–1.35)	0.793	1.43 (1.10–1.185)	0.007
5–8	1.17 (0.89- 1.55)	0.255	0.90 (0.69–1.19)	0.691	1.14 (0.88–1.49)	0.304
Above 8	Ref.		Ref.		Ref.	
Monthly income						
<20,000 BDT	Ref.		Ref.		Ref.	
20,000–50,000 BDT	1.24 (1.02–1.49)	0.024	1.42 (1.22–1.74)	<0.001	1.40 (1.18–1.67)	<0.001
>50,000 BDT	1.03 (0.85–1.26)	0.713	1.05 (0.88–1.26)	0.555	1.20 (1.00–1.44)	0.043
Residence						
Rural	Ref.		Ref.		Ref.	
Urban	1.09 (0.93–1.28)	0.286	1.02 (0.87–1.18)	0.800	1.20 (1.03–1.39)	0.014
Self-perceived health status						
Good	Ref.		Ref.		Ref.	
Poor	1.78 (1.31–2.40)	<0.001	2.59 (1.92- 3.48)	<0.001	2.04 (1.57–2.66)	<0.001
COVID-19 affected people in family						
Yes	1.21 (0.89–1.64)	0.207	1.93 (1.42–2.62)	<0.001	1.36 (1.03–1.78)	0.026
No	Ref.		Ref.		Ref.	
COVID-19 affected people in area						
Yes	1.62 (1.39–1.88)	<0.001	1.58 (1.37-1.82)	<0.001	1.64 (1.43-1.89)	<0.001
No	Ref.		Ref.		Ref.	
Income status change due to COVID-19						
Yes	1.78 (1.54–2.05)	<0.001	1.80 (1.58–2.06)	<0.001	1.70 (1.49–1.94)	<0.001
No	Ref.		Ref.		Ref.	
Possibility of decreasing income						
Yes	2.24 (1.93–2.59)	<0.001	1.95 (1.69–2.25)	<0.001	1.84 (1.60–2.12)	<0.001
No	Ref.		Ref.		Ref.	
Probability of losing job						
Yes	2.27 (1.94–2.65)	<0.001	2.43 (2.11–2.81)	<0.001	1.64 (1.43–1.87)	<0.001
No	Ref.		Ref.		Ref.	
Food scarcity due to COVID-19						
Yes	3.18 (2.52- 4.01)	<0.001	4.32 (3.46–5.40)	<0.001	2.01 (1.68–2.40)	<0.001
No	Ref.		Ref.		Ref.	
Probability of food scarcity in future						
Yes	2.22 (1.92–2.56)	<0.001	2.35 (2.06–2.68)	<0.001	1.73 (1.53–1.97)	<0.001
No	Ref.		Ref.		Ref.	

TABLE 3 | Multivariable logistic regression analysis by depression, anxiety, and stress.

Variables	Depression		Anxiety		Stress	
	AOR (95% CI)	*p*-value	AOR (95% CI)	*p*-value	AOR (95% CI)	*p*-value
Age						
Younger age	Ref.		–	–	Ref.	
Middle age	0.91 (0.69–1.20)	0.547	–	–	0.88 (0.68–1.14)	0.339
Older age	1.37 (0.69–2.72)	0.355	–	–	1.07 (0.56–2.03)	0.828
Sex						
Male	Ref.		Ref.		Ref.	
Female	1.34 (1.15–1.55)	<0.001	1.62 (1.41–1.86)	<0.001	1.79 (1.57–2.05)	<0.001
Education						
Below university	0.97 (0.80–1.18)	0.766	1.06 (0.88–1.28)	0.517	0.92 (0.77–0.1.09)	0.357
University	Ref.		Ref.		Ref.	
Marital status						
Married	Ref.		–	–	Ref.	
Unmarried	1.87 (1.41–2.49)	<0.001	–	–	1.72 (1.41–2.11)	<0.001
Family members						
Up to 4	1.72 (1.28–2.30)	<0.001	–	–	1.53 (1.16–2.02)	0.003
5–8	1.39 (1.04–1.87)	0.026	–	–	1.26 (0.95–1.66)	0.104
Above 8	Ref.		–	–	Ref.	
Monthly income						
<20,000 BDT	Ref.		Ref.		Ref.	
20,000–50,000 BDT	1.43 (1.16–1.77)	<0.001	1.70 (1.40–2.06)	<0.001	1.48 (1.22–1.81)	<0.001
>50,000 BDT	1.57 (1.23–2.00)	0.377	1.48 (1.19–1.82)	<0.001	1.56 (1.25–1.94)	<0.001
Residence						
Rural	–	–	–	–	Ref.	
Urban	–	–	–	–	0.94 (0.79–1.13)	0.541
Self-perceived health status						
Good	Ref.		Ref.		Ref.	
Poor	1.81 (1.32–2.47)	<0.001	2.37 (1.74–3.22)	<0.001	2.12 (1.60–2.79)	<0.001
COVID-19 affected people in family						
Yes	–	–	1.39 (1.01–1.93)	0.043	1.13 (0.84–1.51)	0.402
No	–	–	Ref.		Ref.	
COVID-19 affected people in area						
Yes	1.28 (1.09–1.50)	0.002	1.24 (1.06–1.44)	0.005	1.31 (1.12–1.53)	<0.001
No	Ref.		Ref.		Ref.	
Income status change during the COVID-19						
Yes	1.06 (0.88–1.29)	0.501	1.17 (0.98–1.40)	0.081	1.26 (1.06–1.51)	0.008
No	Ref.		Ref.		Ref.	
Possibility of decreasing income						
Yes	1.61 (1.31–1.98)	<0.001	1.18 (0.97–1.44)	0.086	1.37 (1.13–1.67)	0.001
No	Ref.		Ref.		Ref.	
Probability of losing job						
Yes	1.38 (1.13–1.67)	0.001	1.37 (1.15–1.64)	<0.001	1.11 (0.94–1.32)	0.209
No	Ref.		Ref.		Ref.	
Food scarcity during the pandemic						
Yes	1.97 (1.49–2.60)	<0.001	2.70 (2.07–3.50)	<0.001	1.48 (1.18–1.85)	0.001
No	Ref.		Ref.		Ref.	
Probability of food scarcity in future						
Yes	1.40 (1.17–1.69)	<0.001	1.46 (1.23–1.74)	<0.001	1.35 (1.14–1.59)	0.001
No	Ref.		Ref.		Ref.	

In the present study, the prevalence estimates of depression, anxiety, and stress were 71.1, 62.3, and 56.7%, respectively. Higher levels of depression, anxiety, and stress were positively associated with female sex, being unmarried, a lower number of family members, higher monthly family income, poor self-perceived health status, the presence of people being infected in their residential area, the probability of decreased income, current food scarcity and the potential for food scarcity in the future, and the possibility of losing employment during the pandemic.

Comparison With Other Studies

The results of the study were compared to earlier research focused on (i) depression, anxiety and stress [using Patient Health Questionnaire (PHQ-9), Depression, Anxiety, Stress Scale (DASS-21), Generalized Anxiety Disorder (GAD-7), Hospital Anxiety and Depression Scale (HADS), Health Anxiety Inventory (HAI), Geriatric Depression Scale-15], and (ii) studies with a particular focus on financial difficulties during COVID-19.

The results of this study showed that depression, anxiety, and stress were comparatively higher in females than males, in line with other epidemiological research (4, 46), but in disagreement with previous studies in Bangladesh using similar (47) and different instruments (48). It is likely that women may assume additional caretaking duties of their families during the pandemic which may account for their increased mental health problems. In the present study, depression and stress were significantly higher among those who reported being unmarried and with a lower number of family members. Being alone during lockdown can often cause feelings of loneliness and affect mental well-being leading to depression and stress (49, 50), and the present study supports and such findings. A previous study has reported that being married (compared to being single, widowed or separated) can be associated with depression (51), however this utilized data collected prior to the pandemic.

A significant association between high income family (monthly income 20,000–50,000 BDT) and depression, anxiety, and stress emerged in our results, inconsistent with prior Bangladeshi studies (4, 33, 34) which did not find a significant association between income and mental health concerns. More work is needed to ascertain why this is the case. Having family members and other people living their residential area infected with COVID-19 were associated with higher depression, anxiety and stress, consistent with previous studies which have suggested this may be due to fear of infection, enforced quarantine and feeling stigmatized (52). People with poor self-reported health status also exhibited higher odds of depression, anxiety and stress in the present study, consistent with previous Bangladeshi reports (32, 34).

In the present study, financial difficulties due to a reduction in family income, food scarcity, and potential unemployment were found to be statistically significant associated factors of depression, anxiety, and stress. COVID-19 is a highly contagious disease with catastrophic repercussions for humanity and the global economy, as well as for mental health causing psychosocial distress (53). Major victims of the COVID-19 outbreak include micro, small, medium-sized enterprises and also the general population (54). Prolonged country-wide lockdowns and a global economic recession disrupted normal supply chains and created economic hardship (55). A previous study conducted in Bangladesh indicated that the COVID-19 pandemic and partial lockdown had socio-economic impacts including on poorer communities, leading to price increases of basic essentials, disruptions to formal education, and the possibility of a severe socio-economic and health crisis (56). The data we present are a year old as it takes time to analyze data and publish the results. It is possible that these may have changed in the last year and further work may be needed to ascertain any temporal changes.

Limitations

This study is not without limitations which should be taken into account when interpreting the results. The study was cross-sectional so causality cannot be determined. In this respect, a prospective study will be helpful. Respondents needed to have access to the internet to participate, indicating that they had a higher socio-economic standing than the general population, although research assistants collected data from friends and family members who were not digitally literate. Therefore, the possibility of sampling bias should be considered. Self-reported health status was measured using a binary response and that may have limited the range of responses. Finally, this study relied on self-reported responses regarding experience during home-quarantine stay which may not align with the clinical diagnosis of mental health professionals.

CONCLUSIONS

The present study demonstrates that mental health disturbances are prevalent among residents in Bangladesh, and financial difficulties correlate with mental health issues. Psycho-social support needs to be strengthened for people living in Bangladesh. The government, non-governmental agencies and other workplaces should support employees during the pandemic and in its aftermath rather than cutting jobs or salaries. The findings should inform mental health strategies to increase mental resilience during the COVID-19 pandemic in Bangladesh. Furthermore, the present study will contribute to future research in Bangladesh.

DATA AVAILABILITY STATEMENT

The raw and clean data files were served as **Supplementary Material**.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board of the Biological Science Faculty, Jessore University of Science & Technology, Jessore-7408, Bangladesh [Ref: ERC/FBS/JUST/2020-43(a)]. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AS, MI, SN, and ZS: conceptualization. AS, MI, SN, and TK: methodology. AS and MI: data curation, writing—original draft preparation, formal analysis, and investigation. MI, SP, and KK: writing—review and editing. MZA, MIA, SN, TK, and ZS: resources. MZA and KK: supervision. All authors read and approved the final manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2021.755357/full#supplementary-material

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REVIEW
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The Role of Debt in the Maintenance of Homelessness

*Nick Maguire**

Centre for Innovations in Mental Health, Department of Psychology, University of Southampton, Southampton, United Kingdom

Debt is highly prevalent within the homeless population. This narrative review makes use of a varied literature to explore the relationship between debt and homelessness, focussing particularly on organisational (systemic) and individual factors and formulating the relationship between the two. A number of forms of debt and the causes of that debt are explored, in terms of individual factors such as motivation and organisational factors such as inflexible rent protocols. These factors are considered within the context of the cash economy operated by people who are homeless, together with the survival behaviours that drive such a way of operating. Conclusions are drawn about the nature of interventions and how individual psychological approaches to motivation need to be taken into account.

Keywords: debt, homelessness, organisational, individual, motivation, drug use, rent

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***Correspondence:**
Nick Maguire
nm10@soton.ac.uk

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INTRODUCTION

Homelessness remains one of the significant indicators of damaging wealth differential in developed economies. In the UK in August 2020, 2,688 people were found to be sleeping on the streets of England (1). This was a drop from the previous year, the reduction being attributed to the "everyone in" initiative designed to reduce the incidence rate of COVID-19. This is however likely to be a significant underestimate of the total number of people who are homeless; Crisis (2) put the true figure of people who are homeless and living on the street at over 200,000.

There are many factors implicated in the causation and maintenance of homelessness (3), ranging from the way in which we configure our economy and geographical variation in wealth (4) right down to genetic predispositions of arousal (5). This multi-factored approach means that the causes and maintaining factors are highly complex in their interactions. Mental health factors, mainly associated with childhood abuse and neglect (6) are associated with behaviours that lead to tenancy breakdown, moderated by factors such as the environment (built and organisational), interpersonal relationships and economic factors. Those systemic factors can in turn be influenced by commissioning processes and government policy, which may be in turn led by economic and ideological processes.

The role of debt in the causation and maintenance, therefore, can be seen to be an interaction between individual behaviours (spending) and environmental factors (e.g. organisational and tenancy systems around rent payment, referral for court proceedings for non-payment, local authority support for rent arrears, etc.). In one of the few studies looking at debt-related mechanisms of homelessness in the Netherlands (7), loss of job and chronic shortage of income were cited as the most prevalent reason for debt (49% of respondents). Fines, credit buying (legal) and health costs (23%), use of drugs (18%) and gambling (10%) were also cited.

A number of reviews in both the peer-reviewed and grey literatures have covered financial difficulties generally across populations of people who are multiply excluded, but the research in this

area is sparse. Attention in the literature tends to be paid to structural issues, such as mechanisms of financial exclusion [e.g., (8, 9)].

There is a particular dearth investigating the role of debt in the maintenance of homelessness for single homeless people. Given the lack of research, it is not possible to conduct a good quality systematic review. Rather a narrative review will be conducted on the available evidence. In addition, observations on systemic processes will be included, based on the author's experience. Given the existing literature on structural financial exclusion, this review will focus more on individual and organisational systemic factors that cause and maintain debt, which in turn contribute to a state of homelessness. Interacting roles of debt and how they interlink with other factors will be described. It will consider possible mechanisms whereby debt is implicated in the maintenance of homelessness and go on to develop ideas based on good practise, around interventions that may reduce the impact of this relationship.

STRUCTURE OF PAPER

This paper is divided into four main sections. The methodology describes the search strategy and papers included. The main section details a number of forms of debt experienced by people who are homeless, some related to each other, some separate. A section on a framework describing cash economies considers this as a maintaining factor, before moving to the final main critical section on possible interventions and the lack of psychological thinking. A concluding section summarises the thinking that results from the evidence considered.

METHODOLOGY

Several databases were searched with the simple search terms "homeless* and debt". The search strategy started broad with Google Scholar and Google (to pick up any charity and other stakeholder reports that were not identified as academic literature). In addition, a meta-search engine was used (that searches CINAHL, Medline and PsychInfo). A citation search was used, as well as the author's own information on relevant papers. No exclusion criteria were applied and no date range set. All papers identified were written in English.

A mix of qualitative and quantitative papers, together with narrative reviews were identified, together with several reports commissioned and produced by homelessness charities. The literature covers research carried out in the UK, Scandinavia, Europe and the US. Different health ecosystems are therefore represented in factors leading to debt. The search was not intended to be exhaustive, but rather provide evidence where it existed on mechanisms of debt in homelessness. See **Table 1** for a summary of papers identified and used to identify the role of debt below.

FORMS OF DEBT IN HOMELESSNESS

According to the literature covered and in the author's experience, people can be in financial debt in varying of forms, that have differential impacts on their lives. The main forms of debt to be covered in this review are: rent debt; drug debts; debts to peers; debts caused by benefits systems; debts caused by health treatment; and debts caused by court-imposed fines. The important issue is that most of these forms of debt are implicated for different reasons in repeat tenancy loss.

Drug Use as a Setting Condition for Debt

People who are homeless, in the main, have significant and complex issues, involving functional interactions between mental health, drug and alcohol and social relationship issues (3). Good evidence suggests that these issues are strongly associated with early childhood abuse and neglect (18). This means that the behaviours that lead to tenancy breakdown can be considered to be associated with ways of coping with these adverse childhood experiences. For example, difficulties in regulating emotions have been found to be associated with childhood abuse [e.g., (19)], and in turn, drug and alcohol use have been found to be ways of self-medicating for artificially regulating emotions. Drug and alcohol use become habitual over time, serving several functions such as avoidance of uncomfortable withdrawal experiences. It can therefore be argued that from the individual's perspective, a financial priority is to continue to fund habitual drug or alcohol use, particularly if the person is multiply and chronically excluded from statutory health, social and housing services. Less debt is accrued through sole abuse of alcohol, as drink is much cheaper to acquire. Thus, a set of interacting factors can be seen to lead people who are homeless into behaving in ways that, as will be seen, mean they are more likely to accrue debt.

Rent Debt

Emmet (13) summarised sources of significant housing debt for those who are homeless. Rent debt accrued through varying income was a significant factor, leading sometimes to physical ill-health as well as mental health and other emotional issues. Most housing solutions require regular payment of rent and in some cases service charges (e.g. homeless hostels, social housing, private rented sector). Non-payment of rent is one of the most common reasons for eviction, and therefore maintenance of homelessness. Further, debts accrued through non-payment of rent are often carried forward and used as reasons not to house people until those debts are repaid. Therefore, prioritisation of substances over rent can be seen to result in exclusion *via* two mechanisms; firstly, non-payment of rent, and secondly, debts accrued being carried forward. Many tenancies (including hostels) will not be available for people with rent debt.

This is mostly an issue for those who use illegal drugs, due to the significant daily cost compared to the relatively cheap alcohol use. The pattern of antisocial behaviours associated with alcohol and drugs are different; drug use is mainly associated with acquisitive criminal behaviours and debt accrued, whereas alcohol tends to result in behaviours of disinhibition, such as verbal and physical assault.

TABLE 1 | Papers on homelessness and debt identified through literature search.

Author and year	Peer review?	Design	Participant Population and country	Construct under investigation	Results	Comments
Amar et al. (10).	Yes	Experimental design involving debt repayment simulation	171 people recruited from a non-clinical population. US	Effective interventions for debt	Small debts tend to be paid off before larger ones, despite this being problematic in terms of interest.	Useful experimental design, underpinning thinking and behaviour that may be important in debt management generally.
Bernard and Casey, (11)	No	Qualitative methods, interviews	Front line workers and people with lived experience of homelessness. Number not stated. UK	Debt associated with UC and how it maintains homelessness	Several issues around UC causing debt identified. Recommendations made to change systems of administration.	UK report by homeless charities making use of qualitative and observational data to formulate UC issues in debt.
Culhane et al. (12)	Yes	Secondary data analysis. Tests of difference among multiple populations	4679 people who are homeless who experience severe mental health issues. US.	Effectiveness of supportive housing	Supportive housing is effective in enabling reductions in other services, e.g. hospitalisations, time incarcerated. Debt costs reduced.	Supportive housing may be an intervention that should be considered in dealing with debt. Housing first in the UK may serve this purpose.
Emmet (13)	No	Qualitative methods	19 people who were homeless or at risk of homelessness. UK	Mechanisms of housing debt and its effects.	Changes in circumstances and unexpected expenditure placed people at risk of housing debt. Housing debt placed significant emotional strain on people, particularly families.	Identifies the role of housing debt in difficulties in maintaining tenancies, meaning a vicious cycle is established. Stress may be a moderating factor to be investigated.
Flåto and Johannessen (14)	No	Qualitative methods and review of literature	Economic and social behaviours of people who are homeless. Norway.	'Harvesting economy', i.e. the rational behaviours associated with managing cash and debt.	Economic behaviours result in short-termism and reliance on social relationships and networks to manage day to day life.	Really useful framework to consider rational behaviours that may underpin debt maintenance.
Mogk et al. (15)	Yes	Cross sectional survey	101 people who were homeless. US	Impact of legal structures and practise on homelessness.	Strong association between legal involvement and consequences such as fines, and homelessness status. Possible maintaining factors.	Useful to identify financial factors implicated in maintenance of homelessness.
O'toole et al. (16)	Yes	Cross sectional survey	274 people, around half of whom were homeless. US	Impact of accumulation of medical debt on health seeking behaviours	Aggressive debt recovery had a significant negative effect on the health seeking behaviours of people who were homeless.	The impact of debt on health as an important maintaining factor in health inequality is identified.
Skolnik (17)	Yes	Narrative review	NA	Role of punishment in maintenance of homelessness	Framework of alternative punishments generated that are hypothesised to reduce contribution to homelessness	Useful to consider in the context of Mogk et al. (2020) as alternative to standard methods of dealing with debt.
van Laere et al. (7)	Yes	Cross sectional survey. Self report historical and current data gathered at one time point.	120 people recently made homeless. Netherlands	Factors implicated in the causation and maintenance of homelessness.	A number of factors identified in pathway to homelessness, including debt for those evicted from tenancies.	Debt was significantly implicated in eviction for those who had lost tenancies. Provides context for the observations around systemic issues discussed.

There are also systemic issues that increase the likelihood of rent debt. Many of the debts accumulated by people who are homeless can be seen to be a function of poorly configured organisational systems that do not take account of the individual needs of people who are homeless. For example, many forms of temporary accommodation (e.g., hostels and shelters) operate "service charges" that are additional charges levied automatically to pay for provision of meals and other services. If these forms

of charge are implemented without flexibility or thought, people who do not use the services feel aggrieved about paying them. This sometimes leads to non-payment of those service charges, but as they're rolled into the rent, that doesn't get paid either. Thus the accumulation of rent debt results from an inflexible system in which charges that do not applied to all residents are automatically levied. Other systems charges such as deposits can also be barriers to obtaining tenancies.

Peer and Dealer Debt

Another form of debt accrued can be to peers and dealers, particularly around illegal drug use. Drug dealers are in the business of dependency, and will very often "tick" users, i.e. supply them with payment due at a later date. Thus, the user can ramp up a significant debt over time, which has to be repaid to avoid sometimes violent consequences. The level of debt can be kept stable by the dealer, therefore ensuring that the user always must return, resulting in continued dependence. Thus, debt can be used as a way of ensuring continued income through sustained dependence.

Debts to peers have a range of consequences and are important in maintaining homelessness. People are less able to fund recovery activities if the priority is to repay peers who have lent them money, often to pay off another form of debt. Not only does this form of debt mean that practical forms of recovery cannot be funded, but this debt may be used as leverage for other risky behaviours that may lead to tenancy breakdown (e.g. dealing and stealing). Thus, debt is used by dealers in order to extract a range of behaviours from vulnerable people, including staying in debt through use, or other illegal behaviours that may lead to imprisonment.

Serious debt to drug dealers can result in physical harm and even death, if not being drawn into working for those dealers. This of course increases the risk of arrest and incarceration. Experience of recent drug supply patterns attributable to the COVID pandemic (e.g. "county lines" dealing networks) indicates that this issue is worsening.

Court Debts

A significant form of debt implicated in the maintenance of homelessness is costs accrued through illegal activity that is considered by the courts. This is often in the form of fines that must be paid, often over time as part of an agreement. In a recent study, Mogk et al. (15) found that over 25% of their US sample reported unpaid fines levied by the courts. Importantly, individuals with this kind of debt reported 22.9 months more homeless time than those without, once demographic factors were controlled for. Skolnik (17) provides some useful ways of reconsidering punishments that do not exacerbate debt, including more proportional financial penalties such as day fines, and other fundamental interventions such as absolution frameworks. Thus, the dynamic relationship between the behaviours that lead to homelessness and the financial consequences of some of those behaviours can be seen to be played out through debt. The debts are often not repaid quickly and can act as a barrier to further tenancies.

Benefits Debt

In the UK, universal credit (UC) has provided significant difficulties for many people who are homeless (11). A number of mechanisms underpin these issues. Firstly, new accounts required 5 weeks to set up, requiring individuals to sustain themselves for that period. Thus, individuals were likely to accrue debt over that period, from a range of people including local authorities, drug dealers, peers, and landlords. This was recognised and individuals were enabled to borrow money for the period of time until regular UC payments started. However, this is still a debt, to be paid back over a period of 12 months and would still result in a monthly deficit. Additional difficulties are around the 1-month arrears in which UC is paid, and the removal of systems to pay rent directly to landlords. For people who are homeless and have addiction issues, prioritisation of habit over rent payment is common. Systems that can ensure that rent is paid first can be part of a useful systemic intervention to overcome this prioritisation.

Any historical debts, accrued through loans and rent arrears are often paid back through involuntary attachments to UC, resulting in significant deductions. This can leave people who are homeless with very little to live on a week, increasing the chances of funding drug and alcohol through debt and antisocial behaviours.

Lump sums paid to people who are living on the streets or in insecure accommodation can be problematic, particularly if people have drug and alcohol problems. Many people describe having access to means (money) leading to increased use as long as the money was available. Benefits and other finance systems (e.g. loans for housing set up) are often set up to pay money in lump sums rather than over time. Thus, the systems set up individuals who have drug and alcohol problems to fail in terms of spending large amounts of money in short spaces of time. This can result in debt if the money is to be paid back.

Health Debt

Health debt varies significantly by country and by income. In countries where there is no universal health system [e.g. the US, in which 28m people remain uninsured; (20)], debt is incurred through e.g. emergency room interventions or other essential procedures. Health companies are increasingly and more aggressively chasing such debt, resulting in people e.g. losing their homes through bankruptcy (16). This is particularly true of those already in poverty.

Finance in Housing

Even when housed, a number of structural factors increase the likelihood of building up debt, or become unmanageable as a result of debt.

Culhane et al. (12) identified debt service costs (e.g. non-payment of rent and unoccupied space, benefit subsidy) in a US population as a significant cost that can be reduced in supported housing interventions. They do not, however, discuss how these arrears are incurred or the specific mechanisms whereby personal debt is translated to benefit debt that can be saved through the intervention described. However observations made in a number

of private and hostel dwellings illustrate some of the mechanisms of accruing debt.

Non-payment of rent has already been discussed. But there are other more subtle ways in which debt is a product of and contributes to homelessness. For example, utilities are often metered, as a result of landlord experiences of tenants who did not pay bills. This experience is generalised to all those who are perceived as high risk, and together with lack of access to bank accounts to pay direct debits, means that payment metres are widely used. This also means higher tariffs and more expensive energy. In addition, the cash economy most often used by people who are homeless results in uneven distribution over time, resulting in weeks when no money is available. For some, this lack of money can be evened out by pawning possessions or borrowing money in order to pay for food and energy. For some, more extreme measures are needed at such times, such as stealing, begging or dealing drugs.

Cash Economy

The cash economy that many people who are homeless use provides significant barriers for stable budgeting. As discussed, payment of benefits for many is in lump sums every four weeks. This means that issues other than payment of regular bills may take priority, thereby building up debt. Particularly common are drug and alcohol addiction issues. People will prioritise reducing withdrawal and other physiological and psychological factors over reduction in debt in other areas.

Flato and Johannessen (14), using a qualitative methodology, surmised that people who are homeless operate a "harvest" economy', which enables money to be gradually accumulated and quickly spent. They argue that this is an entirely rational way of operating financially, given that they are at high risk of being robbed, thus carrying around cash for any length of time makes little sense. Activities designed to gather money (stealing and begging) leave people vulnerable, so when enough has been "harvested" for a particular activity (e.g. buying drugs, food etc.), it is immediately spent. The participants reported paying off debts if they had money, but also incurring debts for others (e.g. buying drugs for them) with the expectation that the debt would be paid later. This could be a variable strategy.

INTERVENTIONS

Interventions can be broadly divided into three types. Most of the literature covers two; structural and systemic levels of change, i.e. change in the societal and financial structures that govern the way in which the country is run, and change at the level of the organisational systems with which the individual interacts. These two can in some cases interact, e.g. banking operates with levels of security and ID that may be considered structural, but also systemic in terms of the way in which local systems operate to the exclusion of the individual (e.g. bank decisions about direct payments to landlords). The third level of intervention is with individuals, e.g. budget training.

Structural interventions are covered in some detail elsewhere [e.g. (8)] so will not be covered here, although some novel frameworks do add to the existing literature. For example, Slonik (17) proposes a heuristic whereby quality of life ordinances are contravened by people who are homeless, that elicits various forms of punishment from society. As this plays out financially, they propose that the state should adopt a much more sophisticated set of parameters around payment of fines, including "debt absolution frameworks", overhauling criminal and civil methods for dealing with fines that remain unpaid.

Budgeting

Many interventions focus on teaching budgeting skills to people who are homeless, modelled on other interventions that have been found to be useful with general populations [e.g. (10)]. However they often do not deal with issues of motivation to make behavioural changes. The difficulties around addiction can be much more powerful than the consequences of debt, meaning that motivation to make use of new skills, even if effectively learned, can be low. Budgeting skills may be useful, but only when an individual is ready to make behavioural change, so implementation of this intervention needs to be intentionally related to the person's assessed motivation.

Systemic Interventions

Organisations should look at the costs that they attach to tenancies of all forms. In particular, charges such as service charges that may be resented by tenants and not paid by UC should be examined (11), and flexibility in implementation may be warranted.

The way in which rent is collected should be re-examined, particularly in terms of direct payments to landlords. This system can be abused so does need to be implemented in partnership with the individual, through discussion around priorities.

Organisations who house people who are homeless should not be setting them up for failure by not attending to the known and predictable behaviours associated with build-up of debt. If someone coming into a tenancy has debt, a clear assessment is needed of the underlying reasons for that accrual. It may be that more purposive, informed decisions may be taken that make success more likely. Organisational factors such as assessments often do not take account of an individual's level of motivation to address these long-standing issues.

Existing interventions often involve providing loans (and sometimes gifts) to people to cover rent deposits and guarantee further debt accrual. These systems are often run by local authorities, but sometimes voluntary sector organisations such as local homelessness charities.

Underpinning Psychosocial Mechanisms of Change

In order for individuals in change at any level, issues of motivation to engage in the process of change need to be worked through. A significant reason for the failure of such interventions is that these issues are not even considered. It is often assumed that the person who is homeless will automatically be intrinsically motivated to make those changes, as they make sense to most people. However, as Flåto and Johannessen (14) identify, from the person's perspective, the behaviours leading to debt are an entirely rational way of coping when living on the streets.

Psychological interventions such as Motivational Interviewing [e.g. (21)] or other interventions that work with the individual and where they are in what they want to change need to be used as possible methods of change at the individual level, to overcome such mechanisms. These forms of intervention should be "baked in" to the wider financial or organisational interventions rather than being seen to be "bolt on". Only in this way will a multidimensional approach that takes account of the dynamic relationships between mental health, housing, behavioural, psychological and financial factors be understood in a way that is going to be useful to the person. This requires collaborative ways of working across organisations, something that is notoriously difficult to achieve in a sustainable way given different epistemological and practical beliefs and approaches.

CONCLUSIONS

This review sought to understand the way in which debt is implicated in the maintenance of homelessness. Through consideration of the existing literature and observational evidence, a picture emerges of a dynamic set of relationships between multiple factors, including understandable, "rational" behaviours of people, and the often inflexible, mindless responses of systems and structures. In order to progress with this issue in any meaningful way, we need to understand the mechanism of accrual of debt in terms of the interaction of the individual and their environment, rather than focusing on either in isolation. Societal and structural ways of viewing and treating people who are homeless can be seen to be the setting conditions for unhelpful systemic attitudes, which then play out in mindless maintenance of debt through inflexible punishments and consequences. These punishments are assumed to act as deterrents, but as discussed if there is little motivation to change behaviours, the deterrent function is largely redundant and in fact makes the problem worse, and more debt likely.

Debt can therefore be seen to be one of the fundamental factors maintaining homelessness, overseen by crudely modelled financial systems. Interventions need to be not only with individuals, but the systems that operate those crude processes also, to knit together an understanding of why people behave in such a way that accrues debt, with the complicity of their surrounding systems. Interventions such as those provided by Amar et al. (10) for populations of people who are housed should be examined for relevance and adaptation to make them more effective for people in the homeless population.

When implementing interventions on the individual level, motivation to change has to be a consideration and engagement techniques built into any work done. Therefore, not only do we need to pay attention to systemic and individual factors, but also the motivation of individuals and those that set up and run those systems to engage in change.

Future research needs to unpack some of those dynamic relationships to understand individual attitudes to financial management, from the perspectives of both the people experiencing the debt and those who deal with the consequences. Evaluation of the unintended consequences of ways of configuring systems may illuminate some of the mechanisms of exclusion and exacerbation of debt.

This review is just the start of a process of identifying factors implicated in threat at a range of levels, as well as the interactions between those levels. It identifies the gaps in the literature around individual and systemic factors in debt, that may over time be addressed.

AUTHOR CONTRIBUTIONS

NM is the sole author of this work and bears sole responsibility for the content.

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Economic Recession and the Long Term Risk of Psychiatric Disorders and Alcohol Related Diseases—A Cohort Study From Eastern Finland

Rand Jarroch†, Behnam Tajik†, Tomi-Pekka Tuomainen† and Jussi Kauhanen†*

Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Kuopio, Finland

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Edited by:
Annie Harper,
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Tri-Service General Hospital, Taiwan

***Correspondence:**
Rand Jarroch
randj@uef.fi

†*These authors have contributed equally to this work*

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Background: Long-term development of psychiatric disorders and alcohol-related diseases after economic recessions is insufficiently studied. We investigated the overall impact of the economic recession between 1991 and 1994 in Finland on the long-term incidence of psychiatric and alcohol-related diseases.

Methods: A population-based sample of 1,774 women and men aged 53–73 years were examined between 1998 and 2001 from the Kuopio Ischemic Heart Disease Risk Factor Study (KIHD). Participants completed comprehensive questionnaires on the possible impact of the 1990s recession in Finland on their lives. They were followed-up until 2018. Cox proportional hazards regression was used to estimate hazard ratios (HR) of new incident psychiatric and alcohol-related disorders during the 20-years follow-up after linkage to the National Hospital Registry. Logistic regression was used to estimate odds ratios (OR) of psychiatric disorders at baseline.

Results: At baseline, 93 participants had psychiatric disorders. During 20-years follow-up, 138 new psychiatric disorders and 45 alcohol-related diseases were developed. The covariate-adjusted risk of psychiatric disorders was over twice higher among men who experienced recession-induced hardships compared to those who did not (HR = 2.20, 95%CI = 1.04–4.70, $p = 0.04$). The risk of alcohol-related diseases was more than four times higher among men with hardships (HR = 4.44, 95%CI = 1.04–18.90, $p = 0.04$). No such associations were observed among women. No association was observed between recession-induced hardships and having psychiatric disorders at baseline in both genders (multivariate-adjusted $p = 0.63$ for women, multivariate-adjusted $p = 0.36$ for men).

Conclusion: Long-term risk of psychiatric disorders and alcohol-related diseases was increased after the 1990s economic recession in Finland, but only among middle-age and older men.

Keywords: socioeconomic, economic recession, psychiatric disorders, alcohol-related diseases, population-based, epidemiology

INTRODUCTION

There is a vast body of evidence on the crucial impact of economic recessions on poor mental health (1, 2). Several researches have elucidated this impact among different population worldwide (3–5), consequently posing a new challenge for policy makers, health systems and psychiatric interventions (6).

Psychiatric disorders refer to a group of chronic mental illnesses such as anxiety disorders, depression, post-traumatic stress disorder, suicide attempts, schizophrenia and sleep disorders (7). Depression, stress and suicide driven by recessions have been particularly intensively studied, with confirmed increase in depression and stress due to recessions (8).

Alcohol consumption, on the other hand, is another frequently investigated outcome of interest during recessions, nevertheless with contrasting findings (8–10). Two opposing mechanisms have been suggested to explain this complexity. The first interprets the increase of alcohol consumption as a consequence or coping mechanism against psychological stress caused by unemployment and income drop, whereas the second explanation suggests a decrease in alcohol consumption due to budget constraints (11).

Socioeconomic position (SEP) inversely affects mental health, either because low SEP associates with stress and adversity (the social causation theory), or because some individuals with genetic predisposition drift down and/or fail to improve their SEP (the social selection theory) (12). Social determinants of health play a very complicated role in mental health vulnerability when SEP suddenly and dramatically changes during recessions (13). Previous literature on the topic has assessed recession-induced hardships largely by using unemployment as a measure. Thus, most studies have focused on how becoming unemployed impacts mental health (14, 15), or changes the alcohol consumption (10). Recession-induced hardships, however, may be experienced by individuals in multiple ways, and this has largely been overlooked in previous research.

Possible negative health outcomes have mostly been studied in a limited period of time either during recessions or shortly after them (16). However, these outcomes are often attributed to cutoffs of expenditures on health, or reduced access to healthcare during recession periods (17). Considering that many negative health effects might need years after the recession to develop into clinically manifest outcomes, longer-term follow-up studies are needed (18). To our best knowledge, there are no prior studies examining the overall hardships caused by recessions with respect to their long-term impacts on mental health and alcohol-related morbidity.

Finland had a prosperous economy and rapid economic growth in the second half of 1980s. The situation, however, changed dramatically in the early 1990s when the country suffered an exceptionally severe recession (19). Although the economy had started to recover in 1996, unemployment rates still remained high that year reaching 19.8%, which can be compared to baseline rate of 5.2% in 1989 before the recession. Many people in Finland experienced long-lasting hardships in those years, which in turn affected the population health (20). Yet, the focus has mainly been on the mortality only during the recession period itself (18), including suicides and alcohol-related mortality (21). Not only in Finland, but also worldwide, there is a lack of long-term studies on the impact of macroeconomic cycles on psychiatric disorders and alcohol-related morbidity. There is also a need to assess recession-induced hardships more widely than focusing just on unemployment.

The aim of our study was to investigate the association of various socioeconomic hardships resulting from the 1990s recession with the long-term incidence of psychiatric disorders and alcohol-related diseases in a population-based sample of middle-age and older women and men in Eastern Finland.

METHODS

Study Population

We performed a prospective analysis among the participants from the Kuopio Ischemic Heart Disease (KIHD) Risk Factor Study (22). KIHD is an ongoing prospective population-based study that investigates non-communicable diseases in middle-age and older women and men in Eastern Finland. Our study is based on 1,774 middle-age and older Eastern Finnish people, who were examined between 1998 and 2001. The recession had happened in a time period that peaked from 1991 till 1994, in other words, about 4–10 years prior to the baseline examination. Participants responded to detailed questionnaires on whether they might have or might have not been exposed to hardships caused by the 1990s recession. The women's cohort comprised of 920 women aged 53–73 years, and the men's cohort comprised of 854 men aged 53–73. Thus, men and women in the study were on average of same age during the baseline examinations.

The KIHD protocol was approved by the Research Ethics Committee of the University of Kuopio and complies with Declaration of Helsinki. All the subjects signed a written informed consent.

We performed three different analyses among our study population. First to investigate the association of the recession-induced hardships and psychiatric disorders at baseline. Second, to investigate the association of the recession-induced hardships and new incident psychiatric disorders during an average of 20-years follow-up. Third analysis aimed to investigate the association of the recession-induced hardships and new incident alcohol-related diseases during an average of 20-years follow-up.

In orders to perform the cross-sectional analysis for psychiatric disorders at baseline, we excluded participants with missing data on experiencing recession-induced hardships ($n = 24$) and missing data on having psychiatric disorder at baseline ($n = 24$), leaving 1,747 women and men to be studied (**Figure 1**).

In the second analysis, we excluded participants who had missing data on their recession-induced hardships experiences ($n = 24$). To ensure having a psychiatric disorders-free sample for studying the new incident cases, we excluded participants with psychiatric disorders at baseline ($n = 27$), participants with missing data on having psychiatric disorders at baseline ($n = 24$), as well as baseline users of antipsychotics ($n = 19$) and antidepressants ($n = 73$). After the exclusions, 1,654 women and men remained in this follow-up analysis (**Figure 1**).

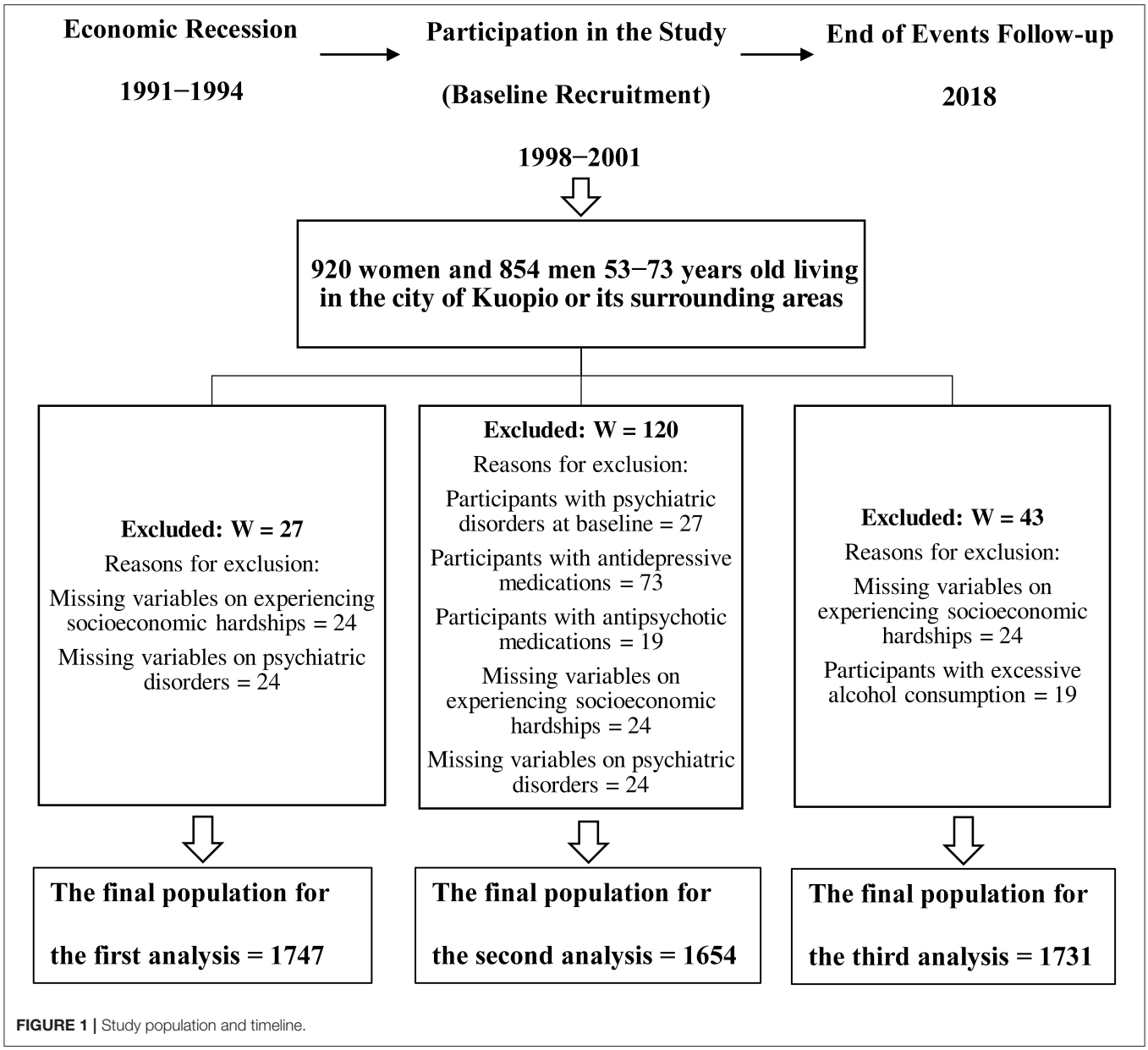

FIGURE 1 | Study population and timeline.

Finally, from the new incident alcohol-related diseases follow-up analysis, we excluded participants with missing data on experiencing recession-induced hardships (n = 24) and participants with excessive alcohol consumption at baseline (n = 19). This is performed to decrease the likelihood of having participants with alcohol-related diseases at baseline. The final number of women and men left in this analysis was 1,731 (**Figure 1**).

Measurements

Baseline Socioeconomic Position

Participants completed questionnaires on their socioeconomic background. We used education to adjust for baseline SEP, since it is not affected by the recession. The other frequently used SEP variables were already implemented in the participants' response to the question whether they had been affected by the recession. Education was measured by the number of years in school.

Defining Recession-Induced Hardships

We used a new approach to try more comprehensively estimate the socioeconomic hardships caused by the recession. Participants were asked whether Finland's economic recession between 1991 and 1994 had influenced their personal or family life economically or psychologically. The detailed questionnaire included questions on income reduction, unemployment, bankruptcy and loss of property. Original responses were grouped into two categories; participants who did and participants who did not experience any socioeconomic

hardships because of the recession, regardless of the number of hardships experienced.

Defining Psychiatric Disorders and Alcohol-Related Diseases at Baseline

Participants of our study were asked whether their doctors had informed them that they had psychiatric disorders at baseline. Data on antipsychotics and antidepressants prescriptions were obtained from the registries of the Finnish Social Insurance Institution (KELA). Alcohol consumption was assessed using the Nordic Alcohol Consumption Inventory for drinking behavior over the previous 12 months with a structured quantity-frequency method (23). The distribution of alcohol consumption in the study population was examined to identify and remove obvious extreme outliers at the far end of the distribution.

Other Risk Factors

Marital status was categorized into two groups: married or living with a partner, and being single, which consisted of the following subgroups: those who were not married, or who were separated, divorced, or widowed. Smoking status was checked in the questionnaire, as well as physical activity, which was assessed using the 12-Month Physical Activity questionnaire to record the frequency, average duration and intensity of the most common physical activities of Finnish middle-aged people. A trained nurse checked and completed the questionnaires with the participants during their face-to-face interviews (24).

Ascertainment of Psychiatric and Alcohol-Related Diseases Follow-Up Events

Incident psychiatric and alcohol-related diseases were derived from the national Hospital Discharge Registry, which is population-based and thus covers the whole population of Finland. The diagnoses include hospitalizations and hospital visits. Outcomes were assessed annually from the registry through personal identity codes. All psychiatric and alcohol-related events that occurred between the baseline examination (1998–2001) and the end of 2018 were included.

Psychiatric disorders diagnoses covered the following wide range of disorders according to the 10th Revision of the International Classification of Diseases (ICD-10) codes: schizophrenia, delusional disorders, psychotic disorders, mania, bipolar affective disorders, depression and other depressive disorders, dysthymia and other persistent mood disorders (F20–34), mood affective disorders (F38), phobia (F40.0), anxiety (41.3, F41.8), obsessive-compulsive disorder (F42.9), post-traumatic stress disorder (F43), neurotic disorder (F48.9), anorexia, sleeping disorders, sexual dysfunctions, and sexual behavior disorders (F50–69).

Alcohol-related diseases included: degeneration of nervous system due to alcohol (G31.2), special epileptic syndromes related to alcohol (G40.5), alcoholic polyneuropathy (G62.1), alcoholic myopathy (G72.1), alcoholic cardiomyopathy (I42.6), alcoholic gastritis (K29.2), alcoholic liver disease (K70), alcohol-induced chronic pancreatitis (K86.0–86.8), and toxic effect of alcohol (T51).

Statistical Analysis

The univariate associations between reported experience of recession-induced hardships and baseline socioeconomic, lifestyle and clinical characteristics were assessed by means and linear regression for continuous variables and Chi^2 independency test for categorical variables to explore bivariate relationships.

The category that did not experience any hardships during recession was considered as the reference. The criteria for selecting confounders were based on established risk factors for outcomes or on associations with exposures or outcomes in the present analyses (13). Missing values within each of the covariates were replaced by the cohort mean. All *p*-values were two-sided ($\alpha = 0.05$). The statistical analyses were conducted with the SPSS statistical software (version 27, SPSS Inc., Chicago, IL). All analyses were stratified by gender based on the clear differences between men and women regarding psychiatric disorders and alcohol consumption patterns (13).

Odds ratios (ORs) of psychiatric disorders at baseline were estimated using logistic regression models. Hazards ratios (HRs) for the risk of psychiatric disorders according to recession-induced hardships exposure binaries were estimated using Cox regression models. Two models were used to adjust for potential confounders in both the cross-sectional and prospective analyses. The Model 1 adjusted for age (years). The Model 2 additionally adjusted for sociodemographic variables of education (years) and marital status (married or living as a couple, single), smoking status (number of cigarettes smoked daily * years of smoking), alcohol consumption (g/week) and physical activity (hours/year). The validity of the proportional hazards assumption and independence assumption was satisfied.

RESULTS

Baseline Characteristics

Baseline characteristics based on the three analyses performed among the studied cohort are presented in **Table 1**, according to the two exposure categories. The number of participants who experienced recession-induced hardships is almost double the number of those who did not experience any hardships. Participants who experienced recession-induced hardships in the three analyses were more likely to be younger, and had more likely been unemployed already in earlier years prior to the recession. The mean age of women and men who experienced recession-induced hardships was 62 [Standard Deviation (SD) 6.4] years, whereas the mean age of women who did not experience any recession-related hardships was 65 (6.2) years and 63.4 (6.3) form men. Men who experienced recession-induced hardships had lower education and income compared to men who did not. Women who experienced hardships had higher BMI and were more likely to smoke compared to women who did not (**Table 1**).

Association of the Recession-Induced Hardships and the Incidence of Psychiatric Disorders at Baseline

There were 93 participants with psychiatric disorders or using antipsychotics and antidepressants at baseline. After adjustment

TABLE 1 | Baseline characteristics according to the level of recession-induced hardships.

Variables	Psychiatric disorders baseline analysis		Psychiatric disorders follow-up analysis		Alcohol-related diseases follow-up analysis	
	Did not experience recession-induced hardships ($n = 573$)	Experienced recession-induced hardships ($n = 1,174$)	Did not experience recession-induced hardships ($n = 536$)	Experienced recession-induced hardships ($n = 1,108$)	Did not experience recession-induced hardships ($n = 572$)	Experienced recession-induced hardships ($n = 1,159$)
Age (years)						
Women	65.1 (6.2)	62.1(6.4)***	65 (6.2)	62.2 (6.4)***	65.1 (6.2)	62.1 (6.4)***
Men	63.5 (6.3)	62.1 (6.5)**	63.3 (6.5)	62.1 (6.4)**	63.4 (6.3)	62.2 (6.4)*
Education (years)						
Women	9.6 (3.5)	9.7 (3.2)	9.6 (3.5)	9.6 (3.2)	9.6 (3.5)	9.6 (3.7)
Men	9.9 (3.9)	9.3 (3.6)*	9.8 (4)	9.3 (3.4)*	9.9 (3.5)	9.3 (3.4)*
Income (€/year)						
Women	14,157 (7,787)	13,677 (7,913)	14,016 (7,847)	13,772 (7,993)	13,847 (7,750)	13,519 (7,890)
Men	21,168 (14968)	17,797 (13,713)**	21,173 (15,052)	17,990 (1,31,71)**	21,283 (15,018)	17,834 (12,745)***
Marital status						
Women						
Married/living as a couple	68%	64%	69%	65%	68%	64%
Single	32%	36%	31%	35%	32%	36%
Men						
Married/living as a couple	85%	84%	85%	85%	85%	85%
Single	15%	16%	15%	15%	15%	15%
Unemployment year						
Women	1989 (10)	1987 (16)	1989 (10)	1987 (16)	1989 (10)	1987 (16)
Men	1989 (6)	1988 (14)	1989 (6)	1988 (14)	1989 (6)	1988 (14)
Smoking (number of cigarettes smoked daily * years of smoking)						
Women	0.7 (3.8)	1.9 (7.4)**	0.6 (3.5)	1.8 (7.1)**	0.7 (3.8)	1.9 (7.4)**
Men	4 (12)	5.1 (13.2)	4 (12.1)	5 (13.2)	4.1 (12.1)	5 (13.1)
Alcohol intake (g/w)						
Women	19 (38)	19 (37)	20 (39)	18 (35)	19 (38)	19 (37)
Men	82 (112)	80 (141)	83 (113)	80 (138)	76 (93)	63 (81)
BMI (kg/m^2)						
Women	27.7 (4.8)	28.7 (5.2)*	27.6 (4.7)	28.6 (5.2) *	27.7 (4.8)	28.6 (5.1) *
Men	27.3 (3.2)	27.4 (3.7)	27.3 (3.2)	27.4 (3.8)	27.3 (3.2)	27.4 (3.8)
Physical activity (hours/year)						
Women	597 (476)	632 (545)	608 (482)	632 (545)	597 (476)	632 (546)
Men	469 (395)	454 (374)	474 (397)	456 (374)	472 (396)	453 (375)

Results being presented are mean (SD) for continuous variables and n (%) for categorical data.
$p \leq 0.05$.
**$p \leq 0.005$.*
***$p \leq 0.001$.*
BMI, Body Mass Index.

for age (Model 1) and baseline SEP and lifestyle variables (Model 2), there was no cross-sectional association between experiencing recession-induced hardships and the prevalence of psychiatric disorders at baseline in both genders (multivariate-adjusted $p = 0.63$ for women, multivariate-adjusted $p = 0.36$ for men).

Association of the Recession-Induced Hardships and the Incidence of Psychiatric Disorders During 20-Year Follow-Up

During a mean follow-up of 20 years, the total number of new psychiatric disorders observed was 138, of which 36 were among women and 102 among men. After adjustment for age (Model 1), no association was observed between recession-induced hardships and psychiatric disorders among men [HR = 2.03, 95%Confidence interval (CI) = 1.03–4.40, $p = 0.07$]. However, when further adjusting for baseline SEP and lifestyle variables, the risk of psychiatric disorders was over twice higher among men who experienced recession-induced hardships compared to men who did not (multivariate-adjusted HR = 2.20, 95%CI = 1.04–4.70, $p = 0.04$) (**Table 2**). Interestingly, marital status seems to play a role in this association, where men who are married or living with a partner have 44% less risk of psychiatric disorders than other men (HR = 1.44, 95%CI = 1.05–1.98, $p = 0.02$).

There was no association between experiencing recession-induced hardships and the later incident psychiatric

TABLE 2 | Hazard ratios for psychiatric disorders according to the level of recession-induced hardships.

	Level of recession-induced hardships binaries		
Variables	**Did not experience recession-induced hardships (reference group) (*n* = 536)**	**Experienced recession-induced hardships (*n* = 1,108)**	***P*-value**
***N* of cases of psychiatric disorders, %**	36 (6.6%)	102 (9.2%)	
Women	28 (9%)	64 (11.8%)	
Men	8 (3.4%)	38 (6.7%)	
HR model 1*			
Women		1.21 (0.80–1.90)	0.40
Men		2.03 (1.03–4.40)	0.07
HR model 2*			
Women		1.34 (0.80–2.00)	0.71
Men		2.20 (1.04–4.70)	0.04

Values are hazards ratios (95% confidence interval).
Model 1: adjusted for age.*
Model 2: adjusted for model 1 plus education, marital status, smoking status, alcohol intake, and physical activity.*

TABLE 3 | Hazard ratios for alcohol-related diseases according to the level of recession-induced hardships.

	Level of recession-induced hardships binaries		
Variables	**Did not experience recession-induced hardships (reference group) (*n* = 572)**	**Experienced recession-induced hardships (*n* = 1,159)**	***P*-value**
***N* of cases of alcohol-related diseases, %**	9 (1.6%)	36 (3.1%)	
Women	7 (2.1%)	12 (2.0%)	
Men	2 (0.8%)	24 (4.2%)	
HR model 1*			
Women		0.71 (0.30–1.84)	0.50
Men		4.70 (1.10–19.80)	0.03
HR model 2*			
Women		0.60 (0.21–1.60)	0.30
Men		4.44 (1.04–18.90)	0.04

Values are hazards ratios (95% confidence interval).
Model 1: adjusted for age.*
Model 2: adjusted for model 1 plus education, marital status, smoking status and physical activity.*

disorders among women (multivariate-adjusted $p = 0.34$). The p-value for gender interaction was 0.29, which was not significant.

Association of the Recession-Induced Hardships and the Incidence of Alcohol-Related Diseases During 20-Year Follow-Up

During the mean follow-up of 20 years, a total of 45 new alcohol-related diseases were detected. After adjustment for age (Model 1), the risk of alcohol-related diseases was more than four times higher among men who experienced hardships compared to those who did not (HR = 4.70, 95%CI = 1.10–19.80, $p = 0.03$). Further adjustments for baseline SEP and lifestyle variables slightly attenuated the association (multivariate-adjusted HR = 4.40, 95%CI = 1.04–18.94, $p = 0.04$) (**Table 3**). Being married or cohabiting seems to also protect men from 63% higher risk of alcohol-related diseases compared to single men (HR = 1.63, 95%CI = 1.09–2.44, $p = 0.017$).

Again, there was no association between experiencing hardships and the later incident alcohol-related diseases among women (multivariate-adjusted $p = 0.63$). The p-value for gender interaction was 0.48, not suggesting gender-based interaction.

Overall, after controlling for age, SEP, and lifestyle variables, we find that within 20 years on average of experiencing hardships due to the 1990s economic recession, men aged 53–73 years have a higher risk of suffering from psychiatric disorders and alcohol-related than men who did not experience any recession-induced hardships.

DISCUSSION

We examined middle-age and older population from Eastern Finland who experienced hardships, either personally or in their

immediate families, due to the 1990s recession in Finland. The recession had peaked between 1991 and 1994, a few years before our baseline examination which took place between 1998 and 2001. Participants were followed until the end of 2018, and new incident psychiatric disorders and alcohol-related diseases were obtained from national registries during the two decades of follow-up. In our population-based prospective study, the risk of psychiatric disorders and alcohol-related diseases was increased among men who had experienced recession-induced hardships. This increase was observed among men during the long-term follow-up of about 20 years, but was not observed during the immediate years after the recession by the time our baseline examination took place. The recession had no association with increased risk of psychiatric disorders or alcohol-related diseases among women, neither during the short-term nor the long-term follow-up.

In our longitudinal study, participants who experienced recession-induced hardships had more likely been unemployed already before the recession. Unemployment seemed to specifically affect individuals who had no financial security and stable income when the recession occurred, and not only those who lost their jobs during the recession. As the study participants reported not only their own personally experienced recession-induced hardships, but also those affecting their family members, we got a more comprehensive picture of the events. Unemployment and socioeconomic difficulties of other family members had likely affected the respondents themselves, at least on a psychological level. Psychological stress, in turn, may lead to sympathetic nervous system dysfunction and imbalance in the inflammatory pathways including cytokines, eventually, contributing to the development of neuropsychiatric disorders (25).

Different factors influence the evolution of psychiatric disorder epidemiology over time. The risks can be within-person factors, caused in part by genetic transmission of higher proclivity to mental health problems, or they may be due to intergenerational social determinants. There are also various household and neighborhood effects with national level and macroeconomics influences in the background (26).

There are clear gender differences regarding psychiatric disorders during recessions. Depression seems more prevalent among men with low income than among women in similar situation (27). Men in these occasions have also been shown to have higher suicide rates than women (16). Despite the growing participation of women in labor market, and suggestions of their increased susceptibility to economic crises, differences in gender positions in worklife and differential gender reactions to unemployment should be more carefully addressed (16, 28). Viinamäki et al. (29) found that mental disorders were more prevalent among unemployed women than unemployed men during the 1990s recession in Finland. Interestingly however, our cross-sectional findings from the first time point about 4–10 years after the recession showed no differences in the prevalence of psychiatric disorders among either women or men who had suffered hardships during the recession, as they were compared to those who had not been affected. This suggests that women and men might have initially developed some coping mechanisms. However, when we continued to follow the morbidity pattern on the longer-term of 20 years after the recession, men who experienced recession-induced hardships started to appear more vulnerable to demonstrate late psychiatric disorders. Whereas, women, on long-term, seemed to be continuously resilient in coping with the possible psychological stress that had been caused to them by the recession. It is also worth bearing in mind that Finland went through another financial crisis in 2008, together with the rest of the world. There is a chance that some individuals who suffered from the 1990s recession might have also felt the effects of the 2008 economic downturn, which was in economic terms a lot milder in Finland as compared to the recession in 1990s. The men might have also met with other personal hardships during the long follow-up of our study, and thus exhibited an increased risk of psychiatric disorders. However, no data indicates that same men were disproportionally affected by all these factors, and even if they were, the later economic crisis and other factors are likely to just add to the burden, while the 1990s recession still seems to remain the initial, or more early, trigger.

Many studies have shown the psychological stress to facilitate increased alcohol consumption during recessions, but only among men and not women (11, 30). Surprisingly in Finland, alcohol consumption and alcohol-related mortality decreased during the 1990s recession, after they recorded a substantial increase during the period of prosperous economy at end of 1980s (31, 32). Alcohol-related diseases, accidents and violence due to alcohol intoxication and alcohol-related circulatory diseases among men contributed to most of the alcohol-related deaths. Therefore, changes in alcohol consumption are suggested to mediate the changes in alcohol-related mortality pattern along that economic cycle, specifically among 45 years and older Finnish population and those of lower educational attainment (32). Finns with lower educational and occupational class still had three times higher alcohol-related mortality (33) and higher alcohol consumption (19) than those with higher education or occupational level during the 1990s recession. During our 20-years follow-up, men who ended up with higher risk of alcohol-related diseases were also more likely less educated and had lower income. However, the alcohol harm paradox should be addressed cautiously, since low SEP groups are more vulnerable to higher alcohol-related harm even if they consume similar or lower levels of alcohol than higher SEP groups. Although the alcohol harm paradox is not yet fully understood, the joint effect of other adverse lifestyle factors such as smoking and obesity might partially explain the development of alcohol-related diseases among low SEP groups (34).

Our findings also support earlier studies (13) that show married/cohabiting men being partly protected from both psychiatric disorders and alcohol-related diseases. Although Avendano et al. (20) considered Finns as more resilient than many other people against the 1990s recession because of the generous social benefits provided by the state, Lindberg et al. (35), on the other hand, reported poor efficiency and heavy bureaucracy in the Finnish social security system during that recession. Finnish families, therefore, had to develop their own coping strategies with the financial and psychological distress.

Furthermore, the remarkable cuts in mental health care budget due to recession led to a certain psychiatric care crisis in Finland during the recession. One sign of this is the use of antidepressants, which drastically increased in those times, and official rates depression that became the major cause of disability pensions (36).

There is a growing interest in studying the economic and health impacts caused by the coronavirus pandemic. As for now, no country has yet developed a comprehensive social protection or appropriate health systems preparedness against an event like this (37, 38). Therefore, we highly address the importance of long-term follow-ups in future research to better understand the role of macroeconomics on mental health and alcohol-related disease burden, and on peoples' response to crises, including the resilience factors. This will help to integrate the needs of individuals, who in this pandemic have experienced or will experience hardships, with the provision of mental healthcare systems, and thus try to minimize the devastating consequences of the current pandemic-induced recession as efficiently as it may be possible.

Our epidemiological study is based on a regionally and ethnically representative population-based sample. The unique 20-years follow-up time is the longest used in studies on this research area, as most previous studies focused on health outcomes during or shortly after recessions only. The comprehensive and reliable nationwide system of digital registers that was utilized in our study, covers all diagnoses based on secondary and tertiary level hospital treatment episodes in Finland. Therefore, the outcome measure in our follow-up study can be considered reliable.

Unemployment has been widely used as the only measure of socioeconomic hardships during recessions. Instead, we used a detailed questionnaire to draw a broader estimate on how the participants were overall affected by the recession, including, but not limited to, unemployment.

Since our study population are ethnically homogenic, we cannot necessarily generalize our results to other ethnicities and countries except for the rest of the Nordic countries, which share fairly similar demographic characteristics and social and welfare system. Still, the results may not be generalized to women and men of other age groups than of those we studied.

To avoid over-adjustment, we included only education covariate to describe SEP. This resulted from the fact that income and occupation were already included in the participants' responses on whether they were affected by the recession or not. We have used only few covariates to adjust for in the statistical models based on their relevance to the exposure or outcome.

The lack of association that we observed among women between their economic hardships on one hand, and psychiatric disorders and alcohol-related diseases on the other, may be partly due to insufficient numbers of subjects and incident cases, thus, simply an issue of statistical power. This was also reflected in the confidence interval of alcohol-related risk among men, again resulting from the relatively low number of incident cases of alcohol-related diseases, even though the numbers were reasonably proportional to the cohort size.

Finally, while our study showed an association between socioeconomic hardships and subsequent long-term risk of psychiatric disorders and alcohol-related diseases, the underlying pathological mechanisms and possible causalities should be further investigated.

CONCLUSIONS

The present study suggests that economic recessions may pose gender-specific risks for long-term psychiatric disorders and alcohol-related disorders. Findings from our 20-year follow-up study focusing on the effects of the severe economic recession of Finland in 1990s showed an increased long-term risk of developing new psychiatric disorders and alcohol-related diseases among men who had experienced hardships during the recession, but this was not observed among similarly affected women. In the short-term follow-up after the recession, no increase in the risk of psychiatric disorders was observed in either women or men.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because this study is based on the Kuopio Ischaemic Heart Diseases (KIHD) Risk Factors Study database. KIHD data can be requested from Ari Vuotilainen; Data Manager at the Institute of Public Health and Clinical Nutrition, Faculty of Health Sciences, University of Eastern Finland, Kuopio, Finland. Requests to access the datasets should be directed to Ari Vuotilainen (ari.vuotilainen@uef.fi).

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Research Ethics Committee of the University of Kuopio and the protocol complies with Declaration of Helsinki. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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The Acceptability and Initial Effectiveness of "Space From Money Worries": An Online Cognitive Behavioral Therapy Intervention to Tackle the Link Between Financial Difficulties and Poor Mental Health

Thomas Richardson[1,2]*, *Angel Enrique*[2,3], *Caroline Earley*[2], *Adedeji Adegoke*[2], *Douglas Hiscock*[2] and *Derek Richards*[2,3]

[1] Richardson Psychological Consultation Limited, The Psychotherapy Practice, Southampton, United Kingdom, [2] Clinical Research & Innovation, SilverCloud Health, Dublin, Ireland, [3] E-Mental Health Research Group, School of Psychology, University of Dublin, Trinity College Dublin, Dublin, Ireland

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University of Luxembourg, Luxembourg

***Correspondence:**
Thomas Richardson
thomashughrichardson@gmail.com

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Background: Previous research has shown a strong relationship between financial difficulties and mental health problems. Psychological factors such as hope and worry about finances appear to be an important factor in this relationship.

Objective: To develop an online based psychological intervention (Space from Money Worries) to tackle the psychological mechanisms underlying the relationship between poor mental health and financial difficulties, and to conduct an initial evaluation of the acceptability and preliminary efficacy of the intervention.

Materials and Methods: 30 participants accessing Increasing Access to Psychological Therapies (IAPT) services completed GAD-7 to measure anxiety and PHQ-9 to measure depression upon signing up to the online intervention and again 4 to 8 weeks after this. Participants also completed a measure of perceived financial distress/wellbeing and a "Money and Mental Health Scale" constructed for the evaluation.

Results: Overall, 77% ($n = 23$) completed the intervention and follow-up assessments. Intent to Treat Analysis showed that there were statistically significant improvements in symptoms of depression, anxiety, improved perceived financial wellbeing and reduced scores on the money and mental health scale. The vast majority of participants rated each module positively.

Conclusions: Space from Money Worries appears to be acceptable and may lead to improvements in mental health, perceived financial wellbeing and a reduced relationship between financial difficulties and poor mental health. However, future research with a larger sample and a control group are needed to confirm that these changes are due to the intervention.

Keywords: debt, financial difficulties, poverty, depression, anxiety, mental health, computer-based CBT, online CBT

INTRODUCTION

A large body of research has shown a relationship between financial difficulties and mental health problems. Lower socio-economic status is linked to a greater risk of psychiatric disorders in prospective cohort studies (1), and socioeconomic deprivation is linked to higher suicide rates (2). Poorer living standards increase the risk of depression over time (3). Research with a range of different populations shows that those in debt are more than three times as likely to experience mental health problems, and are at a greater risk of specific difficulties including depression, substance use problems and suicide attempt and completion (4). A recent study showed a 2.5 fold risk of completion of suicide across the course of a year for those in debt (5).

In a sample of university students, greater financial difficulties such as struggling to pay electricity bills and having to borrow money is linked with more symptoms of anxiety, psychosis, eating disorder and alcohol problems over time (6–8). This research also showed that that this relationship can work both ways with mental health problems leading to worsening finances as well as financial difficulties leading to poorer mental health over time (6, 7). A recent longitudinal study also showed that debts increased the risk of developing a common mental health problem over the course of a year, but those with existing mental health problems were also more at risk of being unable to pay back debts over the course of the year (9). Qualitative research with those with Bipolar Disorder has similarly identified a theme of a "Vicious Cycle" between money and mental health problems (10).

Research shows that the risk and severity of common mental health disorders such as depression is increased by other specific financial difficulties such as low income (11), being on benefits (12, 13), job insecurity and unemployment (14, 15), bankruptcy (16), levels of financial strain (17), having to borrow money (11), use of short-term "payday loans" (18), having a utility disconnected (11) and having to go without items such as clothes, heating, or socializing (13).

There is potential overlap between those accessing mental health and debt advice services: One study screened those in contact with a debt advice charity and found that 65% scored high enough on measures of depression and anxiety to suggest that a referral for mental health support was warranted (19). The impact of financial difficulties on mental health has led to suggestions that assistance with financial difficulties within mental health services may improve recovery rates (20).

The financial impact of the COVID-19 pandemic is likely to have a considerable impact on mental health at a population level, given that a systematic review of 100 papers concluded that recessions increase the prevalence of common mental disorders, substance use problems, and suicidal behavior (21). This appears to be due to the impact of economic factors such as less income, unmanageable debts and unemployment (21). Research during the COVID pandemic has showed that reduced income or work due to COVID-19 increases symptoms of depression and anxiety (22), and COVID-related financial difficulties are linked to an increase risk of suicidal thoughts or thoughts of self-harm (23).

Research has shown the role of psychological factors in the role between financial difficulties and poor mental health. The impact of debt on anxiety appears to be moderated by stress about debt (24). Greater subjective concern and stress about finances is linked to poorer mental health (7, 25), and worries about debt predicts greater symptoms of depression over time, better than other financial variables such as income and employment status (26). One study showed differences in subjective financial wellbeing between individuals and found that this impacted overall wellbeing (27). Another found that questions about subjective financial wellbeing, such as worry about finances, were more strongly related to mental health than objective measures of financial hardship, such as being unable to pay the bills, in the general population (28), a finding which has been replicated in those with a diagnosis of Bipolar Disorder (13). Furthermore, hope is found to partially mediate the impact of subjective financial hardship on stress, depression and wellbeing, whilst shame partially mediates the impact on anxiety (28). Hopelessness also partially mediates the impact of debt on suicidal ideation (29). A systematic review concluded that self-esteem, active coping and sense of agency have a role in linking financial hardship with poor mental health (30). It has been suggested by a UK based think-tank, which focuses on money and mental health, that psychological approaches can address the causes and consequences of financial difficulties, and that work on changing thinking patterns and coping strategies around finances may "*help to provide a lasting fix to the vicious cycle of financial difficulty and mental health problems*" [(31), p.7]

Research has evaluated the impact of Cognitive Behavioral Therapy (CBT) in those who are unemployed, with mixed results about effectiveness (32). There has also been some research on community based interventions such as debt advice, social prescribing and labor market programmes, however there is not much evidence about the impact of this on mental health (33). Internet-delivered CBT (iCBT) has been shown by several meta-analyses to be effective for symptoms of depression and anxiety (34–38), and represents a way to increase access to psychological interventions. Trials also show the cost-effectiveness of online interventions over up to 12 months (39).

To the authors knowledge, only one previous online intervention has used a psychological approach to mitigate the impact of financial difficulties on mental health, specifically focusing on the stress associated with debt (40).

This study therefore describes the development of an online psychological intervention to try to address the link between financial difficulties and poor mental health. It attempts to assess the suitability of a digital CBT intervention for financial difficulties and mental health in the context of the Improving Access to Psychological Therapies (IAPT) program, which is a stepped care approach for the treatment of common mental health disorders in England provided by the National Health Service (NHS). The primary aim of this pilot study is to assess the acceptability and preliminary effectiveness of the iCBT program on financial distress and associated mental health symptoms when used to treat patients with primary presentations of money worries within IAPT. A secondary aim is to explore the

level of satisfaction of users with the different modules of the iCBT program.

MATERIALS AND METHODS

Study Design

This is an open pilot study with a pre-post design that aims to examine the preliminary clinical impact of an internet-delivered program for financial difficulties and mental health as part of a routine care service delivery.

Setting

This naturalistic study took place within the Improving Access to Psychological Therapies (IAPT) in the National Health Sservice (NHS) of England. More specifically, the study was carried out at Berkshire Healthcare NHS Foundation Trust through "Talking Therapies" Service, which is an NHS IAPT provider. IAPT is a stepped-care model for the treatment of Common Mental Health Disorders, such as depression and anxiety. Within IAPT, guided internet-delivered interventions are offered at step 2 for individuals with mild to moderate presentations of depression and anxiety.

Internet-delivered interventions in IAPT are offered with support from Psychological Wellbeing Practitioners (PWPs) who are clinicians trained in the provision of low-intensity mental health support in IAPT. Over the course of the interventions, the PWPs provide asynchronous reviews based on patients' progress on the platform, giving feedback and recommending content. Reviews are offered every 7 to 10 days and typically take an average of 15 minutes. As part of IAPT Standard Operating Procedures, PWPs provide 6 reviews on average during the course of treatment (which typically takes 8 weeks), but treatment length and number of reviews may vary depending on patient needs. This study collected data from November 2017 to May 2020. All users provided written or oral consent for their anonymized data to be used in routine evaluations for service monitoring and improvement; therefore approval from a Research Ethics Committee was not required.

Sample

To be suitable for an internet intervention at step 2, patients are assessed by PWPs based on their willingness to use internet-delivered interventions, no suicidal or self-harm risk and having internet access. Upon initial screening, individuals who self-reported money worries as their primary presentation were assigned to the "Space from Money Worries" programme.

"Space From Money Worries": Intervention Development and Content

The development of *Space from Money Worries* was informed by research on the psychological links between financial difficulties and poor mental health as previously discussed. This includes the role of hopelessness and shame (28), self-esteem, active coping, and sense of agency (30). Research with Bipolar disorder has also shown the role of psychological factors, such as cognitions around achievement, dependency, and poorer mindfulness increasing compulsive spending over item (41). As well as our knowledge regarding the impact of financial difficulties on mental health, given the research suggesting a possible vicious cycle (6, 7, 9, 10), the intervention also aimed to work on factors which might lead to poor mental health impacting finances such as addressing poor financial coping and avoidance around finances which have been reported by individuals with Bipolar Disorder (10). Space from Money Worries thus aimed to tackle financial difficulties and poor mental health in an integrative fashion.

Space from Money Worries was developed to be able to help a broad spectrum and range of mental health difficulties where financial difficulties are felt to be impacting mental health and/or vice versa, ranging from those with low to moderate levels of stress, depression and anxiety to those with a diagnosis of Bipolar Disorder. It was also designed to tackle a broad range of financial issues from struggling to stick to a budget, coping with debt, managing impulsive spending, and coping with financial crises such as bankruptcy, house repossession or separation. Composite case study examples were included throughout the modules to illustrate the issues and techniques discussed.

Silvercloud health is a commerical company which has developed a number of online Cognitive Behavioral Therapy (CBT) based software packages for use in primary care. "*Space from Money Worries*" was adapted from several of SilverCloud Health's online interventions; "*Space from Stress*," "*Space from Depression"* and "*Space from Anxiety"* which have been shown, by various randomized controlled trials, to be effective (39, 42, 43).

The main therapeutic approach for psychological therapies was CBT. **Table 1** outlines the 7 modules. Patients are recommended to complete one module per week, but all modules are accessible from sign up allowing room for patients to look at the content at different paces. **Table 2** describes the specific therapeutic content of the intervention. **Figures 1–3** demonstrate some of the content of the intervention.

Measures

- GAD-7 (44) is a 7-item measure of Anxiety symptoms which is routinely used in IAPT services as a screening and outcome measure. The GAD-7 items are based on diagnostic criteria for Generalized Anxiety Disorder. The scale ranges from 0 to 21, where higher scores reflect greater symptom severity. Cronbach's alpha at sign-up stage was 0.87.
- PHQ-9 (45) is a 9-item measure of Depression symptoms which is routinely used in IAPT services as a screening

TABLE 1 | Overview of modules.

1. Money and mental health
2. Your thoughts about money
3. Changing your thoughts about money
4. Getting active on a budget
5. Facing your financial fears
6. Managing worry about money
7. Acceptance and hope about money difficulties
8. Getting control over impulsive spending
9. Staying financially healthy

TABLE 2 | Description of specific therapy techniques used in space from money worries.

- Psychoeducation about the impact of financial difficulties on mental health and vice versa
- Thoughts-Feelings-Behavior cycle: Identifying the relationship between thoughts, emotions, and behaviors in relation to finances and vicious cycles
- Identifying cognitive distortions around finances
- Challenging cognitive distortions around finances, for example evidence to support their beliefs, and a "Cash Catastrophizing Calculator" to help work out how likely it is that their worst-case scenarios are actually going to happen
- Mood diaries with options around financial difficulties and impulsive spending to link money problems with poor mental health
- Behavioral activation and activity scheduling adapted to focus on activities which involve little or no money
- Graded exposure: Developing a "Hierarchy of Financial Fears" to help face feared and avoided financial situations and develop more proactive coping strategies
- Worry work: Strategies to reduce worry adapted around finances such as the establishment of "Money Worry Time" periods
- Mindfulness exercises: General mindfulness exercises such as a 3-minute breathing space, as well as an exercise specifically focusing on using urge surfing to resist urges to impulsively spend, and an exercise trying to help reduce rumination and fusion with money problems
- Techniques from Acceptance and Commitment Therapy (ACT) used to increase acceptance and hope around money, as well as reduce rumination and fusion around money where it might be hard to challenge thoughts as inaccurate (for example if individuals are about to be made bankrupt). A specific recorded exercise around acceptance was developed as part of this. Focusing on values was also introduced to increase hope and self-esteem during financial difficulties, and a recorded exercise around this was included
- Assertiveness Skills: These were briefly discussed to increase confidence and reduce avoidance around financial requests, such as speaking to the bank or taking an unwanted item back to a shop for a refund
- Relaxation exercises such as progressive muscle relaxation were included to try to counteract the need for "comfort spending"
- Relapse prevention focus to summarize learning and keep skills for the future
- Practical advice around financial management techniques, for example strategies to reduce the risk of impulse spending, and signposting to financial information and advice services

and outcome measure. The PHQ-9 items are based on the diagnostic criteria for depression. The scales ranges from 0 to 27, where higher scores reflect greater symptom severity. Cronbach's alpha at sign-up stage was 0.88.

- The In Charge Financial Distress/Financial Wellbeing scale (46): An 8-item measure of subjective financial wellbeing or distress with questions such as *"How stressed do you feel about your personal finances in general?*" (rated on a 10-point scale from "No Stress"; to "Overwhelming Stress") and "*How often do you worry about being able to meet normal monthly living expenses?"* (rated on a 10-point scale from "Never" to "All the time"). Scores range from 8 to 80 with higher scores representing better perceived financial wellbeing. Cronbach's alpha at sign-up stage was 0.81.
- The Money and Mental Health Scale: A 9-item questionnaire was developed by the authors for the purposes of this evaluation from findings in the literature previously discussed about psychological factors in the relationship between financial difficulties and poor mental health. Questions such as "*I feel hopeless about my financial situation*" and "*I feel my financial difficulties impact my mental health*" with each questions answered: *Not at all (0), Rarely (1), Sometimes (2), Often (3), or Most or all the time (4)*, with higher scores representing a greater impact of financial difficulties on mental health and vice versa. The full scale is provided in **Table 3**. Cronbach's alpha at sign-up stage was 0.81.
- Module satisfaction. At the end of each of the modules, users are asked whether they perceived the modules as relevant, interesting, helpful in some way, and supportive in progressing toward their goals. The scale is composed of 4 questions that follow a 4-point Likert satisfaction scale from strongly agree, to strongly disagree. These were optional and completed anonymously online and not just for those completing the financial measures therefore the sample sizes for the different modules differ and this sample is different from that who completed the questionnaires above.

TABLE 3 | Questions from the money and mental health scale.

Please answer the following in relation to the last 2 weeks
Not at all (0) Rarely (1) Sometimes (2) Often (3) Most or all the time (4)
1. I feel my mental health affects how much I can manage my finances.
2. I feel my financial difficulties impact my mental health.
3. I worry a lot about my debt/money situation.
4. I avoid my finances because it makes me feel anxious,
e.g., not opening bills, not ringing bank.
5. I impulsively spent more than I can afford.
6. I feel like I have no control over my financial situation.
7. I find it hard to accept my financial situation.
8. I feel hopeless about my financial situation.
9. I criticize and blame myself for my financial situation.

Data Analysis

For the purpose of this study, an intention to treat analysis was conducted and participants that did not have a post treatment scores for all clinical measures were counted as missing. Prevalence and patterns of missing data and missing data mechanisms were explored using *t*-tests between missing and non-missing cases. Little's Missing Completely at Random (MCAR) test (47) was conducted to understand the missing pattern in the baseline and post-treatment scores and the missing data points were deemed to be "MCAR" across baseline and post-treatment scores. To handle missing data, multiple imputation

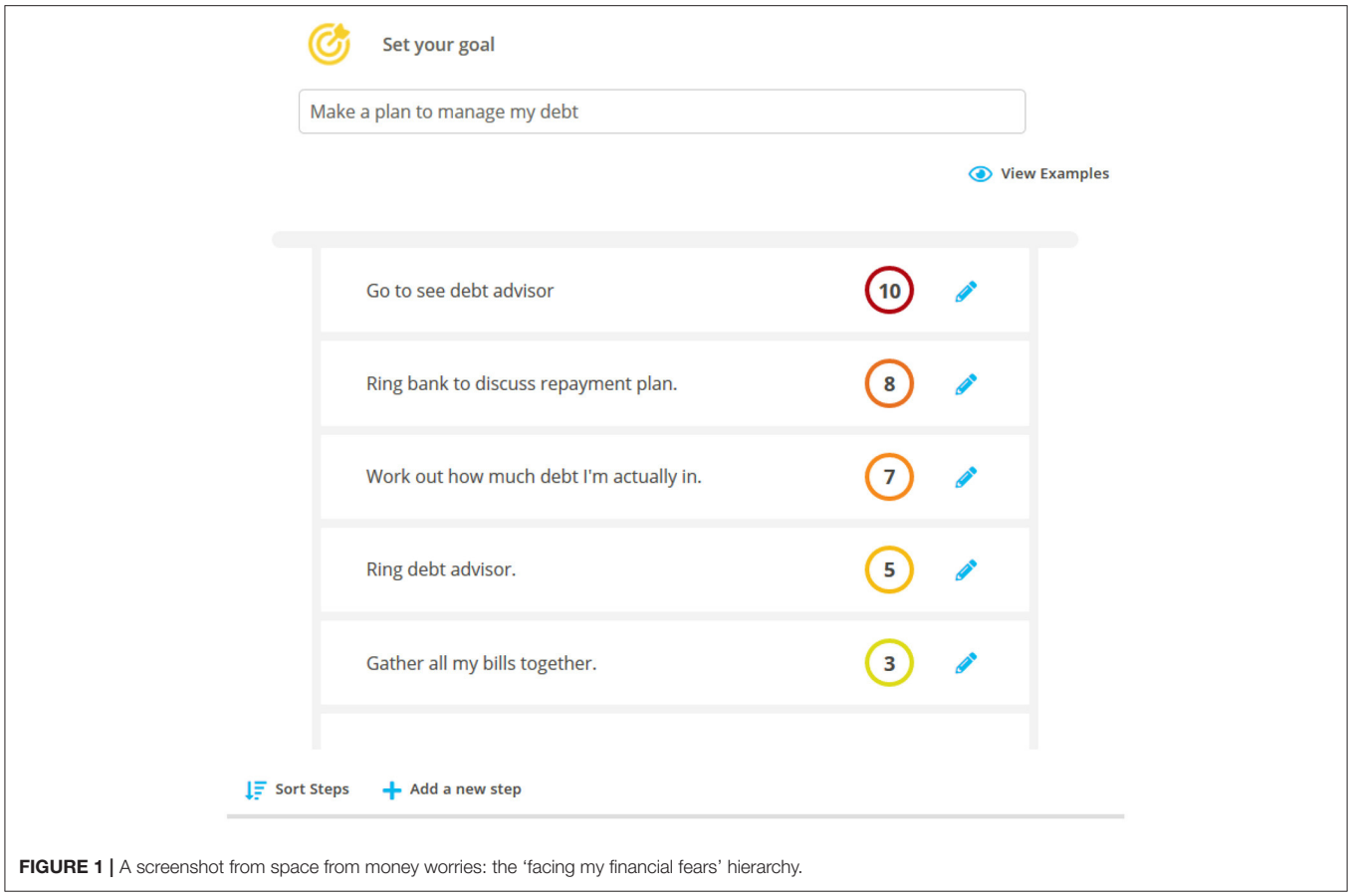

FIGURE 1 | A screenshot from space from money worries: the 'facing my financial fears' hierarchy.

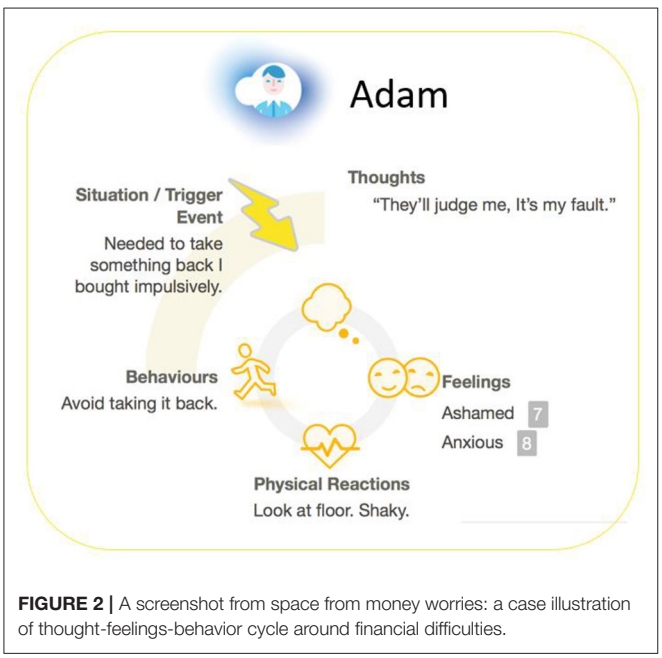

FIGURE 2 | A screenshot from space from money worries: a case illustration of thought-feelings-behavior cycle around financial difficulties.

by chained equation *via* "MICE" package in R was employed, undertaking 100 iterations for the imputation process, the imputation method engaged predictive mean matching (pmm) for the missing data points in the quantitative variables.

Shapiro-Wilk's test ($p > 0.05$) and a visual inspection of their histograms, normal Q-Q plots and box-plots showed that the difference between the pre/post scores for depression (PHQ-9) ($W(27) = 0.90$, $p = 0.051$), anxiety (GAD-7) ($W(27) = 0.94$, $p = 0.156$), Financial Distress/Financial Wellbeing ($W(27) = 0.97$, $p = 0.610$), and Money and Mental Health ($W(27) = 0.97$, $p = 0.628$) were approximately normally distributed and no significant departure from normality. Paired samples *t*-tests were used to analyze changes over time on measures. Within-group Cohen's *d* effect sizes were calculated utilizing the pre and post treatment change score divided by the within-group standard deviation. Stringent cut-off according to Muller (48) was used for the interpretation of the effect size whereby $d = 0.2$, 0.5, and 0.8 indicates small, medium and large effect sizes. For the financial variables, data was collected at either 4 or 8 weeks after the initial questionnaire were completed. Some participants completed both time points whilst some completed just one. For the purposes of the analyses, the last assessment available was used for all participants.

RESULTS

Completion Rates

The thirty-three patients were invited to the program by their PWPs and from those, 30 patients successfully created an account and completed the baseline assessments. In total, 23 participants

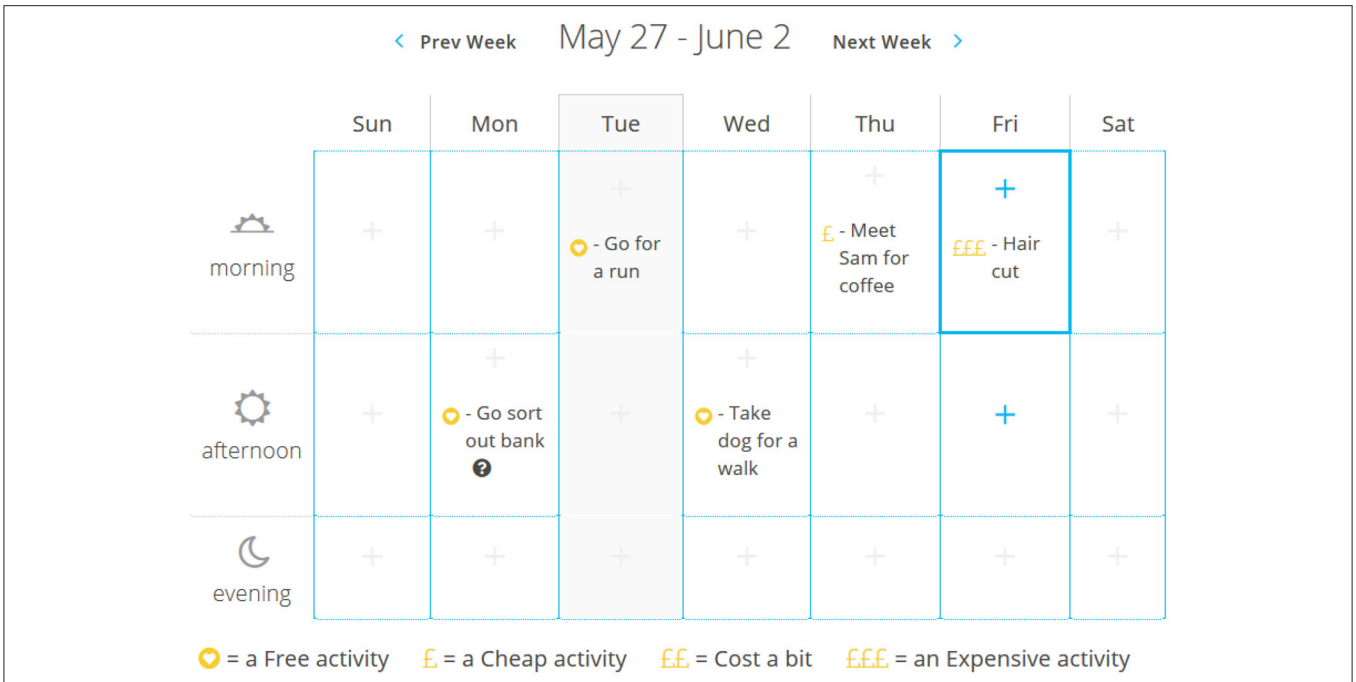

FIGURE 3 | A screenshot from space from money worries: activity scheduling tool with prices included to allow for sticking to a budget.

had a complete course of treatment, as per IAPT definition (i.e., minimum of two assessments). This represented an overall completion rate of 77% ($n = 23$). **Figure 4** reflects the flow of participants through the trial. The average duration of treatment was 68 days.

Across the total sample, attrition rates for the completion of scales at post-treatment were at 22.2% for PHQ-9 and GAD-7. For the In Charge Financial Distress/Financial Wellbeing scale (FinDist) and the Money and Mental Health Scale (MMHS) scales, 37% of post treatment data was recorded as missing. Little's MCAR test confirmed that data was missing completely at random ($\chi^2_{(19)} = 30.8, p = 0.063$).

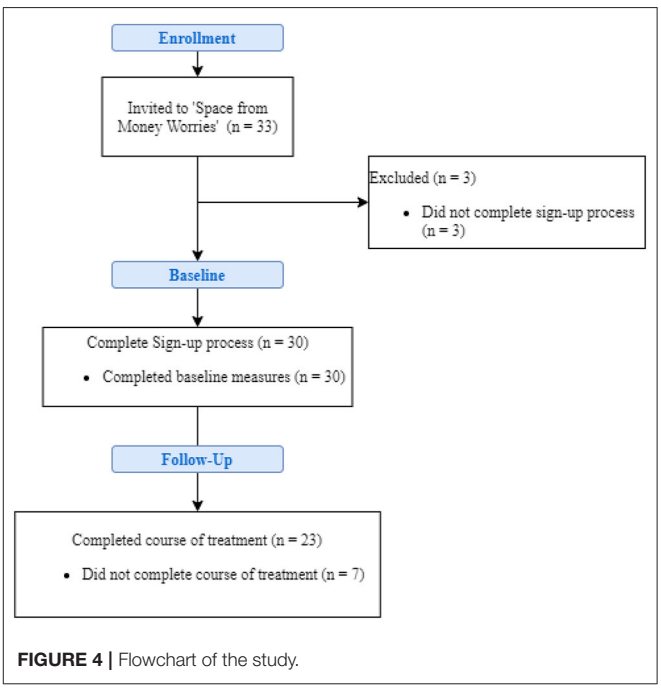

FIGURE 4 | Flowchart of the study.

Changes in Depression and Anxiety Symptoms

A paired-samples *t*-test using intent to treat found a statistically significant reduction in PHQ-9 scores from pre ($M = 12.22$, $SD = 5.69$) to post ($M = 6.74$, $SD = 4.04$), $t_{(26)} = 5.58$, $p<0.001$, Cohen's d (within group effect size) = 1.07 which represents are large effect size and a statistically significant reduction in GAD-7 scores from pre ($M = 10.37$, $SD = 5.16$) to post ($M = 6.70$, $SD = 5.36$), $t_{(26)} = 3.61$, $p = 0.001$, Cohen's d (within group effect size) = 0.69 which represents are medium effect size.

Changes in Financial Variables

A paired-samples *t*-test using intent to treat found a statistically significant increase in total scores on In Charge Financial Distress/Financial Wellbeing scale from pre ($M = 20.37$, $SD = 9.75$) to post ($M = 27.26$, $SD = 11.45$), $t_{(26)} = -3.05$, $p<0.05$. Within-group effect size was d = 0.59 which represents a medium effect size. Scores on the Money and Mental Health Scale total reduced significantly from pre ($M = 25.37$, $SD = 5.52$) to post ($M = 22.07$, $SD = 6.84$), $t_{(26)} = 2.29$, $p < 0.05$, and an effect size of d = 0.44 was observed, which represents a small effect size.

Changes in Suicidality

Out of the 33 participants at baseline, 21.2% ($n = 7$) of these scored >0 on the PHQ-9 question 9 item "Thoughts that you would be better off dead, or of hurting yourself in some way?." At post of these 7 participants, 42.9% ($n = 3$) scored a 0 on this.

Feedback Data

Table 4 displays the feedback data for each module, showing that the vast majority of those completing each individual module rated it as interesting, relevant, helpful to them and supportive of them in progressing toward their goals.

DISCUSSION

This paper aimed to describe the development of *Space from Money Worries (SFMW)* and provides an initial evaluation of its acceptability and effectiveness. This program represents a unique intervention in using insights from the literature around the psychological mechanisms linking financial difficulties and poor mental health and using an online intervention to help to address these. Ratings of each module and a 77% completion rate suggest acceptability, as does the vast majority of those completing the intervention rating the program positively in terms of relevance, helpfulness, supportiveness and usefulness.

Using an initial small sample, the study also showed significantly reduced symptoms of depression and anxiety, demonstrating proof of concept that an intervention focusing solely and specifically on the relationship between poor mental health and financial difficulties may lead to improvements on broader symptoms of depression and anxiety, however due to the lack of a control group it cannot be confirmed that the changes are due to the current intervention or other variables. The finding of significantly improved perceived financial wellness supports this as a possible mechanism whereby *Space from Money Worries* may lead to improved mental health, given that the same measure has been linked significantly to greater depression and anxiety in the general population (28), as well as predicting increases in anxiety and stress over time in those with Bipolar Disorder (13). However, future research with a larger sample allowing for mediation analysis will help confirm if this is indeed a mechanism of therapeutic action for the current intervention.

The money and mental health measure was also shown to significantly improve following SFMW, suggesting that participants felt that this reduced how much financial difficulties impacted their mental wellbeing and vice versa. However again caution is required around causality due to lack of a control group. This is in line with research showing the impact of financial difficulties such as debt on mental health (4), and research on psychological factors which link financial difficulties and mental health such as stress, concern about debt, shame and hopelessness (24, 28, 49). This improvement was significant even with an intent to treat analysis though the effect size was small. Although there was a good Cronbach's alpha for the measure in this sample, it has not been formally developed and evaluated and therefore these results need to be interpreted with caution.

There was a reduction in the number of participants reporting suicidal ideation following the intervention. Research has shown increased suicidal ideation for those in financial distress (23, 29). However, due to the small proportion of individuals reporting suicidal thoughts in this sample further research is required to see if an intervention such as SFMW can reduce suicidality. Given that suicidality is often an exclusion criteria for IAPT, an evaluation of this intervention with a sample with a greater proportion of suicidality is required.

This study is limited by a small sample size and no control group. The clinical and demographic profile of the sample was also not recorded, which prevented understanding the profile of participants and if it had differential effects in specific subgroups. Feedback about the modules was from varying samples and a different sample to those who completed the questionnaires. Further research is needed using a randomized controlled trial design with a larger sample and longer follow-up to determine the effectiveness of *Space from Money Worries* when compared to other interventions which are not specifically focusing on financial difficulties, such as broader online CBT based interventions. It would also be helpful to assess whether addressing the psychological mechanisms specifically, has a greater impact than non-psychological interventions such as signposting to debt advice services: "job club" interventions have

TABLE 4 | Feedback on the modules.

Module	Number people feedback from	Interesting	Relevant to me	Helpful to me	Supporting me to make progress toward my goals
Acceptance and hope about money	6	100%	100%	100%	100%
Changing your thoughts about money	24	100%	88%	88%	92%
Facing your financial fears	15	100%	100%	100%	93%
Getting active on a budget	20	100%	90%	95%	95%
Getting control over impulsive spending	9	100%	100%	100%	100%
Managing worry about money	9	100%	100%	78%	89%
Money & mental health (introduction)	60	78%	85%	88%	82%
Your thoughts about money	41	90%	95%	93%	95%
Staying financially healthy	9	100%	100%	100%	100%

% Answering "Agree" or "Strongly Agree" that this module was….

been found to improve depression in those who are unemployed (32). However, other research trying to provide debt counseling for depression in primary care has had to stop due to poor recruitment, with the authors concluding that this highlights the "*need to widen the focus of research investigation to determine the mechanisms of psychological distress in the context of debt*" (50), suggesting that a targeted psychological intervention such as the one provided here may be necessary. Given the role of avoidance of financial difficulties when individuals are depressed (10), future research could examine whether *Space from Money Worries* leads to improved engagement with formal debt advice services in those with mental health problems.

In conclusion, this preliminary study has suggested that a targeted online psychological intervention is acceptable and appears to be effective for those with financial difficulties and poor mental health which are impacting one another, though replication with a control group is required. Given the finding that those in debt are more than three times more likely to have a mental disorder compared to those not in debt (4), this could have potential at a public health level.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

TR, DR, CE, and DH developed the initial study design. AE, AA, and TR analyzed the data. All authors contributed to writing up the manuscript for publication.

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Financial Hardship, Hope, and Life Satisfaction Among Un/Underemployed Individuals With Psychiatric Diagnoses: A Mediation Analysis

Oscar Jiménez-Solomon[1,2], Ryan Primrose[1,3], Ingyu Moon[4], Melanie Wall[1,5,6], Hanga Galfalvy[5,6], Pablo Méndez-Bustos[1,7], Amanda G. Cruz[1,8], Margaret Swarbrick[9,10], Taína Laing[11], Laurie Vite[11], Maura Kelley[12], Elizabeth Jennings[13] and Roberto Lewis-Fernández[1,6]*

[1] New York State Psychiatric Institute, Columbia University Irving Medical Center, New York, NY, United States, [2] Center on Poverty and Social Policy, School of Social Work, Columbia University, New York, NY, United States, [3] Teacher's College, Columbia University, New York, NY, United States, [4] Nyack College, New York, NY, United States, [5] Department of Biostatistics, Mailman School of Public Health, Columbia University Irving Medical Center, New York, NY, United States, [6] Department of Psychiatry, Vagelos College of Physicians and Surgeons, Columbia University, New York, NY, United States, [7] Department of Psychology, Faculty of Health Sciences, Catholic University of Maule, Talca, Chile, [8] Department of Psychology, Clark University, Worcester, MA, United States, [9] Center of Alcohol and Substance Use Studies, Graduate School of Applied and Professional Psychology, Rutgers University – The State University of New Jersy, Piscataway, NJ, United States, [10] Collaborative Support Programs of New Jersey, Freehold, NJ, United States, [11] Baltic Street AEH, Inc., Brooklyn, NY, United States, [12] Mental Health Peer Connection, Western New York Independent Living, Buffalo, NY, United States, [13] National Disability Institute, Washington, DC, United States

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Edited by:
Thomas Richardson,
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Reviewed by:
Petri Böckerman,
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University of Luxembourg, Luxembourg
Anne Pignault,
Université de Lorraine, France

***Correspondence:**
Oscar Jiménez-Solomon
ogj2102@columbia.edu

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Background: Individuals with psychiatric diagnoses who are unemployed or underemployed are likely to disproportionately experience financial hardship and, in turn, lower life satisfaction (LS). Understanding the mechanisms though which financial hardship affects LS is essential to inform effective economic empowerment interventions for this population.

Aim: To examine if subjective financial hardship (SFH) mediates the relationship between objective financial hardship (OFH) and LS, and whether hope, and its agency and pathways components, further mediate the effect of SFH on LS among individuals with psychiatric diagnoses seeking employment.

Methods: We conducted structured interviews with participants (N = 215) of two peer-run employment programs using indicators of OFH and SFH and standardized scales for hope (overall hope, hope agency, and hope pathways) and LS. Three structural equation models were employed to test measurement models for OFH and SFH, and mediational relationships. Covariates included gender, age, psychiatric diagnosis, race/ethnicity, education, income, employment status, SSI/SSDI receipt, and site.

Results: Confirmatory factor analysis (CFA) for items measuring OFH and SFH supported two separate hypothesized factors. OFH had a strong and significant total effect on SFH [standardized beta (B) = 0.68] and LS (B = 0.49), and a weak-to-moderate effect on hope (B = –0.31). SFH alone mediated up to 94% of the effect

of OFH on LS (indirect effect $B = –0.46$, $p < 0.01$). The effect of SFH on LS through hope was small (indirect effect $B = –0.09$, $p < 0.05$), primarily through hope agency (indirect effect $B = –0.13$, $p < 0.01$) and not hope pathways. Black and Hispanic ethno-racial identification seemed to buffer the effect of financial hardship on hope and LS. Individuals identifying as Black reported significantly higher overall hope ($B = 0.41–0.47$) and higher LS ($B = 0.29–0.46$), net of the effect of OFH and SFH.

Conclusion: SFH is a strong mediator of the relationship between OFH and LS in our study of unemployed and underemployed individuals with psychiatric diagnoses. Hope, and particularly its agency component, further mediate a modest but significant proportion of the association between SFH and LS. Economic empowerment interventions for this population should address objective and subjective financial stressors, foster a sense of agency, and consider the diverse effects of financial hardship across ethno-racial groups.

Keywords: financial hardship, hope, life satisfaction, unemployment, poverty

INTRODUCTION

Financial hardship, usually defined as difficulty meeting basic needs and financial responsibilities, has emerged as an important construct in mental health (1–4). People with psychiatric diagnoses are more likely than the general population to undergo financial hardship, as they experience a higher prevalence of poverty, unemployment, underemployment, and dependency on public benefits with income and asset poverty requirements (1, 3–7). Consequently, people with psychiatric diagnoses experience substantial difficulty meeting basic needs (1) and paying utility bills (8, 9), face considerable food and housing insecurity (10, 11), and often endure over-indebtedness (8, 9, 12).

The high prevalence of financial hardship among people with psychiatric diagnoses is particularly important because financial hardship can adversely impact *subjective wellbeing, life satisfaction (LS),* and mental health (13–15). Subjective wellbeing has been defined as the extent to which people *believe and feel* that their lives are going well (16) and is based on cognitive evaluations (e.g., LS) and affects (e.g., joy, happiness) (17). LS refers to people's explicit and conscious evaluations of their lives, which are based on life domains that matter to the individual (16). Across low- and high-income countries, people living in poverty experience significantly lower subjective wellbeing (18, 19). While low income significantly predicts subjective wellbeing (18), financial hardship may be an even stronger predictor (20, 21). Longitudinally, financial hardship predicts worsening mental health over time (4); moreover, financial hardship and psychological distress seem to have a reciprocal relationship that creates a cycle of socio-economic decline and mental health deterioration (15, 22, 23). In fact, financial hardship may be one of the most important social determinants of mental health and the strongest single socio-economic predictor of poor mental health (2).

Research has highlighted the association of specific hardship indicators – inability to make ends meet, difficulty paying bills on time, housing insecurity, and over-indebtedness – and poor subjective wellbeing (20, 24–28). For instance, difficulty meeting basic needs has a negative impact on subjective wellbeing (21, 29) and LS in particular (30); difficulty paying monthly bills has also been associated with lower LS (31). Housing hardship (e.g., difficulty paying for housing, high housing cost–income ratio) is associated with lower subjective wellbeing (32, 33) and strongly predicts lower satisfaction with life (34). Research has also found a robust association between indebtedness and LS (24, 25, 35, 36), which is moderated by type and level of debt (24). Credit card debt, for instance, is associated with lower subjective wellbeing more consistently than housing or education debt (9, 37). Similarly, higher debt amount and higher debt-to-income ratios, which are likely to cause debt unmanageability, heighten the negative effect of indebtedness (9, 38).

Unemployment and *underemployment* have a particularly negative impact on subjective wellbeing. Cross-sectional and longitudinal meta-analyses in the past twenty years have found that unemployment has a moderate-to-strong effect on psychological distress and overall psychological wellbeing, and that unemployed individuals are on average over twice as likely to report psychological problems than employed individuals (39, 40). Longer periods of unemployment worsen its effect on mental health (40, 41). People with psychiatric diagnoses may be particularly vulnerable to the effects of unemployment and underemployment. Employment status is a strong predictor of LS in this population (42, 43). Hence, the negative effect of psychiatric diagnoses on LS (44) is compounded by the financial and non-financial effects of unemployment (45–47). Accounting for socio-demographic factors and the presence of depression, financial hardship has a moderate negative effect on the LS of unemployed individuals (48). This effect of unemployment on LS is only partly related to its effect on income loss (45, 46). Employment fulfills not only material but also psychological needs, such as structure, social connections, and life purpose (49). As a result, unemployment can be experienced as a loss of control, agency, and social status, with important psychological and social consequences beyond its economic impact (50). Nevertheless,

the relationship between unemployment and wellbeing may be bidirectional, since lower self-rated health increases the chance of joining the pool of the unemployed (51).

Underemployment also has detrimental effects on LS and mental health. Although evidence about the effect of underemployment on wellbeing is limited (52), longitudinal research has shown that transitioning from full-time employment to underemployment (defined as 30 h of work or less per week) predicts increases in psychological distress, while individuals who move out of underemployment experience reductions in distress (53). When underemployment is defined by wage changes, underemployed individuals report LS and mental health improvements relative to those who are unemployed. However, when underemployment is defined based on utilization of skills, the underemployed show no better LS than the unemployed. While income improvements of paid employment may have benefits, being overqualified for a job may create life dissatisfaction and distress (54).

Despite the consistent association between financial hardship indicators and LS, the mechanisms of this association among unemployed and underemployed individuals with psychiatric diagnoses are insufficiently understood. Research in the general population suggests that *subjective financial hardship (SFH)* – one's own experience of a difficult financial situation – may be an important mechanism of the impact of objective financial hardship (OFH) on LS. SFH has been variously defined in the literature. Defined as *financial satisfaction* (a person's overall evaluation of how pleased they are with their financial situation), it is a moderate-to-strong predictor of LS (55, 56). As *financial stress* (anxiety and worry about one's financial situation) and *financial threat* (uncertainty and vulnerability associated with financial difficulties), it is a moderate predictor of poor LS (57, 58). Furthermore, SFH partially mediates the effect of objective indicators on subjective wellbeing. For example, *perceived financial wellbeing* mediates the effect of low cash reserves on LS (59). *Financial dissatisfaction* mediates the impact of indebtedness on low satisfaction with life (35). In a recent large meta-analysis, *subjective socioeconomic status* (SES) partly mediates the association of objective SES and subjective wellbeing (13). The *perception of one's financial situation* (dissatisfaction, perceived ability to control one's financial situation, perceived financial future) mediates the relationship between OFH and psychological wellbeing (60). *Shame* about one's financial circumstances, a common experience in response to financial hardship and poverty (61, 62), mediates the relationship between financial hardship and anxiety (63). Among the unemployed, shame and financial hardship seem to interact to intensify the detrimental effect of unemployment on mental wellbeing (64). Furthermore, shame can be not only a consequence of financial hardship but also exacerbate it. Shame can induce *financial withdrawal* (disengagement from financial actions to improve one's financial situation) and thereby prevent individuals from addressing their financial difficulties (65).

Another important construct in this nexus of associations related to financial hardship and LS is a sense of *hope*, which may also mediate their association (66, 67). Snyder's Hope Theory defines hope as a positive motivational state resulting from two interrelated sets of cognitions: *pathways* and *agency*. *Pathways* refers to the perceived capacity to generate workable routes to achieve one's valued goals, while *agency* is motivational as it relates to the perceived capacity to initiate action along such pathways and even switch pathways when a barrier is experienced (68). Hopeful thinking occurs when both components are assessed and re-assessed continuously by the individual, in interaction with their environment, as they pursue their personal goals (69). A recent longitudinal study found that hope mediates the association between income and LS among moderate-income individuals and between income and happiness among high-income individuals. Hope agency was a stronger predictor than hope pathways (67). In another study, hope mediated the relationship between SFH and depression, stress, and wellbeing (63). These findings are consistent with research showing that feelings of hopelessness partially mediate the relationship between debt and suicidal ideation (70); they are also consistent more generally with research on the link between hope and subjective wellbeing, especially the moderate-to-strong positive association found between hope and LS (71–73).

Taken together, the literature suggests that indicators of OFH – such as difficulty meeting basic needs and paying bills on time, housing unaffordability, and over-indebtedness – may be important predictors of LS among unemployed and underemployed individuals with psychiatric diagnoses (24, 31, 34). Experiencing OFH can foster dissatisfaction, worry, uncertainty, and shame about one's financial situation (14, 35, 55). In turn, the subjective experience of financial hardship may erode individuals' hope about their ability to achieve personal goals, leading to poorer satisfaction with life (63). For some, such as individuals already struggling with their mental health and those disengaged from the workforce, this process may lead to worsened psychiatric distress and deteriorating mental health. Nevertheless, our understanding about these mechanisms among people with psychiatric diagnoses is still incipient and the available evidence insufficient to develop effective interventions to buffer the impact of financial hardship on the subjective wellbeing of this population.

This study seeks to add to the research base on mechanisms of action of the relationship between financial hardship and LS. We examine whether SFH – measured as dissatisfaction with and shame about one's financial situation – mediates the relationship between OFH and LS in an ethno-racially diverse sample of adults with psychiatric diagnoses who are unemployed or underemployed. We especially examine the role of hope, and its agency and pathways dimensions, in mediating the effect of SFH on LS. **Figure 1** presents our conceptualized framework and the hypothesized relationships between objective and SFH, hope, and LS. These relationships have not been sufficiently examined in the general population, and to our knowledge have never been studied before among people with psychiatric diagnoses. We leverage cross-sectional data on a sample of adults with psychiatric diagnoses engaged in two peer-run employment programs, largely dependent on social security disability and welfare programs as main sources of income, and most of whom live with incomes below poverty. By elucidating the mechanisms through which financial hardship erodes subjective wellbeing

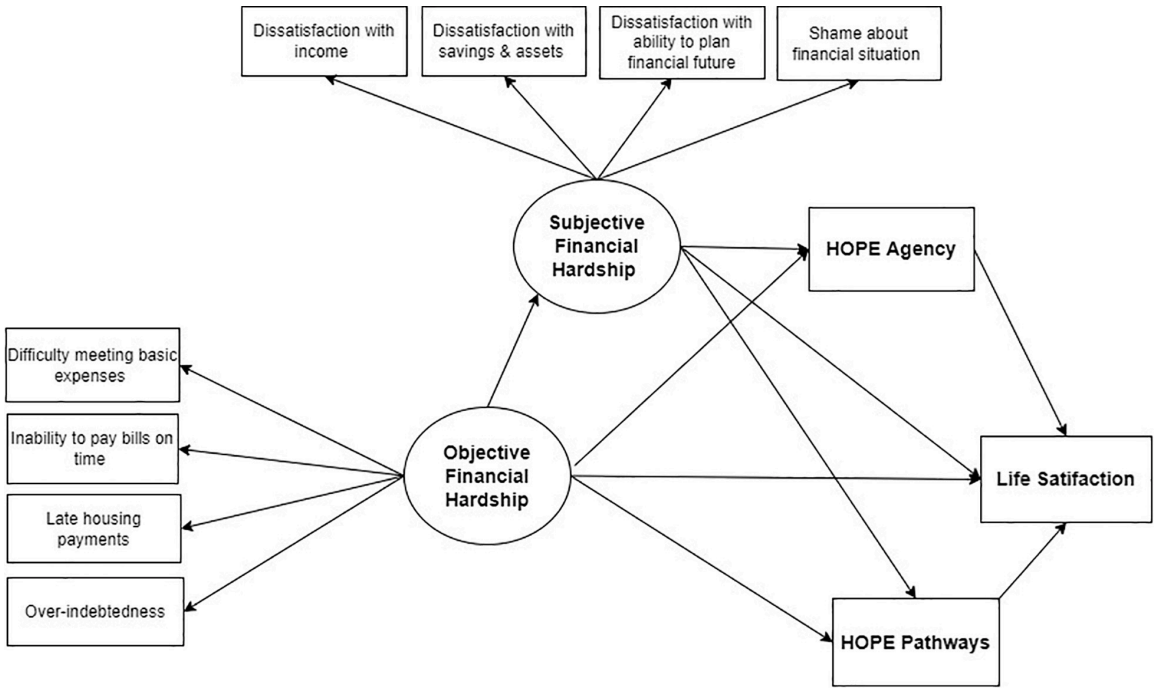

FIGURE 1 | Hypothesized relationships between objective financial hardship (OFH), subjective financial hardship (SFH), hope agency, hope pathways, and life satisfaction (LS).

in this population, we seek to inform the development of interventions for empowering unemployed and underemployed individuals with psychiatric conditions to improve their objective financial situation, buffer the impact of financial difficulties on their mental wellbeing, and ultimately avert further decline in their socio-economic and mental health condition.

MATERIALS AND METHODS

Data

Data were collected from a convenience sample of 215 individuals with a psychiatric diagnosis who participated in two peer-run employment programs in New York City and upstate New York at the time of interview. Both programs provide supports free of charge to individuals who are not engaged in paid work or who are seeking new or additional employment. These supports include employment goal setting, résumé writing, interview coaching, transition to employment, and ongoing emotional assistance. These are provided by people with lived experience of psychiatric diagnoses and recovery with formal training as peer specialists. Both programs are housed in non-profit peer-run organizations also providing other peer supports, such as advocacy, community integration, and supported housing.

Recruitment Procedures

Program staff invited recipients of employment services in 2015–2016 to participate in a financial and emotional wellness survey through face-to-face contacts, flyers, telephone, and mailed letters. All individuals who were active program participants during the survey period were invited to participate (N = 235). Successful interviews were completed with 215 individuals. Hence, the survey response rate was approximately 91.5%. Inclusion criteria were current participation in employment supports and being of working age (18–64). All survey respondents had a documented psychiatric diagnosis, as required for participation in both employment programs. Exclusion criteria included active florid psychosis or acute emotional distress at the time of consent, and difficulty understanding survey procedures, as assessed by program staff.

Interviews and Interviewers

Structured interviews lasting 45–60 min were conducted by peer providers and managers of peer-run programs. The research team decided that program staff known to participants would be most effective in engaging potential research participants, developing trust, and collecting valid data about financial matters. Interviewers received 6 h of training by the first author (OJ-S). OJ-S led debriefing sessions with interviewers after the completion of the first and fifth interviews to provide additional coaching. All surveys were reviewed contemporaneously for completeness by the first author and the project's lead research assistant.

Ethics

The study was approved by the New York State Psychiatric Institute (NYSPI) Institutional Review Board as the IRB of record, which also approved a waiver of written documentation

of consent. Before participating in study procedures, research participants were provided with a consent information sheet. After asking questions about study procedures, participants gave verbal consent. They received $30 USD in cash compensation and travel fare for completion of the interview. Completed questionnaires were de-identified before being transmitted to researchers in person or via certified mail.

Measures

Indicators of Objective Financial Hardship

Objective financial hardship was observed using four items assessing the presence of different types of financial hardships: difficulty meeting basic expenses, inability to pay bills on time, housing unaffordability, and over-indebtedness. The items are: (1) "In a typical month, how difficult is it for you to cover your expenses and pay all your bills? (1, Not at all difficult; 2, Somewhat difficult; 3, Very difficult) (*difficulty meeting basic expenses*); (2) "I pay my bills on time" (1, Completely disagree; 2, Disagree; 3, Neither agree nor disagree; 4, Agree; 5, Completely agree) (*inability to pay bills on time*); (3) "How many times have you been late with your rent or mortgage payments in the last 2 years? (1, Never; 2, Once; 3, More than once) (*housing unaffordability*); (4) "I have too much debt right now" (1 = "strongly disagree" to 7 = "strongly agree") (*over-indebtedness*). These items were obtained from the FINRA Financial Capability Study (items 1, 2, 3) (74) and the OECD Financial Literacy Survey (item 4) (75), two well-established national and international surveys of financial capability. Item 2 was reverse coded so that higher values indicate greater hardship.

Indicators of Subjective Financial Hardship

Subjective Financial Hardship was observed utilizing four items measuring respondents' current dissatisfaction with their ability to meet their needs, savings/assets, ability to plan financial future, and feelings of shame about their current financial situation. The items are: (1) "How satisfied are you with how much money you have available every month to meet your needs?" (2) "How satisfied are you with how much savings you have and the number of things of monetary value you own?" (3) "How satisfied are you with your ability to plan your financial future?" and (4) "I feel ashamed about how bad my financial situation is." Each item was assessed by a 5-point Likert scale. For items 1–3, response categories ranged from completely dissatisfied to completely satisfied; for item 4, from strongly agree to strongly disagree. Items were reverse coded so that higher values indicate greater subjective hardship. Items 1–3 were created to capture dissatisfaction with financial stability (ability to meet basic needs) and financial security (ability to build savings/assets and plan financial future), important domains in the financial wellness framework for people with psychiatric diagnoses proposed by Jiménez-Solomon and colleagues (76). The fourth item was developed to assess financial shame, a documented experience in response to financial hardship and poverty (61, 62). The research team drafted items with input from nine peer specialists (people in recovery from psychiatric diagnoses trained in peer-support principles and techniques) who provided employment supports at each site. The research team crafted eight items and reviewed them with peer specialists for understandability. Two items were drafted to assess each of four domains of SFH (i.e., dissatisfaction with their ability to meet needs, savings/assets, ability to plan financial future, and feelings of shame about their current financial situation). The research team then conducted a small pilot study with ten individuals with psychiatric diagnoses, and respondents provided their input via debriefing interviews. After the pilot, four items (one per domain) were selected based on comprehension and relevance and further edited before final survey implementation.

Adult Hope Scale

Developed based on Snyder's hope theory, the adult hope scale is a validated 8-item measure of trait/dispositional hopeful thinking with adequate internal consistency (α = 0.74–0.88), test–retest reliability (68), and concurrent and discriminant validity (77). Factor analyses consistently support a two-factor model and an overarching construct of hope (78), which can be operationalized as a single composite or two subfactors, *agency* and *pathways,* following Snyder's cognitive model of hope. In our sample, internal consistency for the single hope (α = 0.84), agency (α = 0.79) and pathways scales (α = 0.76) were adequate.

Hope Agency Subscale

Agency was assessed using four items tapping the perceived ability to achieve one's life goals. Respondents indicated the extent to which they agreed with each of four statements on an 8-point Likert scale ranging from 0 (*definitely false*) to 7 (*definitely true*). The statements included: (1) "I energetically pursue my goals;" (2) "I meet the goals that I set for myself;" (3) "My past experiences have prepared me well for my future;" and (4) "I've been pretty successful in life." Items were summed (range 0–28) so that higher values indicate greater agency.

Hope Pathways Subscale

Pathways was assessed as the perceived capability of finding or activating routes to achieving one's life goals. Respondents described their level of agreement with the following four statements: "I can think of many ways to get out of a jam," "There are lots of ways around any problem," "I can think of many ways to get the things in life that are important to me," and "Even when others get discouraged, I know I can find a way to solve the problem." Response options (0-7) range from 0 (*definitely false*) to 7 (*definitely true*). Items were summed (range 0-28) with higher values indicating a greater sense of pathways.

Satisfaction With Life Scale

We used Diener's five-item measure to assess current global LS (79). Each item is assessed by a 7-point Likert scale 1–7 (*completely disagree – completely agree*). Each item is coded 0–6 and summed (range: 0–30), with higher values indicating greater LS. The five items are: (1) "In most ways my life is close to my ideal;" (2) "The conditions of my life are excellent;" (3) "I am satisfied with life;" (4) "So far, I have gotten the important things I want in life;" (5) "If I could live my life over, I would change

almost nothing." In our sample internal consistency for this scale was acceptable ($\alpha = 0.82$).

Covariates

Structural Equation Modeling (SEM) in this study includes potential confounders, including binary gender (males = reference group), age (years), race/ethnicity (Black non-Hispanic, Hispanic, Other, White non-Hispanic [reference]), education (high school or above, below high school [reference], and self-reported diagnosis (1) Bipolar disorder, (2) Depressive, anxiety, trauma-related, and obsessive-compulsive disorders and other diagnoses [hereafter, "Other diagnoses"], (3) Schizophrenia and psychotic disorders [reference]), employment status (currently engaged in paid employment or self-employment, not engaged in paid employment or self-employment [reference]), income (individual income above Federal Poverty Line (FPL) for a household of one at the time of data collection, below poverty

TABLE 1 | Demographic and clinical characteristics of the sample of people with psychiatric diagnoses in employment programs (*N* = 215).

	Total sample (*N* = 215)	
	N	**%/Mean (SD)**
Age	215	44.51 (11.58)
Gender		
Female	91	42.33
Male	124	57.67
Ethno-racial identification[a]		
Black/African American, non-Hispanic	91	42.72
White, non-Hispanic	65	30.52
Hispanic	34	15.96
Other	23	10.80
Highest education completed		
Did not complete high school	55	25.58
High school graduate/equivalent	94	43.72
More than high school	66	30.70
Marital status/Living arrangement[(1)]		
Married/Living with partner or spouse	28	13.08
Single never married	139	64.95
Separated, widowed, or divorced	47	21.96
Employment status		
Currently in paid employment/self-employed	36	16.74
Not in paid employment	179	83.26
Ever worked before[(2)]	171	95.55
Last paid work[(3)]		
Less than 1 year	81	46.29
At least 1 year, less than 3 years	27	15.43
3 years or more	67	38.29
Average hours of work per week[(4)]		
<30	25	69.44
≥30	11	30.56
Individual annual income[b]		
≤$5,885	62	28.83
$5,885 up to $11,770	109	50.69
≥$11,770	44	20.47
Household income[c(5)]		
Less than FPL for household size	118	68.21
At least FPL for household size	55	31.79
Main source of income		
Salaries or wages	32	15.53
SSI	69	33.50
SSDI	57	27.67
TANF	29	14.08
Other	19	9.22

(Continued)

TABLE 1 | (Continued)

	Total sample (*N* = 215)	
	N	**%/Mean (SD)**
Psychiatric diagnosis[d]		
Schizophrenia spectrum	58	26.98
Bipolar spectrum	49	22.79
Depressive, anxiety trauma-related, or obsessive-compulsive	95	44.19
Other	13	6.05
12-month psychiatric hospitalization or ER visit[(1)]	59	27.57
New York region		
Downstate	96	44.65
Upstate	119	55.35

[a]'Other' includes those reporting multiple racial groups, Alaska Native, Other Pacific Islander, Asian Indian, Chinese, Unspecified Other, West Indian, and Don't Know.
[b]Income brackets represent Federal Poverty Limit (FPL) for a single-individual household at the time of data collection, at <50%, 50% to <100%, and ≥100% of FPL, respectively.
[c]Household income FPL based on self-reported household size with reference to appropriate FPL value. N = 42 individuals in our sample (19.5%) did not know or preferred not to answer this question.
[d]Schizophrenia-spectrum diagnosis includes schizophrenia and schizoaffective disorders. Depressive, anxiety, trauma-related, and obsessive-compulsive disorders include major depressive disorders, anxiety disorders, obsessive-compulsive disorders, and posttraumatic stress disorders. Other disorders include attention-deficit hyperactivity disorder, personality disorders, learning disabilities, and refused to answer or did not know their diagnosis.
[(1)]n = 214 (missing data on 1 individual).
[(2)]n = 179 (individual reporting no current paid employment).
[(3)]n = 175 (individual reporting no current paid employment, missing data on four individuals).
[(4)]n = 36 (individuals reporting current paid employment).
[(5)]n = 173 (missing data on 42 individuals).

TABLE 2 | Descriptive statistics for independent and dependent variables and hypothesized mediators in a sample of people with psychiatric diagnoses in employment programs (*N* = 215).

Variable	*N*	Range	Mean	SD
Objective financial hardship (OFH) indicators				
Difficulty meeting basic expenses	205	1–3	2.10	0.78
Inability to pay bills on time	215	1–5	2.37	1.19
Housing unaffordability	203	1–3	1.65	0.89
Over-indebtedness	211	1–7	4.06	2.44
Subjective financial hardship (SFH) indicators				
Dissatisfaction with income to meet needs	215	1–5	3.79	1.17
Dissatisfaction with savings and assets	215	1–5	3.89	1.11
Dissatisfaction with ability to plan financial future	215	1–5	3.42	1.25
Shame about financial situation	215	1–5	3.24	1.34
Adult Hope Scale	206	0–56	37.75	11.09
Hope Agency Subscale	210	0–28	18.33	6.40
Hope Pathways Subscale	211	0–28	19.46	5.89
Life satisfaction (LS)	213	0–30	13.77	7.48

[reference]), receipt of Supplemental Security Income (SSI) or Social Security Disability Insurance (SSDI) (currently receiving SSI or SSDI, not receiving SSI/SSDI [reference]), and New York region (upstate, downstate [reference]).

Analytic Approach

Confirmatory Factor Analysis (CFA) was employed to test measurement models for OFH and SFH indicators and SEM was used to test our mediation hypotheses. Models were estimated using Mplus software version 8.6 (80).

Confirmatory Factor Analysis of Objective Financial Hardship and Subjective Financial Hardship

We hypothesized that eight indicators of financial hardship had two related but distinct underlying latent factors: OFH and SFH. A two-factor CFA model was fit specifying the OFH latent factor underlying four indicators (difficulty meeting basic needs, inability to pay bills on time, housing unaffordability, over-indebtedness) and the correlated SFH latent factor underlying four additional indicators (dissatisfaction with income, dissatisfaction with savings and assets, dissatisfaction with ability to plan one's financial future, shame about one's financial situation). Estimation using weighted least squares (WLSMV) was employed, which takes into account the ordered categorical Likert-response nature of the items. Standardized coefficients for factor loadings were inspected to examine how strongly each item loaded within each factor. A one-factor CFA model underlying all eight items was also fit and compared. Absolute cut-offs indicating "adequate" or "good" fit for common CFA fit statistics (e.g., RMSEA < 0.08, CFI > 0.90) have

been widely criticized (81, 82). We report them but focus on comparing them between models noting that a model with smaller RMSEA and larger CFI than another model indicates better fit (83). Factor loadings and fit statistics supported our hypothesis that OFH and SFH are best represented as two distinct factors rather than one (see Results section), hence our focus on separate OFH and SFH constructs in the mediation models below.

Testing Mediation Hypotheses

Structural Equation Modeling was used to examine, through increasingly complex models, three mediation hypotheses based on the theoretical time-order assumption that OFH precedes SFH, which precedes hope, which precedes LS. The three hypotheses are: (1) SFH mediates the effect of OFH on LS; (2) overall hope mediates the relationship between SFH and LS; and (3) hope agency and hope pathways each separately mediates the relationship between SFH and LS. To control for potential confounders, SEM models included gender, age, ethno-racial identification, educational level, self-reported diagnosis, employment status, income, SSI/SSDI receipt, and New York region, as predictors of each endogenous variable. Standardized path coefficients including total, direct, and indirect effects were estimated using WLSMV, which takes into account the ordered categorical Likert-response nature of all items, and tested using bootstrapping (with 1000 bootstrapped samples) to obtain standard errors and associated inference *p*-values. Missing data in WLSMV estimation is handled using pairwise present observations when forming the polychoric correlations so that individuals are not deleted if they have only partial missing observations. Nonetheless, approximately 6% of respondents were excluded from the final analytic sample (N = 202) due to missing data.

Effects of Covariates

Structural equation models also estimated standardized coefficients testing the independent effect of all sociodemographic and clinical predictors on key outcomes: OFH, SFH, overall hope, hope agency, hope pathways, and LS. For binary dummy variable predictors, the coefficients are standardized only for the outcome, not the predictor; hence, they represent the standardized differences in the outcome for different categories of predictor compared to the reference group, controlling for all other predictors. For instance, participants self-identifying as Black/African Americans reported on average a 0.39 SD higher LS than non-Hispanic Whites, while individuals self-identifying as Hispanics endorsed a 0.32 SD higher LS than non-Hispanic Whites (**Table 4**, Model 1).

RESULTS

Sociodemographic Characteristics of Respondents

Table 1 summarizes the sociodemographic and clinical characteristics of our sample. Respondents had an average age of 44.4 years (SD = 11.6) and a majority identified as male (58%). The sample was racially and ethnically diverse, with 43% identifying as non-Hispanic Black/African American, 30% as non-Hispanic White, 16% as Hispanic, and 11% as another ethno-racial group ("Other"). Most reported low levels of education: ∼70% had a high school education or lower and a quarter of respondents reported less than high school. Over 80% were not employed, which is expected since respondents were recruited thought employment programs for individuals with psychiatric diagnoses, but is also consistent with the 83% estimated proportion of adults in the New York State public mental health system who are not employed (84). Of those who reported paid work, 69% indicated that they worked less than 30 hour per week, suggesting substantial underemployment. Among those employed at time of interview, almost all reported a prior work history (96%); close to half (46%) had not worked for under a year, 15% for 1–3 years, and 38% for over three years. The large proportion of individuals with past paid employment suggests the cyclical nature of un/employment in this population.

The sample's overall low socio-economic status seems to be confirmed by their reported incomes. Four out of five (80%) reported individual annual incomes below the FPL for a household of one, with over a quarter reporting incomes equivalent to deep poverty (below 50% of FPL). Similarly, over two-thirds (68%) reported living in households with incomes below FPL. It is important to note that the household income estimate may not be representative of the full sample, since 42 respondents (20%) did not know this information or preferred not to answer. Consistent with large proportions of individuals with very low incomes, most respondents (75%) said their main source of income came from a social security or welfare program. For 61%, their main source of income came from cash benefits from one of two United States social security programs for people with disabilities, SSI and SSDI. For an additional 14%, their main source of income was from Temporary Assistance for Needy Families (TANF), a United States welfare program for individuals with no or very low income who are not or not-yet eligible for SSI or SSDI. Most respondents were single or living alone, with only 13% married or living with a partner. In terms of clinical characteristics, respondents self-reported diverse diagnoses: 27% in the schizophrenia spectrum, 23% in the bipolar spectrum, and 50% other diagnoses. Over one-quarter reported a psychiatric emergency room visit or hospitalization in the prior year, suggesting that a meaningful proportion of our sample had recently experienced high levels of psychiatric distress.

Table 2 summarizes the mean scores for the independent and dependent variables and the hypothesized mediators in our conceptual model. Most mean scores for the hypothesized indicators of OFH were slightly above the midpoint in the range of possible values, suggesting a substantial level of financial hardship. Most SFH indicators had mean scores that were noticeably above the midpoint (3.2–3.8 on a scale of 1–5), also suggesting that the average respondent endorsed moderate-to-high levels of SFH.

The mean LS score suggests a below-average level of subjective wellbeing relative to the general population. Prior studies have found average LS scores in adults of 18.6 to 22.9 (85). The average LS score in our sample (13.77) falls within the below-average

LS range (10–14) on a scale of 0 to 30. Although the mean score for overall hope is in the upper range of the scale, it also appears to be lower than the average score of 40 reported in the general population (86).These findings are consistent with research showing significantly lower hope indices in clinical samples than in the general population (77).

Confirmatory Factor Analysis for Objective Financial Hardship/Subjective Financial Hardship

We hypothesized that eight indicators of financial hardship had two related but distinct underlying factors: OFH and SFH. The correlation between OFH and SFH was statistically significant and high (r = 0.719; p = 0.000). Nevertheless, the CFA for the two-factor model showed improved fit (RMSEA = 0.088; CFI = 0.969) over a single factor model (RMSEA = 0.129; CFI = 0.931). In our two-factor model, the four hypothesized indicators of OFH demonstrated strong and highly significant loadings (ranging from 0.65 to 0.73). Similarly, the four indicators of SFH had moderate-to-strong and highly significant loadings (ranging from 0.45 to 0.91).

Structural Equation Models

Model 1

Structural Equation Modeling-1 tested whether SFH mediates the association between OFH and LS (Hypothesis 1). The model has acceptable fit statistics (RMSEA = 0.052; CFI = 0.924). After accounting for covariates, OFH has a strong effect on SFH (standardized B = 0.679, p = 0.000), which in turn has a strong and negative effect on LS (standardized B = –0.678; p = 0.000) (see **Figure 2**). The total, direct, and indirect estimates help quantify the extent to which SFH mediates the relationship between OFH and LS (see **Table 3**). Estimates indicate that while OFH has a moderate-to-strong total effect on LS (B = –0.491; p = 0.000), 94% of that effect is mediated by SFH, with a standardized indirect effect of 0.461 (p = 0.004).

Model 2

We hypothesized that hope mediates the effect of OFH and SFH on LS (**Figure 3**). This SEM demonstrated acceptable fit statistics (RMSEA = 0.054; CFI = 0.917). As in Model 1, OFH has a strong direct effect on SFH (0.678; p = 0.000) but did not have a significant direct effect on hope (–0.121, p = 0.458) after accounting for the mediator SFH. SFH shows a strong direct effect on lower LS (–0.590; p = 0.000) that is not mediated by hope. The associations between SFH and hope (–0.274; p = 0.049), and hope and LS (–0.321; p = 0.000), respectively, are small.

Total, direct, and indirect effects indicate that all (100%) of the overall total effect of OFH on LS is mediated by SFH and hope (**Table 3**). Most of this indirect effect is due to paths being specifically mediated through SFH. SFH alone mediates 81% of the total effect between OFH and LS, with a moderate indirect effect of –0.40 (p = 0.002) (**Table 3**). Furthermore, the indirect effect through the chained path from OFH → SFH → hope → LS is small and borderline significant (–0.060; p = 0.047). We find that OFH has a weak-to-moderate total effect on hope (–0.307; p = 0.006) and that SFH mediates close to 60% of this effect, though the indirect effect does not reach significance (–0.186; p = 0.074). Similarly, hope mediates the effect of SFH on LS, but this indirect effect is very weak (–0.088; p = 0.032) and only represents 13% of the association between SFH and LS.

Model 3

Based on prior research and our conceptual framework, we hypothesized that both hope agency and hope pathways mediate the relationship between SFH and LS (**Figure 1**). SEM-3 has overall acceptable fit statistics (RMSEA = 0.054; CFI = 0.915). In summary, the findings of model 3 indicate that the relationship between SFH and LS is partially mediated by hope agency, but not hope pathways (**Figure 4**). Similarly, SFH partially mediates the effect of OFH on hope agency, but not hope pathways. We describe below the specific findings that support this conclusion.

As in SEM-2, the total effect of OFH on LS is fully mediated (100%) by SFH and the hope measures, and most of that effect (74.8%) is from SFH alone (**Table 3**). The associations between SFH and hope agency (–0.367; p = 0.017), and hope agency and LS (–0.367; p = 0.000), respectively, are weak-to-moderate. On the other hand, the associations between SFH and hope pathways (–0.129; p = 0.494), and hope pathways and LS (0.008; p = 0.912), respectively, are very weak and non-significant. As a result, the portion of the mediated effect from OFH to LS that goes through hope is only going through hope agency (18.5%) and not through hope pathways (0%). Similarly, hope agency mediates the effect of SFH on LS, but this indirect effect is also weak (–0.135; p = 0.013) and represents only about 20% of the total effect of SFH on LS.

Although these findings indicate that hope agency is only a partial mediator, the indirect effect of SFH on LS through hope agency (in Model 3) is 1.5 times greater than via the overall hope measure (in Model 2) (20% vs. 13%). Taken together, these findings suggest that whatever role hope has as a mediator of the effect of SFH on LS, this mediating effect is mainly through its agency component.

Effects of Sociodemographic and Clinical Covariates

This section summarizes our main findings on the association between socio-demographic covariates and key outcomes: OFH, SFH, hope, hope agency, hope pathways, and LS. **Table 4** presents the standardized coefficients estimating the independent effect of all predictors in each of our three models.

Race/Ethnicity

Ethno-racial identification was not significantly associated with OFH or SFH after controlling for other covariates. Nevertheless, compared to non-Hispanic Whites, those identifying as Black/African American, Hispanic, and other minoritized ethno-racial identities reported significantly higher LS, overall hope, and hope pathways, net of the effect of OFH and SFH. This was also the case for hope agency for Black/African American and Hispanic individuals, but not for participants of other minoritized races/ethnicities. To contextualize the effect of minoritized ethno-racial identities, we estimate that, after adjusting for the effect of OFH and all other covariates, a one-SD higher SFH was associated with a 0.68 SD lower LS, while identifying as Black/African American, Hispanic, and

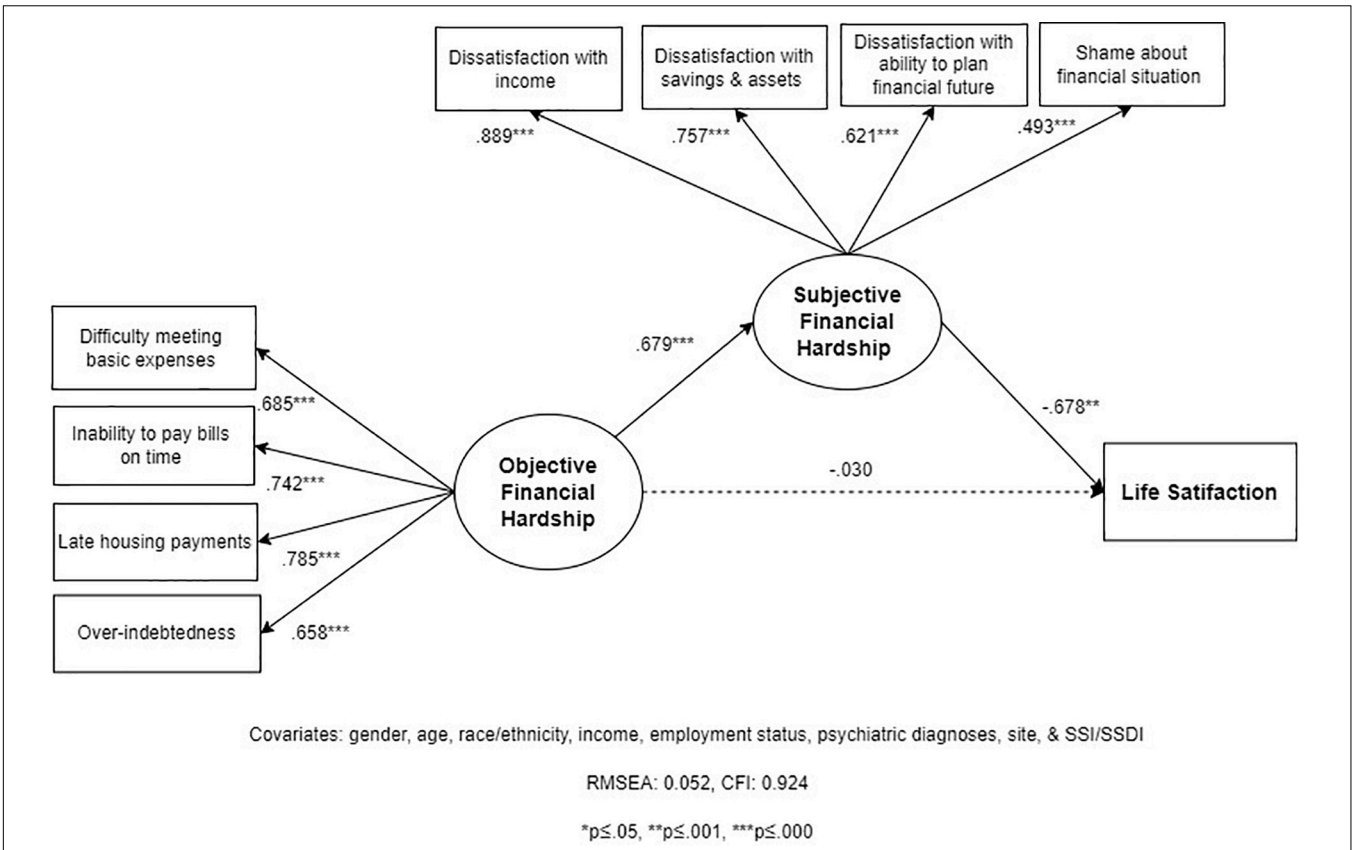

FIGURE 2 | Structural Equation Model 1 (SEM 1): relationships between objective financial hardship (OFH), subjective financial hardship (SFH), and life satisfaction (LS; *N* = 202).

other minoritized ethno-racial individuals was associated with 0.39, 0.32, and 0.65 SD higher LS, respectively (Model 1). These findings suggest that identifying as Black/African American, Hispanic, and other minoritized ethno-racial identities may partly or fully buffer the effect of small differences in OFH and SFH on hope and LS, depending on other covariates. It is noteworthy that in Models 2 and 3, which account for the mediating effect of hope and hope agency, the protective effect of Black or Hispanic ethno-racial identification on LS is noticeable smaller and less significant, in contrast to Model 1, suggesting that part of the buffering effect of minoritized ethno-racial identification may be through increased hope.

Psychiatric Diagnoses

Across all three models, individuals with bipolar disorder, and those with other diagnoses, reported higher OFH than those with schizophrenia-spectrum disorders (by ∼0.70), after adjusting for all other covariates. Diagnosis was not associated with any other mediator or outcome measure in Models 1–3.

Income

Income above poverty level was not significantly associated with OFH. Nevertheless, individuals with incomes above the poverty level reported on average 0.32 SD lower SFH than those with incomes below poverty. Above-poverty income was not associated with hope. However, contrary to our expectations, higher income was associated with lower LS (–0.21) across models, although coefficients for this covariate were only significant at $p \leq 0.10$.

Supplemental Security Income or Social Security Disability Insurance Receipt

Receiving SSI or SSDI was associated with significantly lower (–0.45) OFH, after controlling for other covariates.

New York Region

Respondents in our upstate New York site reported significantly higher (0.43) OFH that their downstate counterparts, net of the effect of individual-level characteristics.

Other covariates did not have a statistically significant association with any of the outcome variables. Most notably, being employed did not have a statistically significant association with OFH, SFH, hope, or LS.

DISCUSSION

This study employed SEM to test, via CFA, measurement models for OFH and SFH in a sample of low-income, ethno-racially diverse, and predominantly unemployed or underemployed

TABLE 3 | Total, direct, and indirect effects for Structural Equation Models 1, 2, and 3 (*N* = 202).

Paths	Total effect	Direct effect	Indirect effect	Percentage of total effect
Model 1				
OFH → SFH → LS	–0.491***	–0.030	–0.461**	93.89%
Model 2				
OFH → SFH → HOPE → LS (All paths)	–0.491***	0.008	–0.499***	100.00%
OFH → SFH → LS	–0.491***	0.008	–0.400**	81.15%
OFH → HOPE → LS	–0.491***	0.008	–0.039	–
OFH → SFH → HOPE → LS	–0.491***	0.008	–0.060*	12.22%
OFH → SFH → HOPE	–0.307**	–0.121	–0.186†	60.59%
SFH → HOPE → LS	–0.678***	–0.590***	–0.088*	12.99%
Model 3				
OFH → SFH → AGENCY + PATHWAYS → LS (All paths)	–0.491***	0.011	–0.502***	100.00%
OFH → SFH → AGENCY → LS	–0.491***	0.011	–0.091*	18.54%
OFH → AGENCY → LS	–0.491***	0.011	–0.043	–
OFH SFH→ PATHWAYS → LS	–0.491***	0.011	0.001	–
OFH → PATHWAYS → LS	–0.491***	0.011	0.001	–
OFH → SFH → LS	–0.491***	0.011	–0.367**	74.75%
OFH → SFH → AGENCY	–0.364**	–0.116	–0.248*	68.13%
OFH → SFH → PATHWAYS	–0.198	–0.129	–0.068	–
SFH → AGENCY → LS	–0.677***	–0.542***	–0.135**	19.94%
SFH → PATHWAYS → LS	–0.658***	–0.542***	–0.001	–

OFH, objective financial hardship; SFH, subjective financial hardship; LS, life satisfaction. †$p \leq 0.10$; *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$.

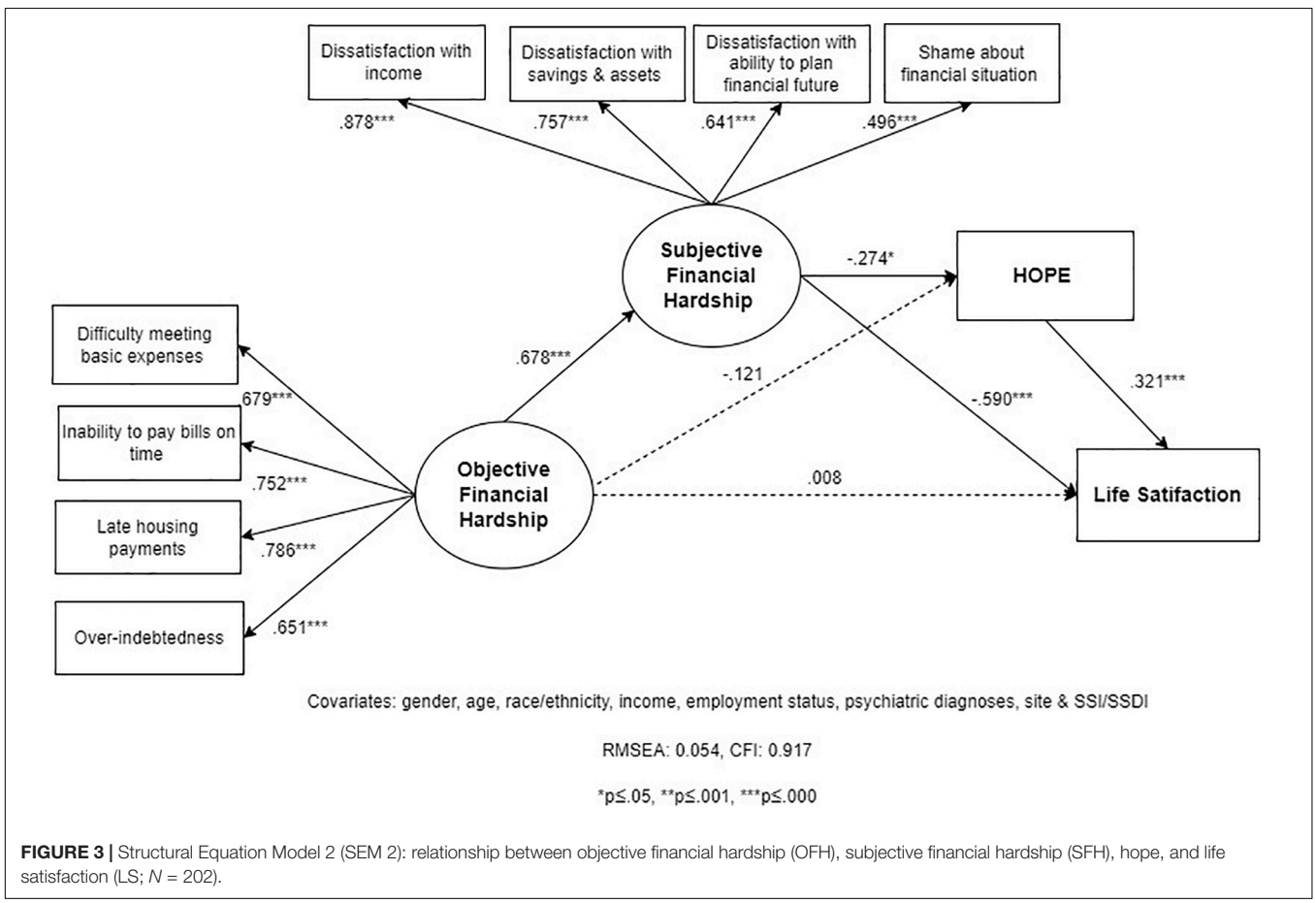

FIGURE 3 | Structural Equation Model 2 (SEM 2): relationship between objective financial hardship (OFH), subjective financial hardship (SFH), hope, and life satisfaction (LS; *N* = 202).

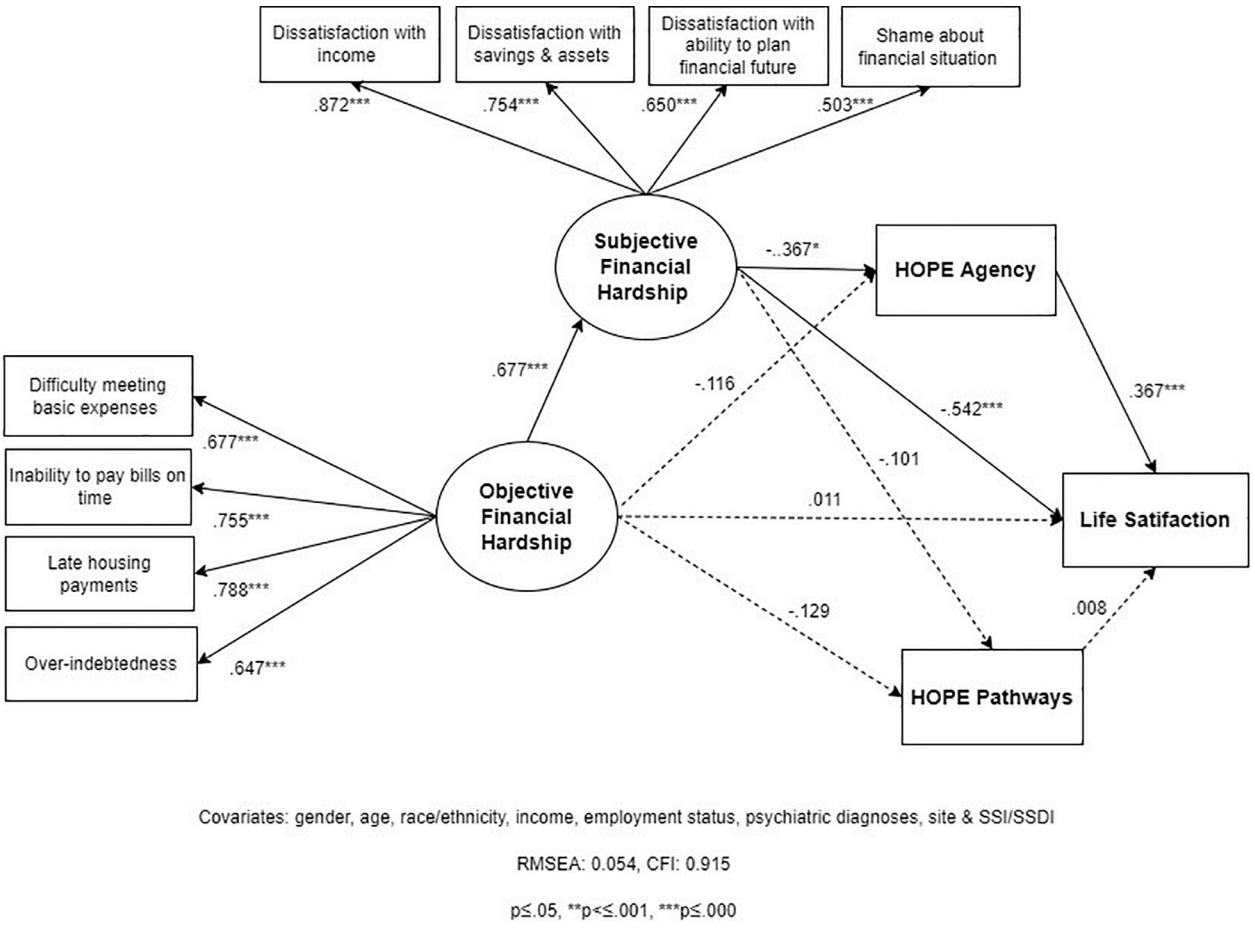

FIGURE 4 | Structural Equation Model 3 (SEM 3): relationships between objective financial hardship (OFH), subjective financial hardship (SFH), hope agency, hope pathways, and life satisfaction (LS; *N* = 202).

adults with psychiatric diagnoses. We hypothesized related but distinct, single factors for OFH and SFH. We also fit three full structural equation models. An initial model examined whether SFH mediates the association between OFH and LS. Two additional models were specified to estimate the extent to which overall hope, and its agency and pathways components, further meditate the effect of SFH on LS. Several conclusions can be drawn from the findings of the structural equation models.

First, confirmatory factor analyses supported our proposed scales for objective and subjective hardship. The hypothesized indicators of OFH and SFH loaded strongly within each factor, and a two-factor model demonstrated improved fit over a one-factor model. Our three full structural equation models provided additional evidence about a two-factor structure. All three models demonstrated acceptable fit and indicators loaded strongly within each factor. Taken together, these findings suggest that the indicators (a) difficulty meeting basic needs, (b) inability to pay bills on time, (c) housing unaffordability, and (d) over-indebtedness comprise a factor that is distinct from the subjective experience of financial hardship. Similarly, the proposed indicators (a) dissatisfaction with one's ability to make ends meet, (b) with savings and assets, and (c) with the ability to plan a financial future, and (d) shame about one's overall financial situation seem to be part of a dimension of financial hardship that is related but separate from more concrete indicators of one's financial situation. These findings are consistent with the robust literature that distinguishes objective and subjective dimensions of the financial hardship experience (13, 87), and finds that indicators of satisfaction with and shame about one's financial situation reflect the subjective experience of concrete financial hardships, such as difficulty meeting basic needs, housing insecurity, and indebtedness (13, 61–65, 88, 89). Future research should examine the validity and reliability of these measures, including their predictive validity in relation to subjective wellbeing and mental health.

A second conclusion from our findings is that while both OFH and SFH have strong effects on LS (0.49 and 0.68, respectively, on a standardized scale), after controlling for potential confounders, the effect of SFH is noticeably stronger. An increase of 1 SD in OFH is associated with a 0.49 SD decrease in LS, while a 1 SD increase in SFH is associated with a 0.68 SD decrease. These findings are consistent with research documenting stronger

TABLE 4 | Standardized coefficients for predictors and socio-demographic covariates (*N* = 202).

	Model 1 (*n* = 202)			Model 2 (*n* = 202)				Model 3 (*n* = 202)				
	OFH	**SFH**	**LS**	**OFH**	**SFH**	**Hope**	**LS**	**OFH**	**SFH**	**Hope agency**	**Hope pathways**	**LS**
Predictors												
OFH		0.679***	–0.030		0.678***	–0.121	0.008		0.677***	–0.116	–0.129	0.011
SFH	–	–	–0.678***	–	–	–0.274*	–0.590***	–	–	–0.367*	0.101	–0.542***
Hope	–	–	–	–	–	–	0.321***					
Hope agency	–	–	–	–	–	–	–	–	–	–	–	0.367***
Hope pathways	–	–	–	–	–	–	–	–	–	–	–	0.008
Covariates												
Black/African American, non-Hispanic	0.261	–0.249	0.390**	0.260	–0.252	0.439*	0.247†	0.260	–0.255	0.469**	0.384*	0.211
Hispanic	–0.082	–0.280	0.317†	–0.082	–0.285	0.517**	0.147	–0.082	–0.287	0.434*	0.472*	0.148
Other race/ethnicity	0.151	0.169	0.649**	0.149	0.162	0.532*	0.473*	0.148	0.158	0.419	0.527*	0.482*
Bipolar	0.692***	0.189	0.150	0.694***	0.192	0.184	0.093	0.696***	0.193	0.225	0.144	0.070
Other diagnoses	0.696***	–0.112	0.023	0.697***	–0.112	0.224	–0.048	0.698***	–0.112	0.307†	0.073	–0.089
Female	0.195	0.038	0.171	0.192	0.040	–0.108	0.206	0.191	0.042	–0.040	–0.145	0.188
Age	0.105	0.110	0.071	0.104	0.111	0.037	0.059	0.104	0.111	–0.004	0.087	0.072
High school or higher	0.270	0.145	–0.097	0.267	0.148	–0.138	–0.052	0.266	0.148	–0.009	–0.212	–0.092
Employed	–0.171	–0.124	–0.041	–0.171	–0.121	–0.144	–0.008	–0.170	–0.120	–0.170	–0.001	–0.025
Above poverty	–0.038	–0.318*	–0.214†	–0.037	–0.317*	–0.021	–0.206†	–0.037	–0.317*	–0.017	–0.013	–0.206†
SSI or SSDI receipt	–0.445*	–0.103	0.040	–0.446*	–0.099	0.032	0.032	–0.446*	–0.097	0.133	–0.140	–0.004
Upstate	0.425**	–0.192	0.036	0.425**	–0.192	0.142	–0.010	0.425**	–0.191	0.192	0.108	–0.035
Model fit statistics												
RMSEA	0.052			0.054				0.054				
CFI	0.924			0.917				0.915				
TLI	0.887			0.867				0.854				

OFH, objective financial hardship; SFH, subjective financial hardship; LS, life satisfaction. †$p \leq 0.10$; *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$.

associations between LS and SFH indicators, relative to measures of OFH. In fact, the strength of the association between SFH and LS found in our study echoes magnitudes found in prior research (20, 21). For some individuals, experiencing OFH may not translate into lower LS. Their subjective experience of OFH may be buffered by a sense of social support, self-efficacy, and other internal and external protective factors. Thus, SFH may be closer in the causal pathway toward LS and mediate the effect of OFH on LS. This brings us to a third conclusion from our findings: SFH mediates almost all (94%) of the effect of OFH on LS. In models that integrate overall hope, hope agency, and hope pathways, SFH by itself still mediates most of the effect (at least 75%). These findings are consistent with extensive research indicating that SFH mediates a significant proportion of the effect of OFH indicators on LS. Lacking cash to meet basic needs, inability to pay bills, indebtedness, and overall financial hardship seem to create dissatisfaction with one's financial situation, a sense of loss of financial control, feelings of threat, and shaming experiences, which, in turn, lower individuals' sense of satisfaction with life (35, 59, 60, 63).

Our two-level mediation models, which incorporate SFH, overall hope, and the two hope components, support a fourth and important conclusion. Decreased overall hope partially mediates the effect of SFH on LS, but this indirect effect is modest (B = –0.09 SD) and represents only 13% of the total effect on LS. The indirect effect of SFH through hope agency is slightly larger but still modest (B = –0.14) and equivalent to only 20% of the effect. The indirect effect via hope pathways nears zero. Thus, SFH has a strong and independent effect on LS beyond its effect through hope. SFH alone mediates most of the effect of OFH on LS, with a moderate indirect effect between B = –0.37 and B = –0.40 depending on the model (representing 75–81% of the total effect of OFH). Our findings are consistent with recent literature indicating that hope only partially mediates the relationship between financial hardship and LS (63, 67). We are unaware of any previous study testing a two-level mediation model to examine the relationships between OFH and SFH, hope, and LS.

These findings also suggest that hope agency may be a more relevant hope component in the relationship between SFH and LS than hope pathways. Our two-level mediation model that estimates the disaggregated mediating effect of hope agency and pathways (Model 3) shows that the association between SFH and LS is partly mediated by hope agency, but not pathways. This finding is consistent with prior research showing the stronger mediating role of agency, relative to pathways, on the relationship between income and LS (66). More generally, prior research has found that agency is a stronger predictor of subjective wellbeing, relative to pathways, which suggests that the belief that one is able to achieve personal goals may be more instrumental to LS than the perception that there are routes for doing so (66, 71). This finding is also supported by research suggesting that agency, and not pathways, mediates the effect of positive affect on LS (90). Even in the face of multiple barriers to one's goals (or the perception that there are few routes to achieving them), the belief that one is capable of pursuing and staying motivated to pursue these goals may still produce a greater sense of wellbeing (72). This may be an encouraging finding, as it suggests that it may be possible to foster subjective wellbeing by building a sense of agency, even if individuals lack a clear sense of the specific paths toward their goals.

Our models also provide exploratory evidence regarding the association between socio-demographic and clinical covariates and key outcomes. Most notably, we find no statistically significant differences in OFH or SFH across ethno-racial groups. This is unexpected given economic inequities across these groups at the population level (91, 92). In contrast, across models, identification as Black/African American, Hispanic, and other minoritized ethno-racial identities was associated with noticeably higher overall hope, agency, pathways, and LS, relative to non-Hispanic Whites, net of the effect of OFH and SFH and other covariates. Taken together, these findings suggest that minoritized ethno-racial identification may play an important role in buffering the effect of OFH and SFH on LS, which is consistent with prior research. Among Blacks/African Americans, for instance, a greater sense of self-worth, mastery, and family supports seem to buffer the effect of financial stress on psychological wellbeing (93).

The stronger sense of agency and pathways, and more positive evaluation of life, among Blacks/African Americans, Hispanics, and those identified with other minoritized ethno-racial groups may also result from ethno-racial/cultural differences in social support, faith, and salience of social comparison (94–97). For instance, Black individuals tend to report higher levels of religiously or spiritually inspired hope than non-Hispanic Whites (98). It is also possible that the role of social expectations or social comparisons may be stronger among non-Hispanic Whites than these two minoritized groups. For non-Hispanic Whites who grow up with expectations of middle-class living and economic advancement, the reality of a disabling condition and financial exclusion may present greater challenges to one's goals and have a greater impact on overall LS (99).

Although research about the association between psychiatric diagnoses and financial hardship is scarce, our finding that individuals with schizophrenia-spectrum disorders report lower OFH than people with other conditions is unexpected. Since individuals with schizophrenia-spectrum diagnoses are more likely to experience long-term disability than people with other psychiatric diagnoses (100–102), they may be also more likely to experience unemployment, underemployment, dependency on disability benefits, and financial hardship (103, 104). Instead, in this study, people with schizophrenia-spectrum disorders report a B = 0.7 SD lower OFH than individuals with other diagnoses. It is possible that individuals with bipolar disorder may be especially vulnerable to experiencing financial instability because of their psychiatric conditions. For instance, psychological traits more common in bipolar disorder, such as compulsive spending, "comfort" purchasing, and inattention to financial matters, may contribute to increased financial difficulties in this population. Compulsive spending may increase indebtedness, while "comfort" purchases may misdirect limited funds and compromise individuals' ability to meet basic needs (105–107). Nevertheless, this would not seem to explain why individuals with other diagnoses (e.g., major depression, anxiety disorders, personality

disorders) also report more difficulties making ends meet, inability to make timely payments on bills and housing, and indebtedness.

A likely, but paradoxical, explanation for the lower OFH reported by respondents with schizophrenia-spectrum disorders, relative to other diagnoses, may be their higher likelihood of experiencing long-term disability. People with schizophrenia-spectrum diagnoses are more likely to depend on SSI/SSDI than people with other disorders. In our sample, for instance, people with schizophrenia-spectrum conditions were more likely to receive SSI or SSDI (90% vs. 58%, $X^2 = 19.20$; $p = 0.000$) and less likely to receive TANF (18% vs. 31%, $X^2 = 3.74$; $p = 0.055$) than those with other diagnoses. Although the cash benefits provided by SSI/SSDI are generally poverty-level, these social security disability programs offer a stable source of income to meet basic needs. TANF, a program that provides cash assistance to low-income families, is designed as temporary support, capped to a lifetime maximum of 60 months, and includes work requirements. For people with long-term disabilities, SSI/SSDI provide a source of more permanent income – a safety net that people with schizophrenia-spectrum disorders may be more likely to receive. A second, seemingly paradoxical, explanation for this relationship with lower OFH may involve the greater financial exclusion of individuals with schizophrenia-spectrum disorders. Our measure of OFH presupposes a minimum level of financial engagement, such as having rent payments, bills, and debts. It is possible that people with schizophrenia-spectrum disorders are less likely to endorse some of these indicators because they lack access to loans or credit cards, or because they do not have housing or utility bills that they are directly responsible for. It is also possible that study participants with these conditions may receive, on a long-term basis, community mental health services (e.g., case management) ensuring some of their basic needs. A sign of the financial exclusion of people with schizophrenia-spectrum disorders in our sample is their greater reliance on representative payees – individuals designated to receive SSA payments and make financial decisions on behalf of SSI/SSDI recipients. Among study participants with SSI/SSDI, individuals with schizophrenia-spectrum disorders were more likely to have a representative payee compared to those with other diagnoses (40% vs. 25%; $X^2 = 3.25$; $p = 0.07$). Representative payees may ensure that an individual's bills and basic needs are addressed. Individuals with a representative payee may also be less aware of their financial situation and thus underreport financial difficulties.

Our models indicate that employment status was not significantly associated with OFH, SFH, hope, or LS in our sample. Although initially surprising, given the extensive literature on the benefits of employment for subjective wellbeing (49, 108), the observed relationships must be understood in the context of the likely employment conditions and overall financial situation of this population. In our study, although paid employment was associated with significantly higher income relative to unemployment, employed participants' income was still extremely low. All individuals who engaged in paid employment reported incomes below 200% FPL for a household of one (results not shown). In addition, over two-thirds of employed individuals reported only part-time employment. From an objective financial perspective, paid employment in this population may bring additional income but not be sufficient to lessen financial hardship. It is also likely that the types of jobs held by study participants may not provide the psychological benefits expected from employment, since underemployed individuals like those in our study tend not to report better LS than unemployed persons (54). Also notable was that the subsample of individuals with incomes above the poverty level did not report lower OFH, contrary to general-population findings of greater OFH among lower-income individuals (109). As in the case of employment/underemployment, this may be due to the limited range of incomes in our sample: even those reporting the highest incomes would be considered low-income by broader economic standards. However, study participants with incomes above the poverty level reported significantly lower SFH (about 30% lower than those with lower incomes). This suggests that, although slightly higher incomes may not affect OFH indicators, they may be enough to improve individuals' satisfaction with their financial situation, possibly by lessening their finances-related shame and providing a more positive outlook on their financial future.

In summary, OFH was a stronger predictor of SFH, hope, and LS than individual income or employment status. Unlike income and employment status, OFH had a strong effect on SFH, a moderate-to-strong effect on LS, and a weak-to-moderate effect on overall hope. Taken together, these findings are consistent with research indicating that financial hardship may be a stronger predictor of subjective wellbeing than income, and that low income may lose its independent effect on LS after accounting for financial hardship (20, 21).

Across all models, the New York upstate site reported significantly higher OFH than the downstate New York site. This finding may reflect the impact of ecological factors associated with the sites' geographic areas and where participants were likely to reside. The upstate site is located in a mid-size city that is less economically vibrant than our downstate site and surrounded by zip codes where ∼30% of residents live in poverty. Most upstate participants were Black/Hispanic and probably more likely to reside in racially segregated and low-resource neighborhoods. By contrast, our downstate site is in a large, economically vibrant metropolis, surrounded by zip codes with poverty levels below 10%, and more ethnically diverse. It is likely that each geographic area provides different access to economic opportunities and resources that operate through ecological and individual-level factors not accounted for in our models. As such, coefficients for our site variables may be a proxy for the effect of ecological-level factors.

Research Contributions and Implications

Study findings contribute to the literature on financial hardship, hope, and LS among unemployed and underemployed individuals with psychiatric diagnoses in several ways. First, this study may be the first to provide preliminary evidence of the relationships between OFH, SFH, hope, and LS in this population. Future research should clarify the mechanisms through which OFH erodes the subjective wellbeing of people with psychiatric diagnoses. Information on mechanisms of

action would inform the development of effective interventions in tandem with supported employment supports to foster the financial wellbeing in this population, buffer the impact of financial difficulties on their mental wellbeing, and ultimately avert further mental health decline. A second contribution involves the finding of a potentially buffering effect that ethno-racial self-identification may play on the impact of financial hardship on LS. Future research should examine the relationship between racialized identities, OFH, SFH, hope and LS to inform interventions for communities likely to experience the compounded effect of poverty, racism, and social exclusion.

Thirdly, this study contributes more generally to research on the mediating role of subjective experience on the relationship between objective indicators of financial hardship and LS. While research has consistently shown that subjective measures of financial wellbeing have a stronger relationship with LS than objective measures (13, 55, 56), some studies seem to take this to mean that OFH is irrelevant. For instance, in their study about financial hardship, hope, and psychological wellbeing, Frankham and colleagues seem to conclude that OFH is not in the causal pathway because its association with psychological wellbeing is no longer significant after controlling for SFH (63). Consequently, their study excludes OFH from the mediation analyses, missing the opportunity to simultaneously explore the relationships between OFH and SFH, hope, and wellbeing. In our view, objective and subjective dimensions of financial hardship should not be considered as opposing or competing explanatory factors. Instead, both objective and subjective measures should be integrated within the same causal models. Future research should leverage theories and methodologies to conduct more conclusive empirical research in this area.

Implications for Practice

Our findings suggest that economic empowerment interventions that are effective at reducing OFH and SFH among individuals with psychiatric diagnoses may meaningfully improve their LS. Financial empowerment interventions should integrate specific strategies to lessen OFH across specific areas, such as difficulty meeting basic needs or paying bills on time, housing unaffordability, and over-indebtedness. This should include support accessing and navigating financial wellness resources that are often unfamiliar to people with psychiatric conditions and their providers, such as the Earned Income Tax Credit, the Child Tax Credit, free financial counseling services, free tax preparation assistance, housing eviction prevention programs, and a host of work incentives for individuals receiving SSI or SSDI. Supported employment programs may be an opportune context in which to integrate economic empowerment interventions, as individuals engaged in those programs may be especially motivated to address objective and subjective financial stressors. Financial empowerment interventions should also incorporate strategies to buffer the stress associated with their financial difficulties. For instance, interventions should build shame-resilience skills around financial difficulties, such as recognizing when one is ashamed, identifying what triggers this feeling, and seeking empathy and support (110, 111). These strategies may include activities that build financial shame resilience led by trained peer specialists, whose lived experience provides a unique source of empathy and trust-building (112, 113).

Strategies to concurrently reduce OFH and SFH while fostering hope may also be important in promoting subjective wellbeing. This study shows that hope, and specifically its agency component, has a weak-to-moderate association with LS, even after accounting for the effect of OFH and SFH. By promoting hope, interventions may help buffer the impact of OFH and SFH and foster the subjective wellbeing of unemployed and underemployed individuals with psychiatric diagnoses. This finding may have important implications for practice in psychiatric rehabilitation and peer services. Hope is widely recognized as an important predictor of mental health recovery (114) and research has demonstrated that hope is the most consistent evidence-based outcome of peer services (115–117). Nevertheless, to promote hope most effectively, psychiatric and peer services must clearly define this construct, operationalize its components, and devise sensible strategies that tap into the strengths of rehabilitation and peer-led interventions.

To build agency, for instance, programs could focus on activities that increase self-efficacy and optimism. Self-efficacy, the belief that one can take the action required to achieve a desired outcome (118), can be developed over time and influenced through various experiences, such as personal successes, observation of others' behaviors and successes, and the encouragement of others (119). Interventions can also build optimism – defined as an individual's thoughts and feelings about a positive future – to garner the many benefits of optimism, including higher levels of subjective well-being, increased health, and greater success in multiple domains of life (114). Both self-efficacy and optimism have been found to positively impact LS (115, 116). Strategies to build self-efficacy, optimism, and overall agency may include sharing personal stories of financial empowerment, supporting individuals to develop concrete financial wellness action plans, and fostering mutual support. Such strategies may not only buffer the impact of OFH and SFH on subjective wellbeing, but also improve the engagement of individuals in their financial empowerment journeys.

Our findings also add to growing evidence about the role of financial hardship as a social determinant of mental health (117, 120). As such, our findings support the case for policy-level interventions aimed at reducing financial hardship, such as expanding access to affordable financial services, tax credits, housing and food supports, and financial counseling (121, 122).

Addressing financial hardship as a social determinant of mental health and wellbeing requires that mental health policy work in tandem with economic policy. Mental health policy ought to expand service structures and funding to support economic empowerment interventions, and economic policy should include specific features to engage and respond to the needs of individuals with psychiatric diagnoses.

Cross-sectorial collaborations may be especially effective at tackling financial hardship as a root cause of poor mental health. In the United States, for instance, a growing number of municipal governments, with the support of the coalition Cities for Financial Empowerment, fund free financial counseling services for their residents as an economic development strategy.

Local government initiatives to improve mental health and wellbeing may be most effective if implemented in coordination with such economic empowerment efforts. Other examples of cross-sectorial collaborations include policy initiatives in the United Kingdom that would provide a debt repayment moratorium – 'breathing space' – for individuals experiencing a mental health crisis and regulate debt collection practices to minimize their psychological impact (123, 124). Future research should examine the feasibility and efficacy of these types of initiatives.

Limitations and Future Directions

Our study has several limitations. The small sample size may have limited our ability to detect effects and biased our estimates. Therefore, our findings should be regarded as exploratory, and null effects should be interpreted with caution. The self-reported nature of OFH indicators may have introduced a level of measurement error. Hence, our findings should be regarded as approximate. Nevertheless, studies have found that self-reported measures of financial hardship can adequately predict observed financial indicators (e.g., actual debt amounts, payments) (125), and that measurement error associated with self-reported indicators does not explain differences in financial hardship across groups (126).

Our data are cross-sectional, which prevented us from establishing temporal relationships between variables in our SEM estimates and to employ statistical methods to approximate causality, such as fixed effects. Future research should examine the causal relationships between financial hardship, hope, and LS over time with larger samples. It would be especially important to better examine the direction of causality since research has documented the bidirectional relationship between OFH and mental health outcomes (15, 22, 23), as well as between LS and mental health (44). This could be accomplished by relying on robust research methods, including panel designs, estimation of fixed effects only based on within-person variation, and controlling for reverse causation (127, 128).

Data for this study were obtained from a convenience sample of individuals with psychiatric diagnoses seeking employment. Furthermore, people seeking employment are less likely to experience high levels of impairment, relative to people with psychiatric diagnoses not seeking employment. Hence, our findings are not necessarily generalizable to all people with psychiatric diagnoses. Nevertheless, given our high response rate and diverse sample (e.g., psychiatric diagnoses, racial/ethnic identities), our key findings may be applicable to individuals with psychiatric diagnoses in publicly funded supported employment programs.

This study utilized the Adult Hope Scale, which is considered a measure of trait or dispositional hope. It is theorized to be a relatively stable indicator associated with long-lasting personality traits (68). Research suggests that hope, experiences of goal attainment, and the environment are likely to interact, such that "trait" hope may increase in response to new experiences of success in achieving goals and environments perceived as conducive to this effect (129). Nevertheless, it is likely that the estimates in our study may be significantly different from those obtained from a "state" measure of hope (e.g., State Hope Scale), which may be more responsive to situational changes. By relying on the Adult Hope Scale, our study may have underestimated the relationships between hope, its components, OFH and SFH, and LS. Future research should examine the mediational paths explored in this study utilizing hope measures that may be more sensitive to change over time as well as those that tap into emotional dimensions of hope such as the Herth Hope Index (120).

Our finding about the weak and non-significant mediating role of hope pathways may have been biased by our study's assumption that hope agency and pathways are contemporaneous and correlated, but do not have a causal effect on each other. If hope agency or hope pathways mediated the effect of the other on LS, when introduced as predictors in the same equation, the effect of the causal factor would be diminished or eliminated. The overall evidence in our study, however, suggests that the pathways component of hope is not likely to play a role as mediator, since the bivariate association between OFH and hope pathways is very weak and not statistically significant. Nevertheless, future research should explore the temporal and theoretical relationship between agency and pathways.

Regarding our estimates about the effects of covariates on OFH, it must be noted that diagnoses in our study were self-reported and relied on the person's recall over their full lifetime, possibly leading to measurement error. It is also possible that diagnosis may be associated with unobserved characteristics predisposing to OFH. Thus, our findings on the effect diagnoses on OFH should be considered preliminary and in need of confirmation. Limited statistical variability in income and employment status in our relatively small sample, in addition to our broad economic measures, may have limited our ability to detect associations between income and employment with other psychological wellbeing outcomes. For instance, there was a small non-significant effect of employment status on OFH (B = –0.17 SD), which may have been detected with more statistical power. In addition, our income measure may not fully reflect the resources available to an individual. We could not obtain reliable data on household income for a substantial proportion of respondents. Hence, we relied only on individual income and not household income, which may be more predictive of OFH and its effects on psychological wellbeing (130).

CONCLUSION

Taken together, our findings provide evidence about the strong effect of objective and SFH on the LS of unemployed and underemployed individuals with psychiatric diagnoses. Our findings especially underscore the role that the subjective experience of financial hardship, as well as the agency component

of hope, play as mediators of the relationship between OFH and LS in this population.

Effective economic empowerment interventions to address financial hardship as a social determinant of mental health require integrated strategies to tackle objective and subjective dimensions alike. Interventions should include strategies that improve the subjective experience of financial hardship, for example, by fostering financial satisfaction and reducing financial shame. This study also highlights the importance of building financial agency, which may include strategies to enhance self-efficacy and optimism about one's financial future. Peer-led interventions are especially well positioned to build financial agency, since research has consistently shown that hope is an evidence-based outcome of peer-led interventions. Interventions must also integrate strategies and approaches that address objective indicators of financial hardship, such as the inability to meet basic needs, housing unaffordability, and indebtedness; these include professional financial counseling to alleviate indebtedness and build credit and services to meet basic needs (e.g., housing, food). Supported employment programs, such as evidence-based Individual Placement Support programs (131), ought to consider integrating economic empowerment strategies in tandem with employment and clinical supports.

Future research should examine the relationships between OFH and SFH, hope, LS, and subjective wellbeing on larger samples using longitudinal designs that can better establish causal and dynamic effects. Future research should also develop and test the feasibility, acceptability, and efficacy of interventions that integrate supports to address objective and subjective dimensions of financial hardship.

DATA AVAILABILITY STATEMENT

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the New York State Psychiatric Institute, Columbia Irving University Medical Center. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

OJ-S: study design, data collection oversight, analysis plan, data analysis, and final draft. RP: literature review, analysis plan, data interpretation, framing discussion, tables, figures, and final draft editing. IM: data cleaning and initial data analysis, initial drafts. MW: senior oversight of data analysis and SEM expert advice, methods section, and final draft editing. HG: statistical advice, methods section, and final draft editing. PM-B: data analysis plan and data interpretation. PM-B, TL, MK, and LV: study and survey design, final draft editing. MS: study design and final draft editing. AC: literature review and final draft editing. EJ: hope theory, data interpretation, discussion and implications for practice, and final draft editing. TL and MK: supervised fieldwork, implications for practice, and final draft editing. LV: participant recruitment and interviews, final draft editing. RL-F: senior research oversight, data analysis plan, data interpretation, framing discussion, and final draft editing. All authors contributed to the article and approved the submitted version.

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EDITED BY
Heather Brown,
Lancaster University, United Kingdom

REVIEWED BY
Paolo Giudici,
University of Pavia, Italy
Bing Xiang Yang,
Wuhan University, China

*CORRESPONDENCE
Johnna Blair
jlb883@psu.edu

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Financial technologies (FinTech) for mental health: The potential of objective financial data to better understand the relationships between financial behavior and mental health

Johnna Blair[1]*, Jeff Brozena[1], Mark Matthews[2], Thomas Richardson[3] and Saeed Abdullah[1]

[1]College of Information Sciences and Technology, Penn State University, State College, PA, United States, [2]School of Computer Science, University College Dublin, Dublin, Ireland, [3]School of Psychology, University of Southampton, Southampton, United Kingdom

Financial stability is a key challenge for individuals with mental illnesses. Symptomatic periods often manifest in poor financial decision-making including compulsive spending and risky behaviors. This article explores research opportunities and challenges in developing financial technologies (FinTech) to support individuals with mental health. Specifically, we focus on how objective financial data might lead to novel mental health assessment and intervention methods. We have used data from one individual with bipolar disorder (BD) (i.e., an $N = 1$ case study) to illustrate feasibility of collecting and analyzing objective financial data alongside mental health factors. While we have not found statistically significant trends nor our findings are generalizable beyond this case, our approach provides an insight into the potential of using objective financial data to identify early warning signs and thereby, enable preemptive care for individuals with serious mental illnesses. We have also identified challenges of accessing objective financial data. The paper outlines what data is currently available, what can be done with it, and what factors to consider when working with financial data. We have also explored future directions for developing interventions to support financial well-being and stability. Furthermore, we have described the technical, ethical, and equity challenges for financial data-driven assessments and intervention methods, as well as provided a broad research agenda to address these challenges.

KEYWORDS

mental health, financial technologies, open banking, FinTech, impulsive spending, privacy-preserving, intervention

1. Introduction

Mental illness is a serious public health crisis on a global scale. It affects more than one billion individuals (1). This results in significant economic consequences, with an estimated total annual cost of $2.5 trillion globally (1). This growing issue impacts many facets of daily life, including a strong association between mental health and financial

instability. Individuals with mental health issues are more likely to live in relative poverty (2, 3). Symptoms of some illnesses can also manifest in poor financial decision making. More specifically, bipolar disorder (BD) appears to be linked with greater risk of impulsive financial behaviors—the diagnostic criteria for hypomanic and manic episodes specifically lists impulsive spending as possible symptoms (4). Those with BD are at greater risk of problem gambling (5), and 71% report impulsive spending whilst hypomanic (6). This impulsive spending has also been shown to be linked to negative feelings and subsequent comfort spending (7, 8). As this illustrates, there is often a cyclical and bidirectional relationship between financial stability and mental health—financial instability can worsen mental health, which in turn, can cause further financial challenges, leading to a vicious cycle (7–10).

The lack of access to objective financial data has been a key challenge in understanding the nuanced relationship between mental health and financial behaviors. Prior studies have mostly used surveys (2) and focus group interviews (10) to assess financial behaviors associated with serious mental illnesses. This means that much of what we know about this relationship is mediated through subjective methods that may be prone to bias and retrospective recall error. For example, Richardson et al. (8) measured self-reported compulsive spending in BD, rather than objective data on spending patterns. While this provides a useful broad overview, there remains a knowledge gap regarding how idiosyncratic, context-driven, and illness-specific factors impact financial decision making and stability of an individual living with mental illness. Furthermore, the lack of granular, *in-situ* assessment methods is a key barrier against developing just-in-time, adaptive, and personalized interventions focusing on financial stability for this population. Given the importance of financial well-being for mental health, this remains a serious knowledge gap with broad practical implications.

In recent years, there has been considerable progress toward more open and accessible financial data. Financial institutes are increasingly adopting open banking application programming interface (API) mandating access to accounts, payments, and transactions. There have also been third-party tools and platforms [e.g., Plaid (11)] that enable access to financial data across a broad range of institutes. We argue that the granular and (near) real-time access to individual financial data can lead to a paradigm shift in the domain of financial well-being and mental health. That is, it can provide a unique opportunity to explore the nuanced relationship between money and mental health, uncover new financial patterns indicative of early-warning signs, and develop preemptive interventions to support healthier financial decisions.

However, there are considerable challenges before we can achieve this vision of financial technologies (FinTech) to effectively support mental health. Specifically, there is a need to identify potential features and analytical methods that can leverage financial behavioral data to identify early-warning signs and opportune moments for intervention delivery. It will also be essential to design effective interventions that balance the need for personal agency and long-term financial stability. Addressing privacy concerns will be critical given the sensitive nature of the data—a recent survey of those with BD found that 97.5% used smartphone apps but concerns about privacy were common (12). Individuals with mental illnesses might need support from others (e.g., family members) to make sustainable financial decisions. As such, the assessment and intervention methods should focus on shared, collaborative financial decision making.

Toward this broad research vision, we make the following contributions for future FinTech development:

- Discuss the potential for technology to serve as a useful way to map the link between finances and mental health and identify personalized warning signs indicating mental health issues.
- Use a $N = 1$ case study with financial data from an individual with BD to illustrate the opportunities and technical challenges for collecting and using objective banking data in mental health contexts, such as data access and data quality.
- Lay the landscape for future research on the potential intervention strategies and ethical challenges for using objective data in the financial mental health domain.

2. Related work

2.1. Financial behaviors related to mental health

Mental health issues can lead to problematic financial behaviors. For instance, those with BD have reported often avoiding finances and finding it hard to plan especially when depressed (7). Depression has also been linked with cognitive impairments such as in attention, working memory, and problem solving (13), all of which have the potential to impact financial capability. In BD, problematic financial behaviors including impulsive spending have been linked to impulsivity, low self-esteem, and thoughts around achievement and dependency on others (14, 15). This combination of purchasing behaviors related to manic and depressive mood episodes can have a significant impact on long-term personal finances. In the following section, we discuss prior work establishing problematic financial behaviors in relation to mental health conditions like BD. These spending behaviors are often interrelated and can take on a cyclical pattern (15).

2.1.1. Non-purchasing behaviors

Many mental health conditions come along with decision-making challenges, memory difficulties, and avoidance

behaviors that can have an impact on finances (13, 16). Memory or attention challenges which are common with some mental illnesses (e.g., depression, BD) can make it difficult to remember important deadlines or due dates (13). Without significant support or reminder systems, individuals may miss these deadlines and face overdue bills or late fees that negatively impact their finances. Different avoidance behaviors can affect financial decisions as well. Some may find it difficult to make a decision or feel anxious when presented with too many options (17), so they may choose to put off making imperative financial decisions. Poor perceived financial wellness can increase stress and anxiety about finances, which can then lead to avoidance of financial matters and ultimately making their financial situation worse (15). Some may avoid acting on their finances entirely, like in cases of debt-related stress, which can also lead to overdue bills. If this avoidance results in neglecting to review banking balances, this can lead to negative outcomes, such as overdrawn accounts (18). All these behaviors, though not focused directly on spending money, can make managing finances and budgeting even more difficult.

2.1.2. Compulsive spending

One of the leading issues in the context of mental health and money is compulsive spending, which is commonly reported in BD (10) This can be a standalone condition or a symptom of other conditions like BD, creating further challenges to mental well-being. Compulsive buying, which can often present during manic mood episodes of BD, is an intense, irresistible need to spend beyond what is necessary, and in many cases beyond one's financial means (19). This can occur despite the emotional distress it may cause, limited funds, or a lack of actual need for the items purchased. Like other addictive behaviors, the amount of spending or the size of purchases may escalate over time as one needs more to feel the same level of outcome. For many, it is the desired part of a dopamine loop and a distraction from negative feelings (19). While these purchasing habits may have temporary and fleeting positive outcomes for the individual, they can create increased feelings of regret, guilt, and even suicidality in the long-term (7). Not only can they affect personal finances, but can also become a stressor in relationships and other parts of their life. This shame and disappointment associated with spending may then be followed by additional spending (15).

2.1.3. Symptom-specific spending

Other BD symptoms can manifest in the types of purchases individuals choose to make. These include impulsivity, risk-taking behavior, goal-directed activity, and comfort spending. Whereas, compulsive spending is a drive to spend money for various reasons, *impulsive spending* is a momentary decision to make a purchase (20). Manic mood episodes in BD can result in high levels of impulsivity, as well as difficulty delaying gratification (4, 20). This can lead individuals to make quick decisions with money without considering the consequences of those decisions (14). Increased *risk-taking behavior* is another common costly symptom that manifests in financial decisions (6, 20, 21). These financial decisions could be perceived as high-risk, high-reward opportunities (e.g., investments or risky business ventures) that individuals jump into quickly, which can negatively impact finances in the long term (21) and increase regret and feeling of guilt (6). Some may also see an increase in *goal-directed activities*, where they are very focused on completing tasks toward a specific project or multiple big ideas (4). Those with BD tend to have ambitious goals linked to manic symptoms (22), and cognitions around achievement predict more spending (15). This can be activities like starting a new business or learning a new hobby, which often include many upfront costs to support.

On other occasions, depressed mood episodes may give way to *comfort spending* (7). These purchases are made as an attempt to change one's mood state or to give themselves something to look forward to in the future (7). This may also take the form of charity or gifts for others, rather than a purchase for themselves. In this case, this can be seen as improving their mood or reducing guilt about their purchases by being generous to others (15). Research with BD found that symptoms of depression, stress, and anxiety increased impulsive spending over time, linked with this theme of "comfort spending" as an outcome (7, 8). A model based on BD by Richardson et al. (15) suggests an interpersonal vicious cycle where regret and guilt from impulsive or high-risk spending leads to worries about others and excessive generosity as a way to cope with this, thus fueling more spending. This suggests that these symptom-related behaviors can be connected. Additional research involving real-time purchasing data could help uncover other relationships and driving factors between different types of spending behaviors.

2.1.4. Patterns of spending

Previous work has provided insight into the different goals and drivers behind spending in the context of BD, less is known about the specific patterns that may exist in these spending behaviors. For some, impulsive spending may result in a single high-dollar purchase (6, 20). Others may experience spending sprees or bursts of many items purchased within a narrow window of time, as is common with BD (4). While these temporal bursts of spending have been explored in regards to individual psychological traits [e.g., neuroticism (23)], however spending patterns in relation to symptoms of mental illness have been under-explored. Our current understanding of how spending temporally presents in relation to symptoms still lacks the depth needed to help predict these behaviors and develop personalized interventions to provide preemptive support.

While previous studies have resulted in valuable insights on how symptoms can manifest in specific financial behaviors,

they might not lead to the complete picture given their reliance on self-reported perceptions of individual's own behaviors. In other words, self-reported data can suffer from incomplete recall and other biases, particularly during symptomatic periods. Being able to access objective personal financial data can help to address this issue. That is, we can use granular and objective financial data spanning symptomatic and non-symptomatic periods to identify idiosyncratic patterns indicative of problematic financial behaviors. However, there are considerable challenges in accessing objective financial data. In the following section, we discuss strategies and highlight these challenges using a $N = 1$ case study in accessing financial data from an individual with BD.

3. Financial behaviors and bipolar disorder: $N = 1$ case study

As previous research illustrates, the relationship between mental health and money is highly complex and nuanced. In this paper, we focus on BD and spending behaviors as an example case to investigate this further. Symptoms related to BD impact several facets of daily life, including personal finances. Bipolar disorder is typically characterized by cycling between the highs and lows of manic and depressive mood episodes. A depressive mood episode often includes severe feelings of sadness, low-energy, indecisiveness, and poor concentration (4). Conversely, manic mood episodes often feature feelings of euphoria, increased energy, high activity, risk-taking behaviors, impulsivity, and a decreased need for sleep (4).

These different mood episodes provide a framework to better understand the relationship between mood and money and the spending patterns that present during different mental health contexts more broadly. This can also inform the ideal points for intervention to help support healthy financial choices. However, there are considerable challenges in accessing objective financial data. In the following section, we discuss strategies and highlight these challenges using a $N = 1$ case study in accessing and processing financial data from an individual with BD.

3.1. Methods

We conducted a case study involving a single individual, also a coauthor, who experienced a relapse into a hypomanic state lasting between 2017 and 2018. This episode was the individual's first substantial symptomatic period since their 2008 diagnosis of BD type II. In the following section, we discuss the process of collecting, pre-processing, and analyzing granular financial data across symptomatic and non-symptomatic periods.

3.1.1. Label creation

To determine symptomatic periods during the study duration, we used the National Institute of Mental Health's Life-Chart Method (NIMH-LCM) (24). Prior work has validated the use of NIMH-LCM for longitudinal assessment of BD (25). Our coauthor collaborated with their family members to complete a Retrospective NIMH-LCM Self-Rating form for a period spanning 2017–2018. Periods of hypomania were logged as mild, moderate, or severe following the form's criteria. Depressive symptoms were also measured on a similar scale.

During the study period, the co-author and their family members recalled that the hypomanic symptoms had escalated slowly with no sudden variations in mood over time. They chose to represent these slower variations in mood by marking their responses to the Retrospective NIMH-LCM on a monthly basis. They began by accounting for a small number of landmark events serving as anchor points in relation to any additional events they could recall. They supplemented their dialogue with emails, photographs, and SMS logs to produce additional date ranges where symptoms were present. These steps resulted in two periods of mild mania lasting 5 months in total, and five periods of moderate mania lasting 9 months in total. They did not identify any period with depressive symptoms during the study duration.

3.1.2. Extracting data from financial statements

The banking institution associated with this case study does not provide a mechanism for access to structured financial data. As such, we had to manually recreate a structured financial dataset by programmatically extracting tabular text content of digitized financial statements (i.e., PDF files). We collected a total of 24 monthly statements as multipage PDF files spanning the study duration. Each PDF file contained transaction-level detail for all open accounts.

We first extracted the tabular text content of each statement into comma-separated text files using Camelot (26), an open-source Python package for PDF text extraction. We manually inspected output from Camelot to ensure accuracy. Specifically, we compared a series of 25 transaction dates, descriptions, and amounts against the original PDF statement, all of which were extracted correctly by Camelot. The formatting of the original PDF files was read with a similarly high degree of accuracy. While the text output was technically accurate, formatting issues prevented its immediate use. Camelot preserved all pagination and line breaks of the original statement, resulting in cases where a single transaction could span multiple rows, a single account could span multiple files, and multiple accounts could be contained within a single file.

Accounting for the variety of these exceptions required a non-trivial amount of manual preprocessing in order to produce a dataset where each row contained a single, complete transaction. We used Microsoft Excel to visually inspect

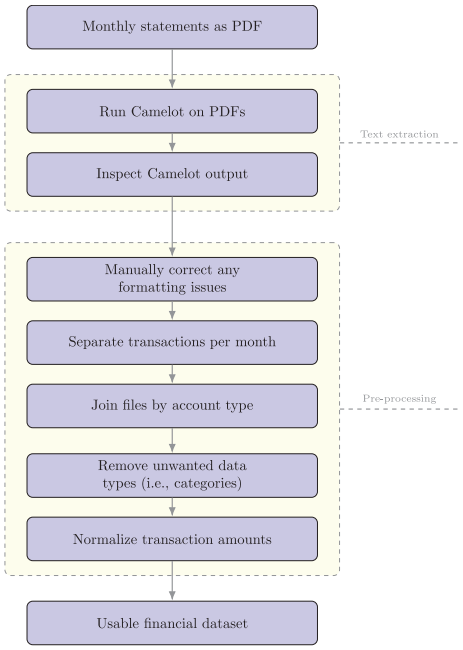

FIGURE 1
Workflow to create structured financial data from PDF statements.

and clean all Camelot output. We then manually merged transactions spanning multiple rows into a single row. During the data processing, we retained account labels (i.e., checking and credit). We used these labels to separate transactions in a single file per account per month. We then joined these files in sequence to produce a single file per account containing transaction dates, descriptions, and transaction amounts. We also sort the transactions by date. Figure 1 summarizes the pre-processing steps.

We then used pandas (27)—an open source Python package—to transform information in comma-separated files into a structured dataset. To preserve privacy, we removed all text-based transaction descriptions. Additionally, we normalized the transaction values between 0 and 1 per account. We hypothesized that problematic financial behaviors will manifest in expenditure transactions. As such, we focused on expenditure and omitted income-based transactions from our analysis. This resulted in creating a single *privacy-preserving* dataset containing normalized expenditure transactions with labels indicating originating account but containing no personally identifiable information nor actual amount.

We performed our analysis based on this combined set using two strategies. The first strategy focused on analyzing details on transaction volume for all accounts, labeled by account, and grouped by date. The second strategy used detail on transaction counts to analyze by frequency of expenditure, again labeled by account, and grouped by date.

3.1.3. Analysis

We conducted an exploratory visual analysis of these two datasets to identify trends in frequency and amount of expenditure. Transactions were resampled on a daily, weekly, and monthly basis. For each of these resampled periods, we visualized transaction frequency and volume, visually shading each figure to indicate symptomatic severity following the NIMH-LCM labels generated earlier. We define transaction frequency as the number of transactions occurring in a given time period, and transaction volume as the normalized, aggregated dollar-value of purchases made during a time period.

To account for unbalanced group sizes and the possibility of unequal variances, we used a one-way Welch analysis of variance to determine how expenditure varied between symptomatic phases. Each transaction was marked as "mild," "moderate," or "none" to account for symptom severity using the NIMH-LCM labels. We also performed a one-way Welch ANOVA after merging "mild" and "moderate" periods together. For each one-way Welch ANOVA test, a Games-Howell *post-hoc* test was performed to produce confidence intervals for the differences between group means and test for statistical significance.

We expected to see occasional increases in transaction frequency, hypothesizing that these would correspond to periods of hypomania and mania. Following methods outlined in Tovanich et al. (23), we explored potentially impulsive, short-term increases to spending frequency by calculating a burstiness parameter.

$$B = \frac{r-1}{r+1},$$

where $r = \sigma/\tau$. Here, τ is the average and σ is the standard deviation of interevent timing for all transactions. Here, a burstiness parameter of 1 indicates spikes, 0 indicates randomness, and -1 indicates stability. We calculated burstiness for the entire dataset. We also calculated burstiness for each symptomatic phase after grouping transactions by symptomatic intensity. We tested for significant differences in burstiness between phases using a one-way Welch ANOVA test with a Games-Howell *post-hoc* test.

3.2. Findings

3.2.1. Exploratory visual analysis

Our visual analysis of transaction volume and frequency during approximated periods of manic symptoms yielded several points of interest. In Figure 2, several noticeable spikes in expenditure from the primary transaction account are visible during periods of moderate manic symptoms, shaded in yellow. As Figure 3 shows, two periods of mild manic symptoms, shaded in green, are marked by an increase to credit expenditure. A mixture of risky spending dynamics occurs during late 2018

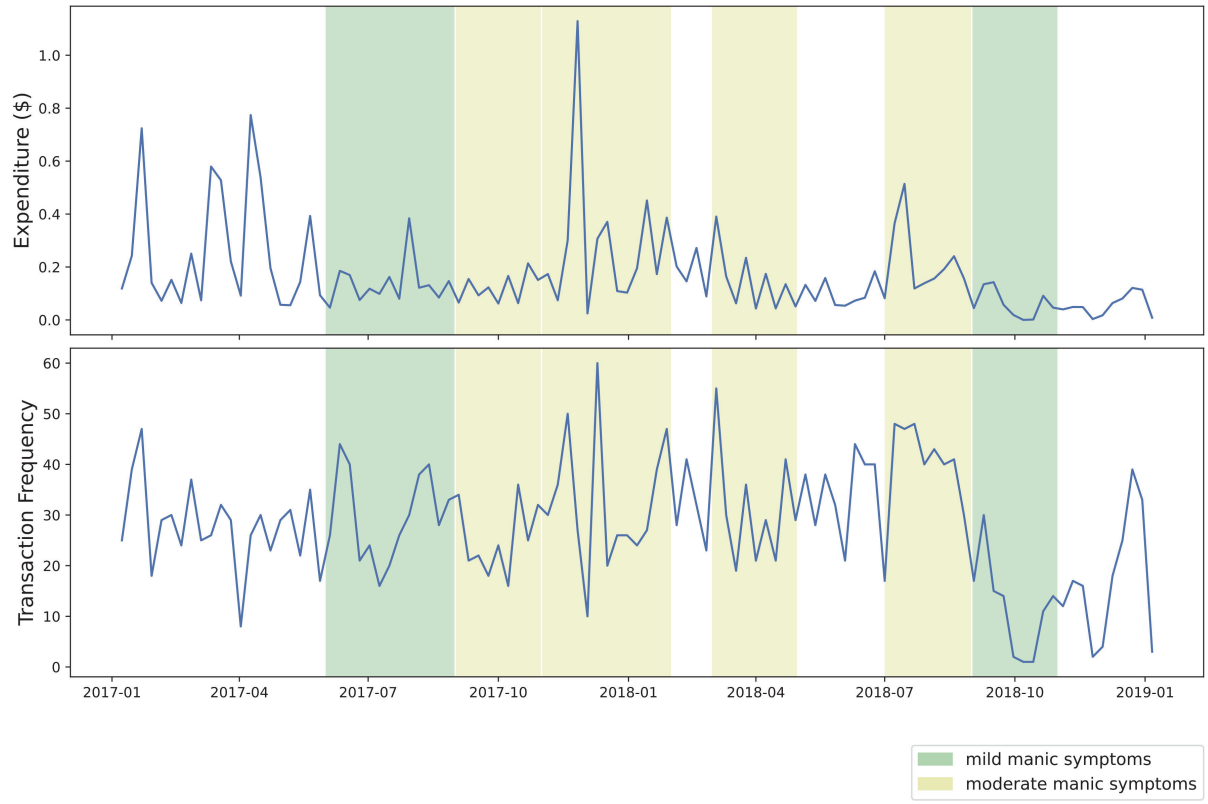

FIGURE 2
Weekly expenditure from transaction account.

where a marked decrease in cash-based spend coincides with an increase of credit spend in Figure 3.

This case study intentionally excluded income-related transactions, assuming that many individuals have more control over expenditure than income. Although income-related data could provide interesting features (i.e., irregular income as a sign of partial employment or the stressors of gig work), we chose to focus our case study on the relationship between mood episodes and expenditure, including the use of credit. The complicated relationship between debt and BD is illustrated in Figure 4, where the percentage of credit-based transactions is shown to increase as this symptomatic episode concludes.

3.2.2. Quantitative analysis

There were a total of 3,373 transactions in our analysis. We grouped daily transaction data (frequency and volume) by intensity of symptoms ("mild," "moderate," "none") and calculated the mean for each group (see Table 1). Our Welch ANOVA test yielded no statistically significant differences in transaction frequency $[F_{(1,\,362)} = 0.31, p = 0.734]$ or volume $[F_{(2,\,362)} = 1.93, p = 0.147]$. With transactions grouped by the presence or absence of any symptoms, we calculated the mean for each group (see Table 2). No statistically significant differences were noted in transaction frequency $[F_{(1,\,558)} = 0.35, p = 0.556]$ or volume $[F_{(1,\,431)} = 0.19, p = 0.665]$ between groups.

Following Tovanich et al. (23), we calculated two different burstiness parameters: B_D with the difference in days between each transaction as the interval, and B_C with the number of consecutive days without any expenditure as the interval (see Table 3). In our dataset, we found B_D to be 0.402 and B_C to be −0.148. Note that a burstiness parameter of 1 indicates spikes, 0 indicates randomness, and -1 indicates stability. No statistically significant differences between symptomatic periods and non-symptomatic periods were found using either interval calculation.

These non-significant results may be due in part to the small sample size of this case study or to the sparse labels available to our dataset. This analysis could be improved with additional longitudinal financial data for comparison. If mood

FIGURE 3
Weekly expenditure from credit account.

logs or specific health records were available, symptomatic periods could be labeled with greater accuracy. The presence of more detailed transaction data and metadata (i.e., timestamps, purchase locations) could significantly improve future analyses.

3.2.3. Unsupervised anomaly detection

In addition to the above statistical testing, we implemented an unsupervised isolation forest algorithm (28) using scikit-learn (29) to detect potential anomalies in weekly spending frequency throughout the analysis period without relying on data labels. This isolation forest algorithm requires a user-defined "contamination parameter"—the estimated percentage of anomalous data points in a dataset. We chose a contamination parameter of 0.05 following a visual inspection of values ranging from 0.01 to 0.1. Setting this parameter value below 0.05 resulted in only the most extreme fluctuations in spending frequency being identified. Larger values resulted in the detection of an increasing number of false positives. Taking this approach to parameter selection was possible with existing background knowledge of the case study.

Figure 5 displays outlier periods of spending frequency detected by the isolation forest algorithm. In this case, both high and low frequency periods were identified by the algorithm. The majority of the higher frequency spending identified by the algorithm occurred during self-reported periods of moderate mania. Additionally, an anomalous decline in spending frequency was identified following the conclusion of this episode. Our approach shows the potential to identify relationships between financial behaviors and mental health states. A potential early warning system could integrate these results with other predictive approaches to form a more complete representation of risky financial behavior.

4. Discussion

In this paper, our goal is to explore financial "biomarkers" indicative of mental health issues as well as identifying opportunities and challenges in developing financial data-driven interventions. Toward this goal, we conducted a $N = 1$ case study to collect, process, and analyze financial transactions from an individual with BD to illustrate the potential, pragmatic considerations, and factors to consider when working with objective financial data. From this dataset, we have identified potentially risky financial behavioral dynamics across

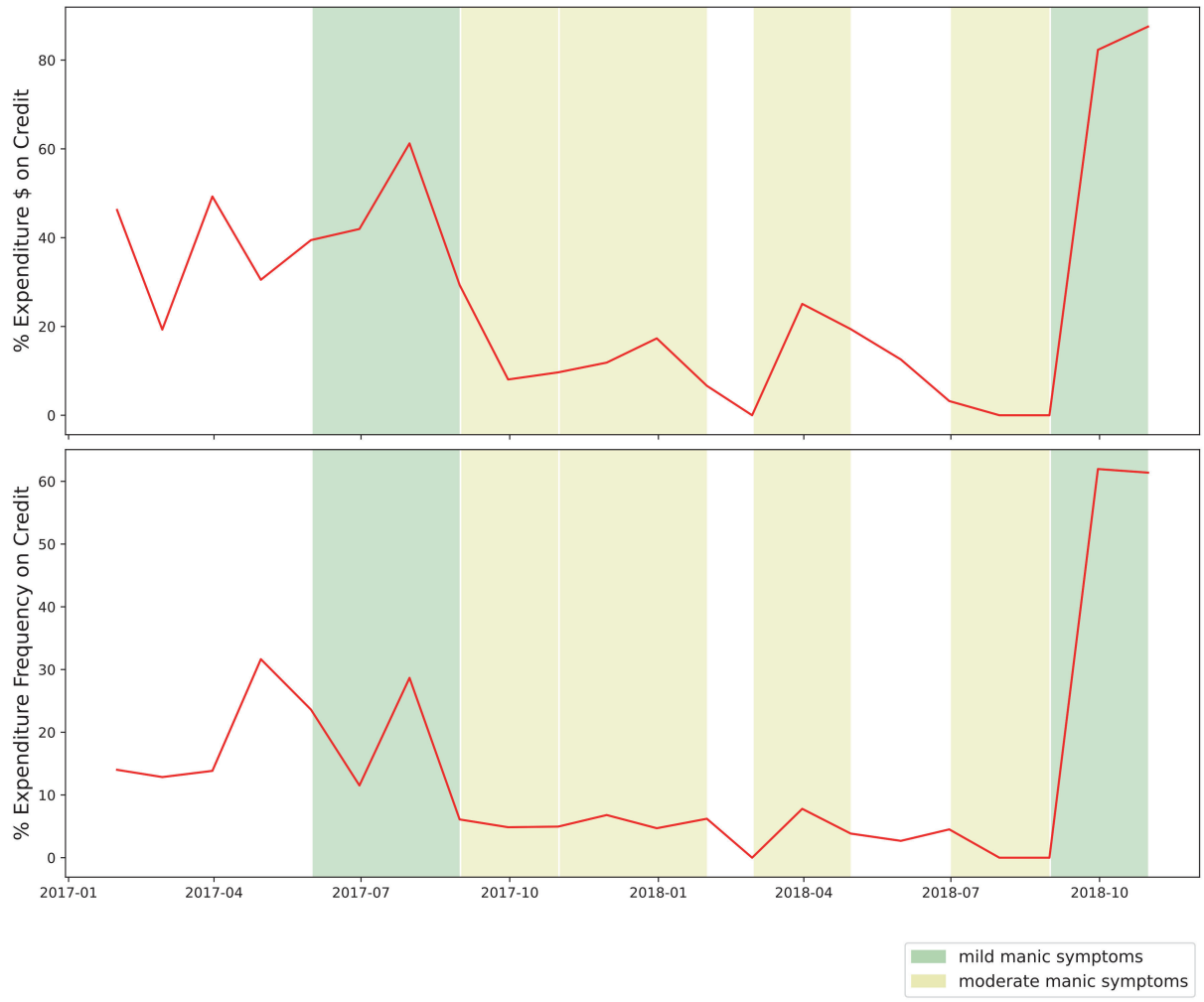

FIGURE 4
Monthly percentage of purchases made on credit.

TABLE 1 Normalized mean daily amounts for transaction frequency and volume by symptom intensity.

	None	Mild	Moderate
Frequency	5.23	5.49	5.34
Volume	0.05	0.05	0.04

TABLE 2 Normalized mean daily amounts for transaction frequency and volume by presence or absence of symptoms.

	None	Sympomatic
Frequency	5.23	5.39
Volume	0.05	0.04

symptomatic phases (e.g., ratio of increased credit spending). However, we have not found any statistically significant trends, which might be due to the small sample size (i.e., only 3,373 transactions spanning two instances of mild mania and five instances of moderate mania in total). Furthermore, our findings and analyses are limited to this $N = 1$ case study, which might not generalize to individuals with BD or other mental illnesses.

TABLE 3 Mean burstiness parameters for periods with and without the presence of symptoms.

	None	Symptomatic
Mean B_D	0.40	0.38
Mean B_C	-0.43	-0.53

However, our approach illustrates the potential benefits and challenges of accessing, working with, and collecting ground truth associated with objective financial data. In the following sections, we will first discuss potentials for using objective financial data to detect early warning signs and interventions focusing on financial stability for individuals with mental illnesses. Specifically, there are open research opportunities to develop technological interventions that leverage real-time, objective data to reduce risky financial decision-making for both individuals and institutions. We then describe existing technical, legal, and ethical challenges as well as providing a broad research agenda to address these challenges. Lastly, we will discuss how to promote equity and prevent discrimination for FinTech focusing on mental health support.

4.1. Early-warning prediction

Considering the complex relationship between mental health and finances, FinTech systems can help users learn about both their financial behaviors and their mental health status throughout time. Over the course of use, such systems could help predict when different mood states are about to happen and serve as an early warning for upcoming spending sprees. Conversely, the financial behaviors detected by a FinTech system could be used to predict the onset of future mood episodes. This would not only help users manage their mental health and financial decisions, but also explain the connections between the two (30).

It is reasonable to believe that a system capable of early detection of symptomatic behaviors could have provided actionable feedback to our coauthor at the time of their episode, potentially affording improved self-awareness of risky behaviors and of illness states. This is especially salient considering the length of this episode and subtlety of its symptoms. Although the harms of this episode may be clear in hindsight, they remained opaque to the individual and several mental health professionals at the time. Objective financial data may have provided a strong signal of relapse.

However, we faced a number of challenges to present this case study in its present form. We believe many of these challenges represent requirements to operationalize objective financial data analysis in research settings. Central to these challenges is the theme of timely access to objective, structured financial data in machine-readable and human-readable formats. Considering our retrospective retrieval, our ability to obtain financial statements as PDF depended on the technical capacities and policies of the banking institution. If a longer period of time had elapsed beyond this symptomatic episode, the data retrieval steps might require processing paper-based records (i.e., digital data retrieval might be available only for a certain time period in some financial institutes). This would seriously hinder data collection at scale in retrospective studies.

Financial data collection methods will vary depending on the data source. At the scale of an $N = 1$ case study, we could afford to manually process PDF statements. Larger studies may require utilizing more scalable data sources such as structured, delimited text, or API-based access. Even at our scale, the use of PDF statements constrained our analysis steps. Many printed or digitized financial statements only list transactions by date. A finer-grained temporal analysis could yield valuable insights into behavioral changes during symptomatic states (e.g., how spending patterns change during disruptions to sleep). Additionally, our calculation of burstiness parameters was limited to a daily time-grain. More specific timestamps could yield useful, actionable insights into more specific patterns of spiky, rapid spending during symptomatic periods. Mood monitoring apps have also been found to relate to more formal measures of mood in BD, suggesting that they might have utility in measuring mood (31). Linking such mobile based measures with live real-time measures of finances could therefore prove useful in the future.

Although reliance on retrospective patient self-report remains common in the field of psychiatry, our analysis was limited by a lack of specific labeling. Access to health records, granular self-reported mood logs, or sleep data would each individually improve our capacity to assess these financial data in more specific terms. In the following section, we will describe future research directions to identify early-warning signs by leveraging real-time, objective financial data.

4.1.1. Research directions

Research in this domain remains limited by the scarcity of structured financial data to individuals and especially to trusted third-parties. The possibility of performing this research at scale depends on a standardized, permissioned technical infrastructure for electronic access by individuals, and authorized third-parties. Although the technical infrastructure currently exists to support these aims, regulations are under development which may clarify the role of authorized third-party access to consumer financial data.

4.1.1.1. Better access to financial data

As evidenced in our case study, objective financial data varies widely in quality and availability based on the data storage and access management practices of the individual's banking institution. These variations pose a number of technical challenges, especially when considering how best to operationalize and scale data collection. Financial data can be made available in different formats including as paper or PDF documents, as structured text files, or using software-based

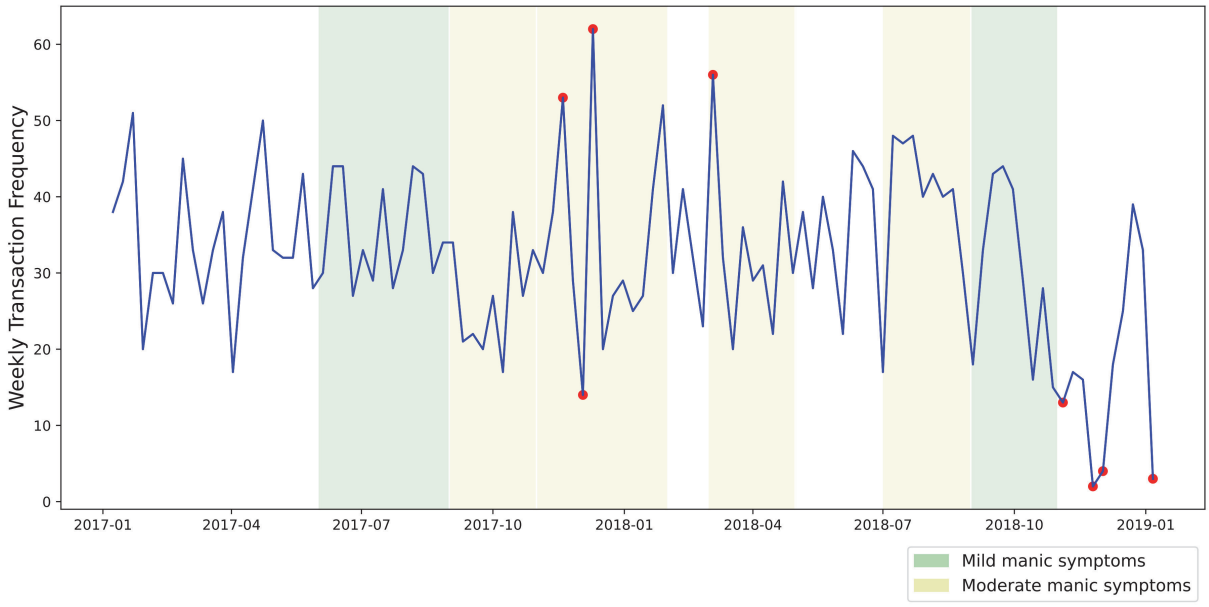

FIGURE 5
Outlier periods of spending frequency as identified by an unsupervised isolation forest algorithm.

approaches known as application programming interfaces, or APIs. We assess each of these types of source material by the quality and ease of access they each afford as shown in Table 4.

Document-based source material (printed or PDF financial statements) imply substantial preprocessing steps to render printed transaction-level detail as structured, digitized data. Transactions are likely logged on a daily basis. Metadata such as location or transaction category will likely be absent. Conditional inclusion or exclusion of transactions will likely only be possible after completion of preprocessing steps. Retrieval will likely involve manual processes and make real-time analysis impossible.

Files exported as delimited plain-text (e.g., from a web-based banking portal) are structured, but may require preprocessing steps to account for variations in institutional output. These may include more granular transaction-level data which is simpler to retrieve on a recurring basis. It may be possible to conditionally include or exclude specific transactions without revealing them to the researcher. Real-time analysis may be possible, but likely depends heavily on access protocols of the institution. Additional third-party metadata may be merged with these types of files.

Overall, API access [e.g., Plaid (11)] supported by financial institutes provides real-time transaction-level financial data and allow for simple, permissioned, and revocable third-party access.

4.1.1.2. Integrating behavioral and contextual datastreams with financial data

Future research should also explore how to integrate multimodal behavioral and contextual datastreams with financial data. This can lead to granular, context-specific understanding of how mental health symptoms can manifest in idiosyncratic financial behaviors. For example, mood data collected using ecological momentary assessments (EMA) can be combined with financial transaction data. This can help to establish the relationship between emotional states and financial decision-making.

Financial data can also be combined with passively sensed data. Prior work has used behavioral and contextual data including location information to assess stability in BD (32, 33). Combining such data streams with financial transaction information can provide valuable insights to researchers, clinicians, and individuals seeking tools for self-management and reflection. Furthermore, the availability of wearable devices and their ability to collect granular health data can complement financial data to predict early warning signs. For example, by leveraging data from wearable sleep-trackers, we can identify how circadian and sleep related factors might impact financial decision making and risk taking.

TABLE 4 Factors to consider when collecting objective financial data.

Source	Data granularity (e.g., transaction level, day level)	Processing difficulty (e.g., manual to automatic)	Metadata available?	Data structure	Possibility of real-time access?	Retrieval difficulty
PDF Statement	Least granular, daily time-grain	Extremely difficult to scale	No. Would need to manually incorporate third-party data after preprocessing	Unstructured, requires preprocessing	Non-realtime. Impossible to obtain in realtime	Manual process, difficult.
Retrospective structured data	Depends on data source	Possible to scale, especially retrospective studies	Possible, but likely requires third-party data	Possible, but likely requires preprocessing steps	Likely not realtime, but may be possible	Depends on source and analysis needs
API integration	Per transaction	Immediately scalable	Possible, given institutional capacity	Structured, machine- and human-readable data	Possible, given institutional support	Simple

4.2. Opportunities for financial data-driven interventions

This use of objective financial data opens up new opportunities for financial intervention systems. In this section, we suggest future directions on different ways to intervene on point-of-purchase decisions and incorporate cognitive financial behavioral therapy activities to help improve overall financial well-being.

4.2.1. Point of purchase interventions

Online shopping has become streamlined and mostly frictionless. With auto-saved credit card information or one-step payment functions, as well as contactless purchasing, consumers spend less time on their purchasing decisions. As a result, steps in the purchasing process that would otherwise be an opportunity for the buyer to reconsider their decisions are often removed (34). While this lack of friction broadly impacts all users, this is particularly problematic for those prone to impulsive spending. Adding friction in online spending process can lead to harm reduction—both at an individual level and for banking institutions themselves. For instance, some UK banks have already added "positive friction" to help customers prevent gambling (35). Future interventions could help address impulsive spending and promote more mindful purchasing by adding increasing levels of friction with flexible settings. In other words, we can introduce friction into the process of purchasing based on the user's changing situational needs or depending on their current mood state.

To start, friction can be reintroduced into online purchasing, such as forcing the reentry of payment cards or adding two-factor authentication. While this ultimately does not prohibit the user from purchasing, it adds additional time to the activity which may slow down their decision process, make the user reconsider, and potentially choose not to follow through. *In-situ* reevaluation prompts could be provided to the user to help with informed decision making. Systems could ask the user questions such as "are you sure you want to buy X for $Y?" to provide an opportunity to consider the potential impact of making this purchase. Constraints could also be added that items must sit in a virtual shopping cart for a certain amount of time (e.g., 24 or 48 h) before the user can initiate payment—especially for very large purchases. Lastly, users could proactively set the system to restrict certain purchases when a mood episode is detected to prevent spending sprees. This could be tailored to the user by restricting purchases containing chosen keywords, by a specified cost threshold, or by time of day (e.g., limiting late-night impulse purchases). These restrictions could then be lifted under specific and predetermined conditions, such as detecting a mood episode has passed or having the user go through an attention or cognition-based assessment.

4.2.2. Psychological financial therapies

In collaboration with clinicians, we can also explore how to leverage existing psychological therapies such as Cognitive Behavioral Therapy (CBT) and Cognitive-Behavioral Financial Therapy (CBFT) (36) to target impulsive spending behaviors and deliver them digitally. Cognitive Behavioral Therapy has been delivered online and has been shown to be effective for depression and anxiety (37, 38). Cognitive Behavioral Therapy often involves individuals identifying and challenging unhelpful thinking patterns, as well as facing fears they are avoiding. With CBFT, this could be linked to financial difficulties, such as understanding the thinking patterns leading to impulse spending and trying to face finance-related fears. When incorporated with FinTech systems, users may be able to reflect on their behavior over time, recognize important patterns, and develop coping skills to manage their spending. Users could be prompted to evaluate and reflect on their behaviors during a set window and consider the context in which they made those financial decisions. Mindfulness has also been shown to predict later compulsive spending in BD (15), so incorporating this and helping individuals be more mindfully aware of the thoughts and feelings which might come before impulsive spending could be useful.

Future research should focus on developing just-in-time interventions to support *in-situ* and real-time decision making. For instance, if the system senses an increase in spending, the user could be pushed a suggestion to move funds to a savings account or make them temporarily inaccessible to them to preemptively reduce potential harm. Users could also be provided alternative activities, such as calling a friend or going for a walk, to prevent problematic behaviors in situations where spending is motivated by boredom or a want to elevate their current mood. In this case, these alternative activities could provide an outlet for their current needs and motivations behind spending that does not involve spending money. In a recent study, Richardson et al. (39) developed "Space from Money Worries"—an online CBT-based intervention designed to tackle the link between financial difficulties and mental health problems, including impulsive spending. Their data showed reduced symptoms of depression and anxiety, as well as lowered financial distress (39). Linking such interventions with objective financial data could help determine whether they have a real-world impact on spending patterns and other financial behaviors.

4.3. Challenges for FinTech to support mental health

While objective financial data opens up these opportunities to support financial well-being and intervene on problematic behaviors, there are a number of challenges to address through future research, including user agency, privacy, and equity concerns.

4.3.1. Personal autonomy and user agency

The use of financial data for mood state prediction and intervention presents several open research questions for personal autonomy and user agency. Given that sensitive data can be used to limit or control users' behavior, it is important to ask who has access to and ownership of the data, as well as the power to make decisions for the user—whether that is the system itself or their care partners. These systems can also empower users to take back control of their financial well-being in the long run. However, given the nature of impulsive spending and different mood states, there are times when user agency has to be limited or handed-off to other to support their overall goals of harm-reduction.

Simply put, some users might not want to step back from the ledge on their own when faced with impulsive spending opportunities, especially when in specific mood states. Some users may have an awareness of such behavioral patterns about themselves, but others may not. As previous work has shown, those who are long aware of this, often take it upon themselves to proactively curb high volume spending (15). For these users, maintaining control of their own financial management systems may be sufficient, as they can set up appropriate spending limitation settings on their own when they anticipate needing them. Other high-risk users may be less aware of their mood states and their relationship to spending sprees. These users may benefit from giving up some of their agency in return for more support. This could take the form of the system acting on their behalf in certain circumstances, like if it senses mood episode onset, or transferring some of the decision-making power to other people.

4.3.1.1. Research directions

Moving forward, we should work to understand personal risk thresholds to better determine what type of intervention is most suitable for individual users. This personal risk threshold could be used to determine whether other people should be involved in users' financial decisions, and what level of friction is the best fit to slow down their impulsive spending habits. An ideal system should strive for a balance between autonomy, constraint, and individual risk profiles. To work out this ideal balance, future work should be oriented around the following questions: What level of friction is appropriate and effective? For whom? And who decides this? What level of autonomy is needed and when? Our overall goal should be to establish how we can help promote financial stability for vulnerable individuals while preserving their personal autonomy as much as possible.

4.3.1.2. Supporting shared and collaborative decision making

Previous work has leveraged open banking data to notify pre-selected care partners of different financial events (e.g., low balance or high-dollar alerts) (40) to improve financial well-being. For those with higher risk thresholds, one could argue that some users might benefit from more active third-party involvement, including the delegation of power to transact and the disclosure of financial information. In this case, care partners could play a more active role in decision making and co-managing patient finances. For instance, a payment system could be set to require care partner approval before significant purchases are authorized.

A collaborative approach can help address some of overarching agency concerns. By using a more collaborative system, control can be distributed across a team of individuals when user agency needs to be limited. This would involve working within their larger social support network, rather than transferring financial decision-making power to one individual. In this case, primary users would work with their support networks—clinician, family, or care partners—to make a preemptive plan of action for specific situations. This could leverage existing clinical practices (e.g., *advanced directives*) (41) to define the conditions in which the users agency in financial decisions are limited. Ideally, mental capacity would be assessed prior to big purchases or taking out loans, as when individuals are in a manic mood episodes they may legally lack the mental capacity to consent to those decisions. However, this approach could dictate what decisions can be made on their behalf, by whom, for how long, and under what circumstances this plan goes into effect. While this type of agreement is traditionally a legal document drafted between patients and clinicians, it could then be carried out and reinforced through FinTech system architecture.

4.3.2. Privacy

For both institutional and individual level interventions, it is crucial to consider privacy risks and concerns with using objective banking data for financial intervention and ensure the systems we develop remain in the users' best interest (12). Privacy also needs to be considered in how the outputs from this system are presented, used, and potentially shared with others. The main goal here should be to find the right balance between providing the most useful, accurate information to benefit the user while also maintaining as much of their privacy as possible. In some circumstances, users may want to share their data with other members of their social support networks. For this, it could be beneficial to grant information access to others at different levels of granularity, based on their roles in the larger system. For example, a therapist could have access to long-term behavioral data for clinical purposes. Whereas, a friend or family member may only be provided "need to know" information or a task by task basis, should the user need assistance with different financial decisions.

Given the amount of social stigma that surrounds both mental health conditions and poor finances, the data used to support these systems is highly sensitive and personal to users. If users are uncomfortable with the amount of data used, how their privacy is protected, and the amount of trust given to the system, they are unlikely to use the system long enough to see any personal benefits. To support user adoption and long term use, it is highly important that we ensure privacy to maintain user trust in the intervention system. Future work is needed to understand user acceptance and the privacy trade-offs involved with using personal data within this context.

4.3.2.1. Establish privacy and acceptance concerns

Through qualitative work we can gather a more in-depth understanding of the range of privacy concerns different users may have with using objective, real-time data to monitor, and intervene on their spending behaviors. This work could be carried out through interviews with individuals with mental health issues, their family members and care partners, and their clinical support. By collecting data from multiple stakeholders, we can gain in depth insights into concerns and expectations when it comes to developing FinTech to support mental health issues. Furthermore, providing a prototype for users to explore during these sessions can also prompt a more thorough discussion on privacy, trust, and shared decision making. This could give users a more concrete idea of the kind of data involved, but also what users stand to get out of the system.

4.3.2.2. Establish data sharing policies

Additional work could look at the wider context in which these systems might be used, for the purpose of establishing ideal data sharing policies. Focus groups with primary users and members of their social support networks could be conducted to gather a better understanding of these concerns and expectations of all parties involved. Similarly, scenario-based data collection could gather insight on the specific situations where users would be comfortable sharing their data with others and at what granularity. These next steps would provide a better sense of privacy tradeoffs that users may work through and help design future FinTech systems in alignment with their specific privacy needs.

4.3.2.3. Privacy preserving analysis

Recent technical developments may allow for financial mental health research to be conducted while preserving the privacy of participants. Federated learning, for example, creates the possibility of "training statistical models over remote devices or siloed data centers, such as mobile phones or hospitals, while keeping data localized" (42). In this case, a user's financial data could be securely stored and modeled on their own smartphone

without ever being exposed to third-parties. Further, users who wish to grant third parties access to their financial data using API-based methods have a high level of control over what is shared. Third party access could be restricted to certain accounts or types of transactions, to transactions within certain date ranges, or based on certain financial conditions being met. An individual's trusted care partner could have a different level of access than their accountant, for example. Perhaps most importantly, an individual sharing their financial data using API-based methods also has the option to revoke this access.

4.3.3. Equity and preventing discrimination

FinTech systems can operative on either an institutional or individual level, each providing users differential access to resources. Therefore, equity and discrimination should also be considered when developing interventions. We should prioritize making these systems more accessible to primary users—those who need them for help with their own finances, by promoting digital access and increased financial citizenship and limiting possible problematic use.

4.3.3.1. Institutional vs. individual approaches

With an institutional approach, financial health interventions can intervene at the point of individual transactions and control overall money outflow from the user's bank account. These efforts could reduce harm for the user, such as decreasing their likelihood of defaulting on loans or going into bankruptcy. This could also prevent banks from granting loans to those who are not in a state, financially and psychologically, to take on these high-risk financial decisions. This helps the individual avoid negative financial consequences of defaulting on these loans in the future, which is also a significant incentive for the bank itself (43), who would otherwise not see repayment.

Conversely, individual-level FinTech systems could provide assistance outside the confines of existing banking institutions and potentially help a wider range of users. Rather than relying on financial transaction data from banking institutions, an individual-level system could instead use online purchasing data or other alternative sources. An individual-level system could then provide financial cognitive behavioral therapies (36) reinforced through system architecture, involve existing social support networks to help the user with financial decisions and meet behavior change goals—outside the confines of banking institutions.

4.3.3.2. Equity and discrimination

Previous work in this space has largely focused on institutional approaches. The lack of individual-level options limits who can benefit from them. While institutional level interventions involving banks can help promote good money habits, this is only accessible to those with existing financial citizenship, who already have the financial means to maintain a traditional bank account. Focusing solely on institutional-level interventions helps those with privilege of existing banking access avoid future bankruptcies, foreclosures, defaulting on loans, or other dire financial situations—potentially leaving out those in the most need (44).

Individual-level interventions can also present similar concerns when data or control is shared or handed off to others. Choosing these third-party allies may be a difficult decision for users to make. Some may feel obligated to choose those who are closest to them, like a parent or a partner, who may expect to be given this role, even if the user does not feel comfortable with it. Others may lack significant relationships or experience strained relationships, leaving them with no or few options for trusted support. These scenarios may lead users to hand over control to those who may not use it in their best interest. Additional work is needed to uncover the range of challenges that may present in this context, as well as how to better support users in the process of choosing and maintaining their financial allies.

Future work is needed to address institutional and individual equity concerns. At an institutional level, it is important to consider the bank's role in the overall system. This could mean limiting how much of this personal data is accessible to banks to only the minimum amount necessary for the intervention to function as designed. Shifting too much control to banks could give them the power to assume all Fintech users lack the ability to make their own financial decisions, regardless of individual circumstances or current mood state, and deny opportunities unjustly. More research is needed to understand the ideal role for banking institutions within the wider system and how to balance the needs of both the institution and individual users. Future work should also expand on individual-level options to provide more equitable systems that operate independently from banking institutions. Improving access to financial data for individuals would take us one step closer to this, as open financial data is currently limited, especially in the United States.

5. Conclusion

Mental illness and financial instability are often linked with each other. Financial woes can be detrimental to mental health and problematic decision making during symptomatic periods can lead to long-term financial ruin. Recent studies have explored the bidirectional relationship between mental illnesses and financial instability. However, they have been mostly limited to self-reported data, which might not provide a complete picture due to recall bias and coarse sampling methods. This lack of granular understanding is also a serious barrier toward developing effective, just-in-time interventions to

support financial stability for individuals with mental illnesses. In recent years, there has been an increasing focus on open and accessible financial data (e.g., Open Banking API). Several third-party tools and platforms now provide access to transaction and payment data across different financial institutes. The resultant granular and (near) real-time access to financial data can help to identify nuanced relationships between financial (in)stability and mental health issues as well as developing personalized, just-in-time interventions. However, there are considerable challenges before we can use objective financial data for mental health support.

In this paper, we aim to explore opportunities in identifying financial "biomarkers" and intervention strategies for individuals with mental illnesses and document their associated challenges for future research. We have identified potentially risky financial behavioral dynamics across symptomatic phases (e.g., ratio of increased credit spending). While we have not found statistically significant trends nor our findings are generalizable beyond this case, our approach provides an insight into the challenges of accessing objective financial data. Based on our findings, we have also explored potential intervention strategies. Furthermore, we have described technical, ethical, and equity challenges in developing financial data-driven assessment and intervention methods, as well as providing a broad research agenda to address these challenges. We believe that being able to leverage objective, personalized financial data in a privacy-preserving and ethical manner will lead to a paradigm shift in mental health care.

Data availability statement

The data supporting the conclusions of this article will be made available by the authors upon request.

Ethics statement

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

JBl led the overall direction and planning of the project. JBr processed and analyzed the data. JBl and JBr led the manuscript writing process. MM, TR, and SA helped in editing the manuscript. All authors participated in the data analysis plan.

Conflict of interest

Author TR has been paid as a consultant and receives royalties from a software company for developing an intervention around financial difficulties and mental health. Author TR also acts as an advisor to a financial technology company for which he receives shares.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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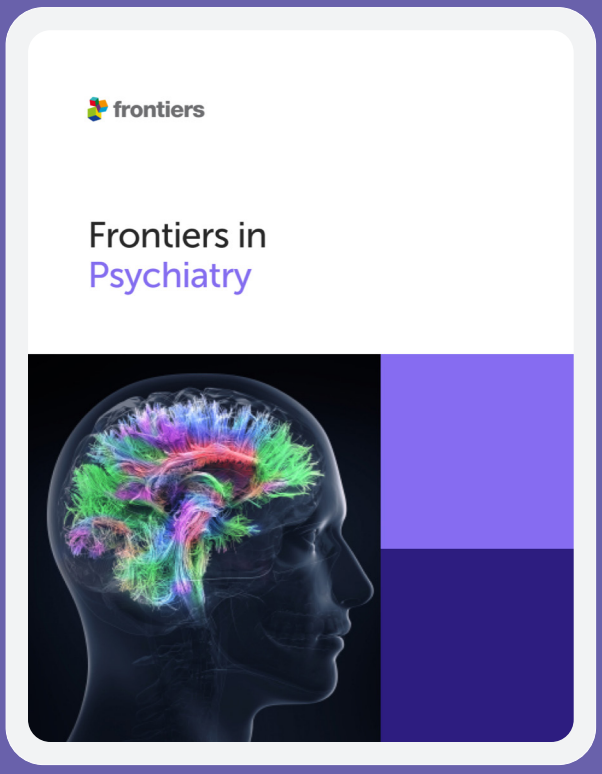

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